



Hexcel 8552 IM7 Unidirectional Prepreg 190 gsm & 35%RC Qualification Material Property Data Report

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**Prepared by:
Kristin Marlett**

**Reviewed by:
Yeow Ng and John Tomblin**

**Approved By: Ed Hooper (FAA DER)
Accepted By: Wichita FAA ACO Office (pending)**

Testing Facility:

National Institute for Aviation Research
Wichita State University
1845 N. Fairmount
Wichita, KS 67260-0093

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1. Introduction

1.1 Scope

The test methods and results described in this document are intended to provide basic composite properties essential to most methods of analysis and are consistent with MIL-HDBK-17-1F—Composite Materials Handbook for Polymer Matrix Composites. This report contains material property data of common usefulness to wide range of projects. The lamina and laminate material property data have been generated with FAA oversight through FAA Special Project Number SP4652WI-Q and also meet the requirements of NCAMP Standard Operating Procedure NSP 100; the test panels, test specimens, and test setups have been conformed by the FAA and the testing has been witnessed by the FAA. However, the data may not fulfill all the needs of any specific company's programs; specific properties, environments, laminate architecture, and loading situations may require additional testing.

The use of NCAMP material and process specifications do not guarantee material or structural performance. Material users should be actively involved in evaluating material performance and quality including, but not limited to, performing regular purchaser quality control tests, performing periodic equivalency/additional testing, participating in material change management activities, conducting statistical process control, and conducting regular supplier audits.

The applicability of NCAMP material property data, material allowables, and specifications must be evaluated on case-by-case basis by aircraft companies and certifying agencies. NCAMP assumes no liability whatsoever, expressed or implied, related to the use of the material property data, material allowables, and specifications.

This report contains material property data only. Statistical analysis of the data including the calculations of b-basis values is given in a separate report, Hexcel IM7 Unidirectional Prepreg 190 gsm 35% RC Qualification Statistical Analysis Report NCP-RP-2009-028 N/C. The qualification material was procured to NCAMP Material Specification NMS 128/2 Rev - Initial Release dated February 6, 2007. The panels were fabricated by Cessna Aircraft Company, 5800 E Pawnee, Wichita, KS 67218. The qualification test panels were cured in accordance with Baseline Cure Cycle (M) of NCAMP Process Specification NPS 81228 Rev A Initial Release June 7, 2007. The NCAMP Test Plan NTP 1828Q1 Rev B was used for this qualification program.

Part fabricators that wish to utilize the material property data, allowables, and specifications may be able to do so by demonstrating the capability to reproduce the original material properties; a process known as equivalency. More information about this equivalency process including the test statistics and its limitations can be found in Section 6 of

DOT/FAA/AR-03/19 and Section 8.4.1 of MIL-HDBK-17-1F. The applicability of equivalency process must be evaluated on program-by-program basis by the applicant and certifying agency. The applicant and certifying agency must agree that the equivalency test plan along with the equivalency process described in Section 6 of DOT/FAA/AR-03/19 and Section 8.4.1 of MIL-HDBK-17-1F are adequate for the given program.

Aircraft companies should not use the data published in this report without specifying NCAMP Material Specification NMS 128/2. NMS 128/2 have additional requirements that are listed in its prepreg process control document (PCD), fiber specification, fiber PCD, and other raw material specifications and PCDs which impose essential quality controls on the raw materials and raw material manufacturing equipment and processes. *Aircraft companies and certifying agencies should assume that the material property data published in this report is not applicable when the material is not procured to NMS 128/2.* NMS 128/2 is a free, publicly available, non-proprietary aerospace industry material specification.

The data contained in this report is intended for general distribution to the public, either freely or at a price that does not exceed the cost of reproduction (e.g. printing) and distribution (e.g. postage). Data that is subject to export control regulations, if any, will be made available on a case by case basis through written request to NCAMP.

1.2 Symbols Used

ν_{12}^t	major Poisson's ratio, tension
$\mu\epsilon$	micro-strain
E_1^c	compressive modulus, longitudinal / warp direction
E_1^t	tensile modulus, longitudinal / warp direction
E_2^c	compressive modulus, transverse / fill direction
E_2^t	tensile modulus, transverse / fill direction
F_1^{cu}	ultimate compressive strength, longitudinal / warp direction
F_1^{tu}	ultimate tensile strength, longitudinal / warp direction
F_2^{cu}	ultimate compressive strength, transverse / fill direction
F_2^{tu}	ultimate tensile strength, transverse / fill direction
SBS	short beam strength
ν_{12}^c	major Poisson's Ratio, compression
ν_{21}^c	minor Poisson's Ratio, compression
$F_{12}^{s5\% \text{ strain}}$	in-plane shear strength at 5% strain
$F_{12}^{s0.2\%}$	in-plane shear strength at 0.2% offset
G_{12}^s	in-plane shear modulus

Superscripts

c	compression
cu	compression ultimate
s	shear
su	shear ultimate
t	tension
tu	tension ultimate

Subscripts

1 – axis; longitudinal / warp direction
(parallel to warp direction of reinforcement)

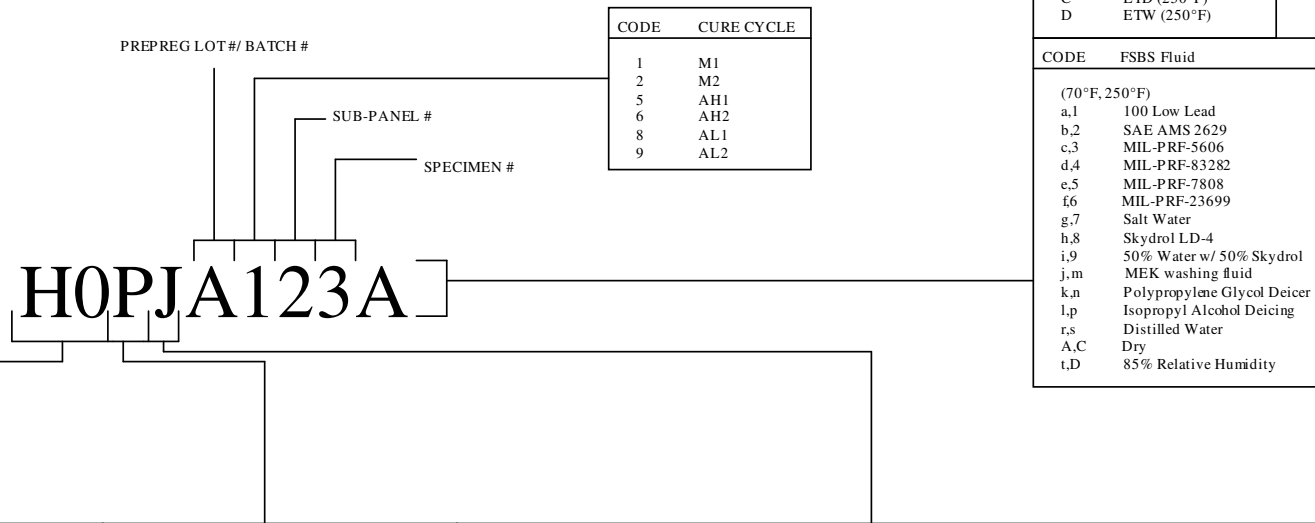
2 – axis; transverse / fill direction
(parallel to fill direction of reinforcement)
12; in-plane

Acronyms and Definitions

ASTM	American Society for Testing and Materials
B – Basis	95% lower confidence limit on the tenth population percentile
CV	Coefficient of variation
CTD	cold temperature dry
CPT	cured ply thickness
ETD	elevated temperature dry
ETW	elevated temperature wet
Gr/Ep	graphite/epoxy
norm	normalized
RTD	room temperature dry
SACMA	Suppliers of Advanced Composite Materials Association
SRM	SACMA Recommended Method
CPT	cured ply thickness
Tply	thickness divided by the number of plies provides the thickness average per specimen
wet	specimen with an “equilibrium” moisture content
T, RH	temperature, relative humidity

1.3 NIAR– Hexcel Specimen Naming Format

NIAR NCAMP— HEXCEL SPECIMEN NAMING FORMAT



CODE	COMPANY	CODE	MATERIAL SYSTEM	CODE	TEST METHOD	CODE	TEST METHOD
HO	Hexcel	P	(H1 1) AS4 PW Fab Prepreg 38% RC-1628	J	(WT) Warp Tension/ (LT) Longitudinal Tension (D3039)	Q	(SBS) Short Beam Shear (D2344)
HT	ATK Space Systems	I	(H1 2) IM7 Uni Prepreg 38% RC-1828	U	(FT) Fill Tension/ (TT) Transverse Tension (D3039)	q	(SBS1) Laminate Short Beam Shear
HB	Bell Helicopter	U	(H1 3) AS4 Uni Prepreg 35% RC-1128Q1	L	(WC) Warp Compression/ (LC) Longitudinal Compression (D6641)		
HE	Boeing Helicopters			Z	(FC) Fill Compression/ (TC) Transverse Compression (D6641)		
HF	Cessna Aircraft Company			N	(IPS) In Plane Shear (D3518)		
HG	General Atomics						
HW	Goodrich			A	(UNT1) Un-notched Tension Layup 1 (D3039)	1	(SSB1) Single Shear Pin Bearing Layup 1 (D5961)
HU	Gulfstream Aerospace			B	(UNT2) Un-notched Tension Layup 2 (D3039)	2	(SSB2) Single Shear Pin Bearing Layup 2 (D5961)
HY	Hawker Beechcraft			C	(UNT3) Un-notched Tension Layup 3 (D3039)	3	(SSB3) Single Shear Pin Bearing Layup 3 (D5961)
HJ	Israel Aircraft Industries			W	(UNC1) Un-notched Compression Layup 1 (D6641)	P	(UNT0) Un-notched Tension 0/90 (D3039)
HL	Lockheed Martin Aeronautics			X	(UNC2) Un-notched Compression Layup 2 (D6641)	R	(UNC0) Un-notched Compression 0/90 (D6641)
HN	Northrop Grumman			Y	(UNC3) Un-notched Compression Layup 3 (D6641)		
HP	Spirit AeroSystems			D	(OHT1) Open Hole Tension Layup 1 (D5766)	4	(FHT1) Filled Hole Tension Layup 1 (D6742)
				E	(OHT2) Open Hole Tension Layup 2 (D5766)	5	(FHT2) Filled Hole Tension Layup 2 (D6742)
				F	(OHT3) Open Hole Tension Layup 3 (D5766)	6	(FHT3) Filled Hole Tension Layup 3 (D6742)
				G	(OHC1) Open Hole Compression 1 (D6484)	7	(FHC1) Filled Hole Compression Layup 1 (D6484)
				H	(OHC2) Open Hole Compression 2 (D6484)	8	(FHC2) Filled Hole Compression Layup 2 (D6484)
				I	(OHC3) Open Hole Compression 3 (D6484)	9	(FHC3) Filled Hole Compression Layup 3 (D6484)
				K	(CAI1) Compression After Impact Layup 1 (SRM-2R)		
				M	(ILT1) Interlaminar Tension Layup 1 (D6415)		
				T	(MOL) Material Operating Limit Short Beam Shear (D2344)		
				V	(MOLC) Material Operating Limit Open Hole Compression (D2344)		

1.4 References

ASTM Standards

All testing was in accordance with nationally recognized standards, methods and procedures. Specific mechanical property test methods applicable to the test program in this document include:

- ASTM D2344/D2344M-00e1 – Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- ASTM D3039/D3039M-08 – Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials
- ASTM D3518/D3518M-94(2007) – Standard Test Method for In-Plane Shear Response of Polymer Matrix Composite Materials by Tensile Test of a $\pm 45^\circ$ Laminate In-Plane Shear Strength and Modulus
- ASTM D5766/D5766M-02a – Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates
- ASTM D5961/D5961M-08 – Standard Test Method for Bearing Response of Polymer Matrix Composite Laminates
- ASTM D6415-06ae1 – Standard Test Method for Measuring the Curved Beam Strength of a Fiber-Reinforced Polymer-Matrix Composite
- ASTM D6484/D6484M-04 – Standard Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates
- ASTM D6641/D6641M-01e1 – Standard Test Method for Determining the Compressive Properties of Polymer Matrix Composite Laminates Using a Combined Loading Compression (CLC) Test Fixture
- ASTM D6742/D6742M-02 – Standard Practice for Filled-Hole Tension and Compression Testing of Polymer Matrix Composite Laminates
- ASTM D7136/D7136M-07 – Standard Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event
- ASTM D7137/D7137M-05e1 – Standard Test Method for Compressive Residual Strength Properties of Damaged Polymer Matrix Composite Plates

1.5 Methodology

1.5.1 Process Definition

For each combination of test, batch and condition, the specimens were selected from minimum two separate panels cured separately as shown in Figure 1-1 unless otherwise specified.

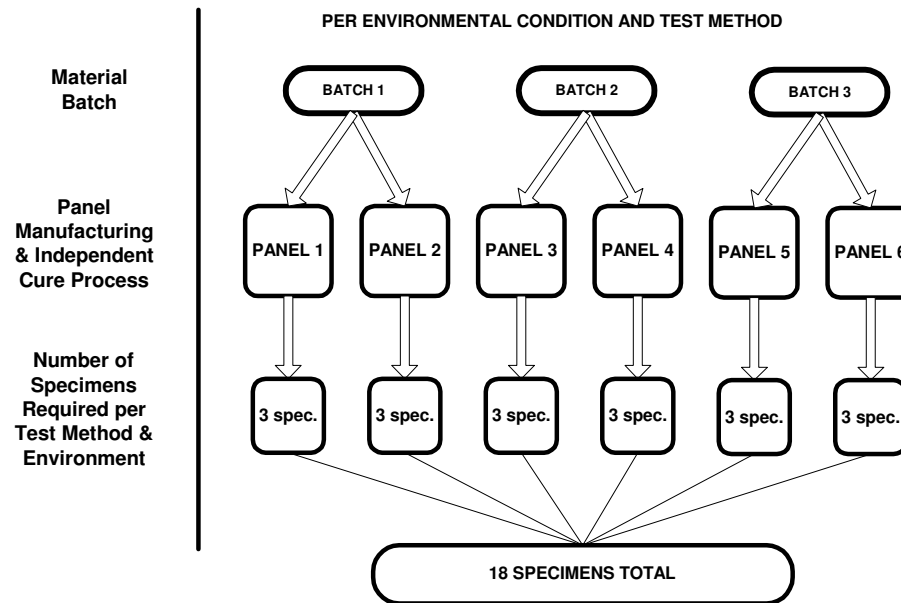


Figure 1-1: Specimen Selection Methodology

All panels were fabricated in accordance with NCAMP Process Specification NPS 81228 “M” Cure Cycle.

In order to facilitate individual specimen trace ability, individual specimen numbering and/or skewed lines were written or drawn across each sub-panel as shown in Figure 1-2.

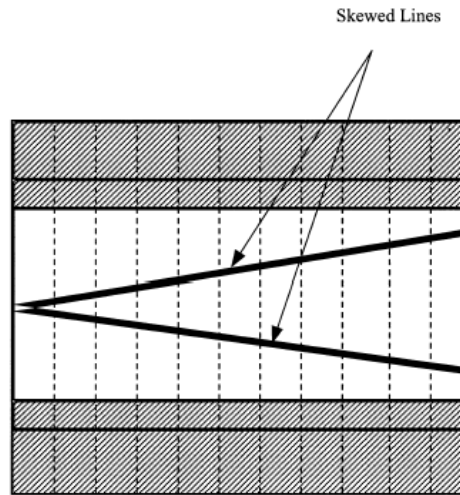


Figure 1-2: Specimen Traceability Line

For the single shear bearing tests, the ASTM D5961 was used with one of the pairs of specimens replaced by a steel fixture. The configuration is shown in Figure 1-3 below.

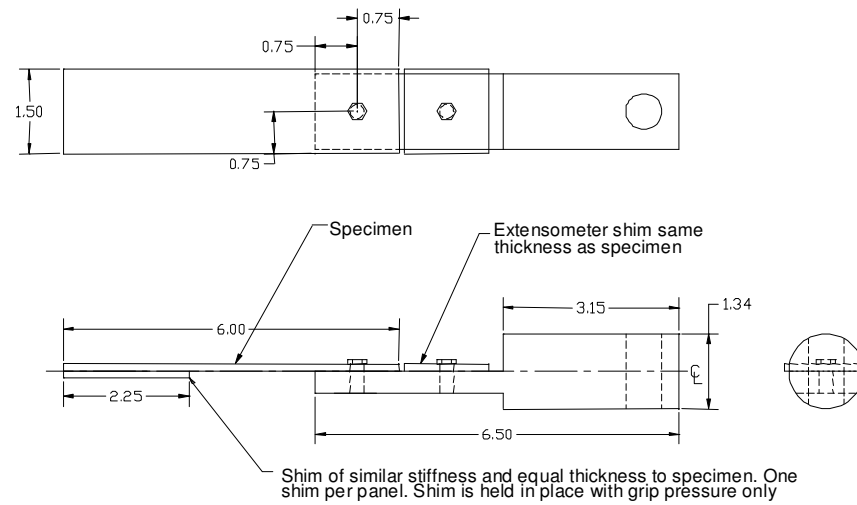


Figure 1-3: Modified ASTM D5961 (Single Shear Bearing) Specimen and Loading Arrangement

1.5.2 Specimen & Testing Details

1.5.2.1 Tabbings

Tabs were used on all Longitudinal Tension specimens.

1.5.2.2 Specimen Dimensions & Test Configuration

For filled-hole and bearing tests, the hole diameter was 0.25 in -0.000 +0.003 in. For filled-hole tension tests, the fasteners were installed to 85±5 in-lb. For filled-hole compression and bearing tests, the fasteners were installed to 30±5 in-lb. Fasteners were installed after moisture conditioning.

Unless otherwise specified, a tolerance of ±5 °F applied to all temperature conditions specified in this document.

For filled-hole and bearing tests, the hole diameter was 0.25 in -0.000 +0.003 in. The following fasteners were used:

- 1) NASM 21297-04003 bolts with MS 21084 nuts and MS21206 washers for FHT and FHC
- 2) NASM 21297-04013 bolts with MS 21084 nuts and MS21206 washers for SSB

1.5.3 Test Matrix

The tables below show the lay-ups and test matrices used for lamina and laminate level testing.

Layup	Test Type and Direction	Property	Number of Batches x No. of Panels x No. of Specimens			
			Test Temperature/Moisture Condition			
			CTD	RTD	ETD	ETW
[0] ₆	ASTM D3039 0° Tension	Strength, Modulus and Poisson's Ratio	3x2x3	3x2x3		3x2x3
[0] ₁₄	ASTM D6641 0° Compression (Note 1)	Modulus	3x2x3	3x2x3	3x2x3	3x2x3
[90] ₁₁	ASTM D3039 90° Tension	Strength and Modulus	3x2x3	3x2x3		3x2x3
[90] ₁₄	ASTM D6641 90° Compression (Note 1)	Strength and Modulus	3x2x3	3x2x3		3x2x3
[0/90] _{2S}	ASTM D3039 0° Tension (see Note 2)	Strength and Modulus	3x2x3	3x2x3		3x2x3
[90/0/90] ₅	ASTM D6641 0° Compression (see Note 1 & 2)	Strength and Modulus	3x2x3	3x2x3	3x2x3	3x2x3
[45/-45] _{3S}	ASTM D3518 In-Plane Shear	Strength and Modulus	3x2x3	3x2x3		3x2x3
[0] ₃₄	ASTM D2344 Short Beam	Strength	3x2x3	3x2x3	3x2x3	3x2x3

Note 1: Back-to-back strain gages are needed on the first two specimens of each environment. If no buckling is observed, the remaining modulus specimens will require a strain gage on one side of the specimens only. An appropriate extensometer may be used in place of strain gage.

Note 2: Derive the 0° lamina tensile or compressive strength $F_{0^\circ \text{ plies}}^u$ as follows

$$F_{0^\circ \text{ plies}}'' = BF \frac{P^f}{wh}$$

$$BF = \frac{E_1 [V_0 E_2 + (1 - V_0) E_1] - (\nu_{12} E_2)^2}{[V_0 E_1 + (1 - V_0) E_2] [V_0 E_2 + (1 - V_0) E_1] - (\nu_{12} E_2)^2}$$

Where BF = Back-out factor obtained using linear classical lamination theory

P^f = Peak load carried by the test specimen (usually at failure)

w = specimen gage width, mm [in.]

h = specimen gage thickness, mm [in.]

V_0 = fraction of 0° plies in the cross-ply laminate (1/2 for $[0/90]_n$ s and 1/3 for $[90/0/90]_n$)

E_1 = axial tensile or compressive stiffness of 0° plies, from an average of all batches

E_2 = transverse tensile or compressive stiffness of 0° plies, from an average of all batches

ν_{12} = major Poisson's ratio of 0° plies, from an average of all batches

Table 1-1: Lamina Level Test Matrix

Table 1-2 below summarizes the laminate level tests carried out. The layup angles 0° , 45° , -45° , and 90° refer to the orientation of the warp/longitudinal fiber direction. The laminate stacking sequences in this program are not specific to any design. Therefore, careful consideration should be given to the validity of properties derived from this program based on the design specific laminates in a structure to be certified.

Table 1-2 also emphasizes those properties and test condition combinations believed to constitute the worst case, which in general is cold dry for tension and hot wet for compression and other matrix dominated properties.

(%0°/±45°/90°) Actual Test Type	Test Type and Layup (5)	Property	Number of Batches x Number of Panels x Number of Test Specimens		
			Test Temperature/Moisture Condition		
			CTD	RTD	ETW
(25/50/25 - QI) UNT1	ASTM D3039 Un-notched Tension [45/0/-45/90]2S	Strength & modulus	3x2x3	3x2x3	3x2x3
(10/80/10) UNT2	ASTM D3039 Un-notched Tension [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & modulus	3x2x3	3x2x3	3x2x3
(50/40/10) UNT3	ASTM D3039 Un-notched Tension [0/45/0/90/0/-45/0/45/0/-45]S	Strength & modulus	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) UNC1	ASTM D6641 Un-notched Compression (4) [45/0/-45/90]2S	Strength & modulus		3x2x3	3x2x3
(10/80/10) UNC2	ASTM D6641 Un-notched Compression (4) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & modulus		3x2x3	3x2x3
(50/40/10) UNC3	ASTM D6641 Un-notched Compression (4) [45/0/90/0/-45/0/45/0/-45/0]S	Strength & modulus		3x2x3	3x2x3
(25/50/25 - QI) SBS1	ASTM D2344 Short Beam (specimens may be taken from panels designed for (25/50/25 - QI) CAI1)	Strength		3x2x3	3x2x3
(25/50/25 - QI) OHT1	ASTM D5766 Open Hole Tension (1) [45/0/-45/90]2S	Strength	3x2x3	3x2x3	3x2x3
(10/80/10) OHT2	ASTM D5766 Open Hole Tension (1) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(50/40/10) OHT3	ASTM D5766 Open Hole Tension (1) [0/45/0/90/0/-45/0/45/0/-45]S	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) FHT1	ASTM D6742 Filled Hole Tension (2) [45/0/-45/90]2S	Strength	3x2x3	3x2x3	3x2x3
(10/80/10) FHT2	ASTM D6742 Filled Hole Tension (2) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(50/40/10) FHT3	ASTM D6742 Filled Hole Tension (2) [0/45/0/90/0/-45/0/45/0/-45]S	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) OHC1	ASTM D6484 Open Hole Compression (1)(4) [45/0/-45/90]3S	Strength		3x2x3	3x2x3
(10/80/10) OHC2	ASTM D6484 Open Hole Compression (1)(4) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength		3x2x3	3x2x3
(50/40/10) OHC3	ASTM D6484 Open Hole Compression (1)(4) [0/45/0/90/0/-45/0/45/0/-45]S	Strength		3x2x3	3x2x3
(25/50/25 - QI) FHC1	ASTM D6484 Filled Hole Compression (2) [45/0/-45/90]3S	Strength		3x2x3	3x2x3

(10/80/10) FHC2	ASTM D6484 Filled Hole Compression (2) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength		3x2x3	3x2x3
(50/40/10) FHC3	ASTM D6484 Filled Hole Compression (2) [0/45/0/90/0/-45/0/45/0/-45]S	Strength		3x2x3	3x2x3
(25/50/25 - QI) SSB1	ASTM D5961 Single Shear Bearing (3) (6) [45/0/-45/90]2S	Strength & Deformation		3x2x3	3x2x3
(10/80/10) SSB2	ASTM D5961 Single Shear Bearing (3) (6) [45/-45/0/45/-45/90/45/-45/45/-45]S	Strength & Deformation		3x2x3	3x2x3
(50/40/10) SSB3	ASTM D5961 Single Shear Bearing (3) (6) [0/45/0/90/0/-45/0/45/0/-45]S	Strength & Deformation		3x2x3	3x2x3
(100/0/0) ILT	ASTM D6415 Interlaminar Tension [0]22	Strength	1x1x6	1x1x6	1x1x6
(25/50/25 - QI) CAI1	ASTM D7136 & D7137 Compression After Impact (1500 in.lb/in) (4) [45/0/-45/90]3S	Strength		1x1x6	

(1) Open-hole configuration: 0.25" hole diameter, 1.5 inch width.

(2) Filled-hole test configuration: 0.25" diameter, see section 2 for fastener callout, 1.5" width.

(3) Single shear bearing test configuration: 0.25: hole diameter, 1.5" width, see section 2 for fastener callout, e/D=3

(4) Back-to-back strain gages needed on the first two specimens of each environment. If no buckling is observed, the remaining modulus specimens will require strain gage on one side of the specimens only. Appropriate extensometer may be used in place of the strain gage.

(5) Loading direction is generally along the 0-degree direction

(6) Use modified ASTM D5961 per Figure 3

(Note that the layup numbers 1, 2 and 3 correspond to those designated as "quasi isotropic," "soft" and "hard" respectively. In addition, the 0°/90° cross-plyed laminates used for the unidirectional materials only are designated "Layup 0").

Table 1-2: Laminate Level Test Matrix

1.5.4 Physical Testing

The properties in Table 1-3 were determined for each panel used for test coupons with the exception of Tg by DMA which were conducted on one laminate per batch from each oven cure conducted where that batch is present. The tests were performed by the National Institute for Aviation Research (NIAR) Composites Laboratory under the supervision of NCAMP.

Property	Condition/Method (Note 1)	Min Replicates per panel
Cured Ply Thickness	ASTM D3171-06	All data from mechanical test specimens
Laminate Density	ASTM D792-00	3
Fiber Volume, % by Volume	ASTM D3171-06(Note 2)	3
Resin Content, % by Weight	ASTM D3171-06(Note 2)	3
Ultrasonic Through Transmission, C-Scan	MIL-HDBK-787A (Note 3)	1
Glass Transition Temperature, Tg by DMA	Dry and Wet – SACMA SRM 18R-94	1 Dry, 1 Wet (Note 4)
Glass Transition Temperature, Tg by TMA	Dry and Wet - HSP-T2 Rev 1 (by TMA)(Note 5)	1 Dry, 1 Wet (Note 4)

- Notes
- 1: Where the applicable standard allows variations in specimen form or test method, the specific parameters to be used will be specified in the test work instructions and reported in the final test report.
 - 2: Method II, except for laminates of materials where actual fiber weight is not accurately known prior to impregnation, as in the case for unidirectional materials. For these materials, in order to verify Method II is accurate, a minimum of 12 samples per batch shall be tested by Method I, Procedure B.
 - 3: Five MHz is preferred for solid laminates. Panels with anomaly should be segregated. Microscopy images may be taken from questionable areas. NCAMP must be involved in the review of all C-scans.
 - 4: Minimum total of 24 dry and 24 wet for each material system.
 - 5: HSP-T2 Revision 1 is a Hexcel non-proprietary test method standard which may be obtained from NCAMP. HSP-T2 is similar but not equivalent to ASTM E2092.

Table 1-3: Physical Testing Matrix

1.5.5 Environmental Conditioning

The following tests were performed by the NIAR Composites Laboratory under the supervision of NCAMP.

Test environments are defined as:

CTD = $-65 \pm 5^{\circ}\text{F}$, dry

RTD = $70 \pm 10^{\circ}\text{F}$, room temperature dry

ETD = $250 \pm 5^{\circ}\text{F}$, dry

ETW = $250 \pm 5^{\circ}\text{F}$, wet (equilibrium moisture content)

Within each test method and test environment, the failure mode was evaluated immediately after each test by an FAA DER. All tested specimens were digitally photographed after each test in order to pictorially document failure modes. Representative photos are included in the CD accompanying this report.

For dry testing, specimens were dried at $160^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for 120 to 130 hours. After drying, specimens were kept in a desiccator until mechanical testing. Alternatively, the specimens may have been left ambient laboratory condition for a maximum of 14 days until mechanical testing (no drying was required if specimens were tested within 14 days

from the date they were cured). Ambient laboratory condition is defined as 70°F±10°F. Since moisture absorption and desorption rate for epoxy is very slow at ambient temperature, there was no requirement to maintain relative humidity levels.

For wet conditioning, specimens were dried at 160°F±5°F for 120 to 130 hours before being conditioned to equilibrium at 160°F±5°F and 85% ± 5%. Effective moisture equilibrium was achieved when the average moisture content of the traveler specimen changed by less than 0.05% for three consecutive readings which are 7 ±0.5 days apart and may be expressed by:

$$\frac{W_i - W_{i-1}}{W_b} < 0.0005$$

where: W_i = weight at current time
 W_{i-1} = weight at previous time
 W_b = baseline weight prior to conditioning

When representative specimens could not be measured to determine the moisture content (due to size, fastener and tab effects), traveler coupons of at least 1" by 1" by specimen thickness and weighing at least 5 grams were used to establish weight gain measurements. If the specimens or traveler coupons pass the criteria for three consecutive readings which are 7 ±0.5 days apart, the specimens were kept in the environmental chamber for up to an additional 60 days. Alternatively, the specimens may have been removed from the environmental chamber and placed in a sealed plastic bag along with a moist cotton towel for a maximum of 14 days until mechanical testing. Strain-gauged specimens were removed from the controlled environment for a maximum of 2 hours for application of gages in ambient laboratory conditions.

1.5.6 Non-ambient Testing

The chamber was of adequate size so that all test fixtures and load frame grips were contained within the chamber.

For elevated temperature testing, the temperature chamber, test fixture, and grips were preheated to the specified temperature. Each specimen was heated to the required test temperature as verified by a thermocouple in direct contact with and taped to the specimen gage section. The heat-up time of the specimen did not exceed 5 minutes, unless otherwise specified in individual test summary sheets. The test was started 2^{+1}_{-0} minutes after the specimen reached the test temperature. During the test, the temperature, as measured on the specimen, was within $\pm 5^{\circ}\text{F}$ of the required test temperature.

For subzero temperature testing, each specimen was cooled to the required test temperature as verified by a thermocouple in direct contact with and taped to the specimen gage section. The test started 5^{+1}_{-0} minutes after the specimen reached the test temperature. During the test, the temperature, as measured on the specimen, was within $\pm 5^{\circ}\text{F}$ of the required test temperature.

1.5.7 Fluid Sensitivity Screening

Table 1-4 lists the requirements for fluid sensitivity screening, which requires ASTM D2344 Short Beam Strength testing on $[0^\circ]_{34}$ lamina level specimens dried at $160^\circ\text{F} \pm 5^\circ\text{F}$ for 120 to 130 hours before being subjected to the conditions indicated, five replicates per fluid and one cure cycle. Specimens were cleaned with a dry towel prior to the tests. In addition to short beam strength, load versus displacement curves were plotted to aid in the identification of matrix/resin softening. Since load versus displacement curves are influenced by test machine and fixture compliance, all the tests were performed with the identical machine and fixture, through a single setup. Experience suggests that for the vast majority of epoxy resins, water is the fluid with the most deleterious effect on properties. Should screening tests for fluid sensitivity indicate this to be the case, further testing of this type might be unnecessary since exposure to water moisture to equilibrium level is an inherent part of the multi batch allowables test program. However, users must evaluate the applicability of the exposure conditions and time on case-by-case basis. For example, the exposure condition for jet fuel may not fully represent the condition of integral fuel tanks.

<u>Extended Contact:</u>	Exposure	Test Condition	Code
100 Low Lead Aviation Fuel	90 days min. @ 70°F±10°F	70°F	FS11RT
	90 days min. @ 70°F±10°F	250°F	FS11ET
SAE AMS 2629 Jet Reference Fluid	90 days min. @ 70°F±10°F	70°F	FS12RT
	90 days min. @ 70°F±10°F	250°F	FS12ET
MIL-PRF-5606 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS13RT
	90 days min. @ 70°F±10°F	250°F	FS13ET
MIL-PRF-83282 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS14RT
	90 days min. @ 70°F±10°F	250°F	FS14ET
MIL-PRF-7808 Engine Oil	90 days min. @ 70°F±10°F	70°F	FS15RT
	90 days min. @ 70°F±10°F	250°F	FS15ET
MIL-PRF-23699, Class STD Engine Oil	90 days min. @ 70°F±10°F	70°F	FS16RT
	90 days min. @ 70°F±10°F	250°F	FS16ET
Salt Water	90 days min. @ 70°F±10°F	70°F	FS17RT
	90 days min. @ 70°F±10°F	250°F	FS17ET
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS18RT
	90 days min. @ 70°F±10°F	250°F	FS18ET
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS19RT
	90 days min. @ 70°F±10°F	250°F	FS19ET
<u>Short Duration Contact:</u>			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	70°F	FS21RT
	90 minutes min. @ 70°F±10°F	250°F	FS21ET
Polypropylene Glycol Deicer (Type I) Mil-A-824 3	90 minutes min. @ 70°F±10°F	70°F	FS22RT
	90 minutes min. @ 70°F±10°F	250°F	FS22ET
Isopropyl Alcohol Deicing Agent (TT-I-735)	48±4 hours @70°F±10°F	70°F	FS23RT
	48±4 hours @70°F±10°F	250°F	FS23ET
<u>Control Tests:</u>			
Distilled Water	90 days min. at 70°F±10°F	70°F	FS31RT
	90 days min. at 70°F±10°F	250°F	FS31ET

Dry	Dry per section 6.1	70°F	FS32RT
	Dry per section 6.1	250°F	FS32ET
85% Relative Humidity	Per section 6.1	70°F	FS33RT
	Per section 6.1	250°F	FS33ET

Table 1-4: Fluid Sensitivity Matrix

1.5.8 Normalization Procedures

Most lamina level tension and compression strength and modulus properties, and all laminate level properties were normalized according to nominal cured ply thickness. Lamina level properties that were not normalized include 90° tensile strength and modulus (unidirectional only), 90° compressive strength and modulus (unidirectional only), in-plane shear strength and modulus, Poisson's ratio, SBS, and ILT. After normalizing, data scatter reduced or remained the same. If data scatter increased significantly after normalizing, the reason was investigated. Wherever properties are normalized, both measured and normalized data were reported.

For unidirectional materials the fiber areal weight cannot be measured in advance of impregnation, hence Method I of ASTM D3171, utilizing acid digestion, will be used to verify the CPT method in accordance with note (2) of Table 1-3.

Method I Fiber Volume (%vol) is 58.535 and Method 2 Fiber Volume (%vol) is 59.405. By comparing Fiber Volume values obtained from Method I and Method II, the values are deemed close enough therefore the FAW is close to the nominal of ~190 gsm. Based on the FAW data from Hexcel (Avg ~190 gsm) and our Method I Phys test data (Avg. void content ~ 0% except for a panel where it is close to 4%) it is appropriate to use the CPT Method for normalization.

The average cured ply thickness of 0.0072 inch has been used as the nominal cured ply thickness (CPT) for normalization purpose. The following normalization formula was used:

Normalized Value = Measured Value x Measured CPT / Nominal CPT.

Prior to beginning the qualification program, we predicted the cured ply thickness value to be 0.0074 inch. However, the as-measured cured ply thickness of the qualification and the equivalency panels are 0.007174 inch and 0.007293 inch, respectively (please review the attached file for cured ply thickness calculation). The grand average of all qualification and equivalency panel thickness is 0.007229 inch. A vote was taken among the material users, and 3 out of the four participating companies agreed that 0.0072 was an acceptable CPT. Not all companies cast a vote.

1.5.9 Conformity

The 3-batch qualification panels have been fabricated according to the requirements of the test plan and conformed by the FAA. The test specimens and test setups have also been conformed by the FAA.

Testing was witnessed by the FAA. Witnessing was delegated to a DER. Mechanical testing was carried out at the National Institute for Aviation Research, Wichita State University. The test setup and procedures were reviewed by NCAMP IAB and NCAMP staff during a facility audit. FAA conformity inspection records and approvals are included in the CD accompanying this report.

1.5.10 Material Pedigree Information

The PMC Data Collection Template includes the material pedigree information required, such as material and batch information, as well as panel fabrication record, environmental conditioning, test equipment, and test procedures. This template in Microsoft Excel file format is included on the CD provided with this report.

2. Test Results

2.1 Lamina Level Test Summary

Prepreg Material: Hexcel Corporation - Hexcel 8552 IM7 Unidirectional NMS 128/2 Material Specification				Hexcel 8552 IM7 Unidirectional Tape Lamina Properties Summary				
Fiber	IM7 unidirectional	Resin	Hexcel 8552					
Tg(dry)	406.43 °F	Tg(wet)	321.41 °F					
PROCESSING:		NPS 81228 "M" Cure Cycle		Tg METHOD DMA (SRM 18-94)				
	Lot 1	Lot 2	Lot 3					
Date of fiber manufacture	01/26/2007	12/25/2006	02/05/2007	Date of testing	1/22/2008 - 3/4/10			
Date of resin manufacture	02/28/2007	01/24/2007	03/01/2007	Date of data submittal	4/5/2010			
Date of prepreg manufacture	02/28/2007	01/24/2007	03/01/2007					
Date of composite manufacture	9/2007 to 10/2007							
LAMINA MECHANICAL PROPERTY SUMMARY								
Data reported as: Normalized & Measured								
(Normalized by CPT= 0.0072 inch)								
CTD Mean		RTD Mean		ETD Mean		ETW Mean		
	Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured
F ₁ ^{tu} (ksi) from LT from UNT0	357.39	353.70	362.69	371.08	---	---	333.50	327.96
	286.78	281.57	324.62	320.79	---	---	346.85	340.46
E ₁ ^t (Msi) of LT	22.57	22.33	22.99	23.51	---	---	24.00	23.77
E (Msi) of UNT0	11.92	11.71	11.99	11.85	---	---	11.94	11.74
ν ₁₂ ^t		0.270		0.316				0.393
F ₂ ^{tu} (ksi)	---	9.60	---	9.29	---	---	---	3.49
E ₂ ^t (Msi) of TT	---	1.46	---	1.30	---	---	---	0.81
F ₁ ^{cu} (ksi) from UNC0	296.49	291.99	248.94	251.13	201.93	199.50	173.00	172.58
E ₁ ^c (Msi) of LC	20.68	20.53	20.04	20.44	20.25	20.00	20.37	20.65
E (Msi) of UNC0	7.75	7.64	7.47	7.52	7.57	7.53	7.74	7.82
ν ₁₂ ^c	---	0.362		0.356		0.374		0.383
F ₂ ^{cu} (ksi) of TC	---	55.31	---	41.44	---	---	---	19.02
E ₂ ^c (Msi) of TC	---	1.53	---	1.41	---	---	---	1.18
ν ₂₁ ^c of TC	---	0.028	---	0.024	---	---	---	0.018
ν of UNC0	---	0.041		0.035		0.030		0.017
F ₁₂ ^{s5%strain} (ksi)	---	---	---	13.22	---	---	---	5.54
F ₁₂ ^{s0.2%} (ksi)	---	11.29	---	7.76	---	---	---	3.31
G ₁₂ ^s (Msi)	---	0.86	---	0.68	---	---	---	0.31
SBS (ksi)	---	21.04	---	17.13	---	11.23	---	8.25

* Derived from cross-ply using back-out factor

Table 2-1: Lamina Summary Data

2.2 Laminate Level Test Summary

Prepreg Material: Hexcel Corporation - Hexcel 8552 IM7 Unidirectional NMS 128/2 Material Specification				Hexcel 8552 IM7 Laminate Properties Summary			
Fiber	IM7 unidirectional	Resin	Hexcel 8552				
Tg(dry)	406.43 °F	Tg(wet)	321.41 °F	Tg METHOD	DMA (SRM 18-94)		
PROCESSING:		NPS 81228 "M" Cure Cycle					
Date of fiber manufacture		Lot 1 01/26/2007	Lot 2 12/25/2006	Lot 3 02/05/2007	Date of testing 1/22/2008 - 3/4/10		
Date of resin manufacture		02/28/2007	01/24/2007	03/01/2007	Date of data submittal 4/5/2010		
Date of prepreg manufacture		02/28/2007	01/24/2007	03/01/2007			
Date of composite manufacture		9/2007 to 10/2007					
LAMINATE MECHANICAL PROPERTY SUMMARY Data reported as: Normalized & Measured (Normalized by CPT= 0.0072 inch)							
	Layup:	25/50/25		10/80/10		50/40/10	
	Test Condition	Normalized	Measured	Normalized	Measured	Normalized	Measured
OHT Strength (ksi)	CTD	57.75	57.28	45.95	45.63	78.75	77.97
	RTD	59.00	58.70	43.65	43.65	86.59	86.63
	ETW	66.97	66.48	38.39	38.34	114.86	113.87
OHC Strength (ksi)	RTD	49.08	48.89	38.80	38.40	63.24	63.36
	ETW	35.52	35.29	25.76	25.57	46.42	46.22
UNT Strength (ksi)	CTD	99.35	98.79	70.22	68.97	174.18	173.12
	RTD	104.69	104.01	67.01	67.08	175.63	176.22
	ETW	112.46	111.50	54.17	53.44	187.43	187.30
Modulus (msi)	CTD	8.35	8.30	5.52	5.42	13.11	13.02
	RTD	8.39	8.34	5.22	5.23	13.15	13.20
	ETW	7.99	7.92	4.47	4.41	13.14	13.15
UNC Strength (ksi)	RTD	87.05	86.95	66.44	67.49	120.84	121.06
	ETW	57.68	57.09	40.61	40.43	79.42	78.79
Modulus (msi)	RTD	7.86	7.86	4.90	4.98	11.90	11.93
	ETW	7.13	7.06	4.10	4.06	11.77	11.66
νUNC	RTD	---	0.334	---	0.587	---	0.423
	ETW	---	0.356	---	0.665	---	0.416
FHT Strength (ksi)	CTD	64.02	63.52	52.25	52.05	80.70	80.53
	RTD	65.87	65.95	48.15	48.08	91.95	91.93
	ETW	70.29	69.52	42.63	42.30	101.26	100.77
FHC Strength (ksi)	RTD	69.19	69.30	54.57	54.25	98.57	98.16
	ETW	51.68	51.61	41.17	40.86	72.79	72.20
LSBS Strength (ksi)	RTD	---	12.13	---	---	---	---
	ETW	---	6.99	---	---	---	---
		---		---	---	---	---
SSB 2% offset Strength Strength (ksi)	RTD	109.89	112.98	114.02	114.20	113.90	113.93
	ETW	88.14	89.88	86.22	86.87	91.67	91.80
ILT Strength (ksi)	CTD	---	11.96	---	---	---	---
	RTD	---	11.04	---	---	---	---
	ETW	---	6.46	---	---	---	---
CAI Strength (ksi)	RTD	31.45	30.96	---	---	---	---

Table 2-2: Laminate Summary Data

2.3 Individual Test Summaries

2.3.1 Longitudinal Tension Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		Tension, 1-axis Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0] ₆					
Resin content:	42.70 % vol						
Fiber volume:	57.30 % vol						
Ply count:	6						
Test method: ASTM D3039-00E ¹		Modulus calculation: linear fit from 1000 to 3000 micro in/in					
Normalized by: 0.0072 in CPT							
		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F, 85%	
Source code		HFJXXXXB		HFJXXXXA		HFJXXXXD	
		Normalized	Measured	Normalized	Measured	Normalized	Measured
F₁^{tu} (ksi)	Mean	357.39	353.70	362.69	371.08	333.50	327.96
	Minimum	325.69	322.58	325.68	340.31	244.53	241.83
	Maximum	379.97	378.95	392.32	401.22	373.23	366.86
	C.V.(%)	3.53	3.70	4.43	4.10	11.64	10.73
	No. Specimens	22		18		18	
	No. Prepreg Lots	3		3		3	
E₁^t (Msi)	Mean	22.57	22.33	22.99	23.51	24.00	23.77
	Minimum	21.85	21.74	20.71	22.78	23.22	22.69
	Maximum	23.22	22.97	23.94	24.38	25.58	26.17
	C.V.(%)	1.72	1.65	3.53	2.27	2.32	2.92
	No. Specimens	22		18		29	
	No. Prepreg Lots	3		3		3	
v₁₂^t	Mean	0.270		0.316		0.393	
	No. Specimens	22		18		25	
	No. Prepreg Lots	3		3		3	

2.3.2 Transverse Tension Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				<div>Tension, 2-axis Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [90]₁₁</div>					
Resin content:	40.08 % vol	Comp. density:				1.58 [g/cc]			
Fiber volume:	59.92 % vol								
Ply count:	11								
Test method: ASTM D3039-00		Modulus calculation: linear fit from 1000 to 3000 micro in/in							
Normalized by: NA									
		CTD (B)	RTD (A)	ETW(D)					
Test Temperature [°F]		-65F	70F	250F					
Moisture Conditioning		dry	dry	equilibrium					
Equilibrium at T, RH				160 F,85%					
Source code		HFUXXXXB	HFUXXXXA	HFUXXXXD					
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured
F₂^u (ksi)	Mean		9.60		9.29		3.49		
	Minimum		7.88		7.40		3.22		
	Maximum		11.19		10.80		3.91		
	C.V.(%)		8.30		9.47		6.28		
	No. Specimens		21		20		19		
	No. Prepreg Lots		3		3		3		
E₂^t (Msi)	Mean		1.46		1.30		0.81		
	Minimum		1.42		1.21		0.76		
	Maximum		1.53		1.40		0.89		
	C.V.(%)		2.04		3.37		5.15		
	No. Specimens		21		20		19		
	No. Prepreg Lots		3		3		3		

2.3.3 Longitudinal Compression Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG						<div>Compression, 1-axis Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0]₁₄</div>			
Resin content: 38.92 % vol		Comp. density: 1.58 [g/cc]							
Fiber volume: 61.08 % vol									
Ply count: 14									
Test method: ASTM D6641M-01 ^{E1}						Modulus calculation: linear fit from 1000 to 3000 micro in/in			
Normalized by: 0.0072 in CPT									
		CTD (B)		RTD (A)		ETD		ETW (D)	
Test Temperature [°F]		-65F		70F		250F		250F	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH								160 F,85%	
Source code		HFILXXXXB		HFILXXXXA		HFILXXXXC		HFILXXXXD	
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured
E^c (Msi)	Mean	20.68	20.53	20.04	20.44	20.25	20.00	20.37	20.65
	Minimum	17.80	19.05	18.19	19.80	18.37	19.37	15.61	17.67
	Maximum	22.39	21.29	22.43	20.89	22.12	20.92	24.76	26.64
	C.V.(%)	6.40	2.94	6.81	1.55	5.76	2.31	9.00	8.49
	No. Specimens	20		15		17		35	
	No. Prepreg Lots	3		3		3		3	
v₁₂^c	Mean	0.362		0.356		0.374		0.383	
	No. Specimens	20		15		17		35	
	No. Prepreg Lots	3		3		3		3	

2.3.4 Transverse Compression Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG						Compression, 2-axis Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [90]₁₄			
Resin content:	39.62 % vol	Comp. density:		1.58 [g/cc]					
Fiber volume:	60.38 % vol								
Ply count:	14								
Test method: ASTM D6641-01e1		Modulus calculation: linear fit from 1000 to 3000 micro in/in							
Normalized by: NA									
		CTD (B)		RTD (A)		ETW (D)			
Test Temperature [°F]		-65F		70F		250F			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFIZXXXB		HFIZXXXA		HFIZXXXD			
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured
F₂^{cu} (ksi)	Mean	55.31		41.44		19.02			
	Minimum	50.41		38.79		16.78			
	Maximum	61.39		46.40		20.70			
	C.V.(%)	5.19		4.50		5.47			
	No. Specimens	20		20		25			
	No. Prepreg Lots	3		3		3			
E₂^c (Msi)	Mean	1.53		1.41		1.18			
	Minimum	1.26		1.25		1.03			
	Maximum	1.70		1.66		1.35			
	C.V.(%)	7.64		6.63		7.99			
	No. Specimens	20		20		9			
	No. Prepreg Lots	3		3		3			
v21	Mean	0.028		0.024		0.018			
	No. Specimens	20		20		9			
	No. Prepreg Lots	3		3		3			

2.3.5 In-Plane Shear Properties

Material:		HEXCEL 8552 - IM7 UNI PREPREG		<div>In-Plane Shear</div> <div>Gr/ Ep</div> <div>HEXCEL 8552 - IM7 UNI</div> <div>PREPREG</div> <div>[+45/-45]3s</div>							
Resin content:	41.07 % vol		Comp. density: 1.57 [g/cc]								
Fiber volume:	58.93 % vol										
Ply count:	12										
Test method:	ASTM D3518-94										
Modulus calculation: linear fit from 2000 to 6000 micro in/in											
Normalized by: NA											
				CTD (B)		RTD (A)		ETW (D)			
Test Temperature [°F]				-65F		70F		250F			
Moisture Conditioning				dry		dry		equilibrium			
Equilibrium at T, RH								160 F,85%			
Source code				HFINXXXB		HFINXXXA		HFINXXXD			
				Normalized		Measured		Normalized		Measured	
<div>F₁₂^{s5% strain}</div> <div>(ksi)</div>						13.22		5.54			
						12.85		5.18			
						13.61		5.95			
						1.60		3.38			
				No. Specimens		12		19			
				No. Prepreg Lots		3		3			
<div>F₁₂^{s0.2%}</div> <div>(ksi)</div>				11.29		7.76		3.31			
				10.78		7.48		3.05			
				11.66		8.28		3.63			
				2.10		2.81		4.63			
				21		16		20			
				3		3		3			
<div>G₁₂^s</div> <div>(Msi)</div>				0.86		0.68		0.31			
				0.81		0.65		0.28			
				0.89		0.73		0.34			
				2.90		3.27		4.51			
				21		16		20			
				3		3		3			

Note: All CTD specimens failed to reach 50,000 microstrain

2.3.6 Unnotched Compression 0 Properties

Material:		HEXCEL 8552 - IM7 UNI PREPREG				<div>Unnotched Compression 0</div> <div>Gr/ Ep</div> <div>HEXCEL 8552 - IM7 UNI PREPREG</div> <div>[90,0,90]5</div>					
Resin content:		39.67 % vol		Comp. density: 1.58 [g/cc]							
Fiber volume:		60.30 % vol									
Ply count:		15									
Test method:		ASTM D6641-01E1		Modulus calculation: linear fit from 1000 to 3000 micro in/in							
Normalized by:		0.0072 in CPT									
		CTD (B)		RTD (A)		ETD (C)		ETW (D)			
Test Temperature [°F]		-65F		70F		250F		250 F			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH								160 F,85%			
Source code		HFIRXXXXB		HFIRXXXXA		HFIRXXXXC		HFIRXXXXD			
		NormalizedMeasured		NormalizedMeasured		NormalizedMeasured		NormalizedMeasured			
UNC0	Mean	113.26	111.64	94.51	95.11	75.53	75.13	64.28	64.03		
	Minimum	105.46	104.58	84.82	89.79	66.78	66.57	53.94	52.06		
	Maximum	121.75	118.90	99.74	98.54	81.34	81.64	70.95	74.96		
	C.V.(%)	4.19	4.02	5.91	3.22	6.61	6.81	8.23	9.70		
	No. Specimens	9		9		9		17			
	No. Prepreg Lots	2		2		2		2			
UNC0	Mean	7.75	7.64	7.47	7.52	7.57	7.53	7.74	7.82		
	Minimum	7.47	7.43	7.04	7.32	7.11	7.11	7.41	7.30		
	Maximum	8.03	7.85	7.60	7.73	7.88	7.84	8.12	8.22		
	C.V.(%)	3.08	2.36	2.62	1.53	3.41	3.12	3.04	3.88		
	No. Specimens	9		9		9		8			
	No. Prepreg Lots	2		2		2		2			
vUNC0	Mean	0.041		0.035		0.030		0.017			
	No. Specimens	9		9		9		8			
	No. Prepreg Lots	2		2		2		2			

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

2.3.7 Unnotched Tension 0 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG						Unnotched Tension 0 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0,90]2S	
Resin content:	40.79 % vol	Comp. density: 1.58 [g/cc]					
Fiber volume:	59.21 % vol						
Ply count:	8						
Test method: ASTM D3039M-00 ^{E1}		Modulus calculation: linear fit from 1000 to 3000 micro in/in					
Normalized by: 0.0072 in CPT							
		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]	-65F	70F		250F			
Moisture Conditioning	dry	dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code	HFIPXXXB	HFIPXXXA		HFIPXXXD			
	Normalized	Measured	Normalized	Measured	Normalized	Measured	
UNT0 Strength (ksi)	Mean	152.58	149.90	171.38	169.16	179.23	175.98
	Minimum	142.06	138.38	143.99	150.39	165.98	164.55
	Maximum	159.85	156.68	182.90	182.06	189.18	189.34
	C.V.(%)	3.39	3.61	5.43	4.18	3.75	3.67
	No. Specimens	19		18		18	
	No. Prepreg Lots	3		3		3	
UNT0 Modulus (Msi)	Mean	11.92	11.71	11.99	11.85	11.94	11.74
	Minimum	11.55	11.25	11.50	11.33	11.60	11.29
	Maximum	12.15	11.91	12.34	12.46	12.35	12.26
	C.V.(%)	1.24	1.61	1.76	2.50	1.76	2.09
	No. Specimens	19		18		19	
	No. Prepreg Lots	3		3		3	

2.3.8 Short Beam Strength Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		Short Beam Strength Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0] ₃₄			
Resin content:	38.85 % vol				
Fiber volume:	61.15 % vol				
Ply count:	34				
Test method: ASTM D2344-00 ^{E1}					
Normalized by: N/A					
	CTD (B)	RTD (A)	ETD (C)	ETW (D)	
Test Temperature [°F]	-65F	70F	250F	250F	
Moisture Conditioning	dry	dry	dry	equilibrium	
Equilibrium at T, RH				160 F, 85%	
Source code	HFQXXXXB	HFQXXXXA	HFQXXXXC	HFQXXXXD	
	Normalized	Measured	Normalized	Measured	Normalized
Mean		21.04		17.13	11.23
Minimum		19.68		16.20	10.96
Maximum		22.58		17.78	11.77
SBS C.V.(%)		3.05		2.51	1.94
Strength (ksi)					
No. Specimens		19		18	19
No. Prepreg Lots		3		3	3

2.3.9 Unnotched Tension 1 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				Unnotched Tension 1 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]2s		
Resin content:	42.20 % vol	Comp. density: 1.58 g[cc]				
Fiber volume:	57.80 % vol					
Ply count:	16					
Test method:	ASTM D3039M-00 ^{e1}	Modulus calculation: linear fit from 1000 to 3000 micro in/in				
Normalized by:	0.0072 in CPT					
	CTD (B)	RTD (A)		ETW (D)		
Test Temperature [°F]	-65F	70F		250F		
Moisture Conditioning	dry	dry		equilibrium		
Equilibrium at T, RH				160 F,85%		
Source code	HFIAXXXB	HFIAXXXA		HFIAXXXD		
	Normalized	Measured	Normalized	Measured	Normalized	Measured
Mean	99.35	98.79	104.69	104.01	112.46	111.50
Minimum	91.60	93.70	89.56	96.38	101.64	104.09
Maximum	105.84	104.20	113.71	111.12	119.29	119.12
UNT1 C.V.(%)	3.46	2.78	6.95	3.90	4.99	3.50
Strength (ksi)						
No. Specimens	16		16		17	
No. Prepreg Lots	3		3		3	
Mean	8.35	8.30	8.39	8.34	7.99	7.92
Minimum	7.29	7.91	7.28	7.90	7.07	7.15
Maximum	8.75	8.52	8.98	8.69	8.51	8.29
UNT1 C.V.(%)	3.70	1.74	5.73	2.68	5.16	3.86
Modulus (Msi)						
No. Specimens	16		16		17	
No. Prepreg Lots	3		3		3	

2.3.10 Unnotched Tension 2 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				Unnotched Tension 2 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,-45,0,45,-45,90,45,-45,45,-45]S					
Resin content:	40.91 % vol	Comp. density: 1.58 [g/cc]							
Fiber volume:	59.09 % vol								
Ply count:	20								
Test method: ASTM D3039M-00 ^{E1}		Modulus calculation: linear fit from 1000 to 3000 micro in/in							
Normalized by: 0.0072 in CPT									
		CTD (B)		RTD (A)		ETW (D)			
Test Temperature [°F]		-65F		70F		250F			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HFIBXXXXB		HFIBXXXXA		HFIBXXXXD			
		Normalized		Measured		Normalized		Measured	
Mean		70.22 68.97		67.01 67.08		54.17 53.44			
Minimum		66.60 65.98		57.64 62.42		50.96 50.23			
Maximum		75.29 72.93		71.95 69.98		56.23 56.42			
UNT2 C.V.(%)		2.54 2.33		5.69 3.17		2.49 2.90			
Strength (ksi)									
No. Specimens		17		18		18			
No. Prepreg Lots		3		3		3			
Mean		5.52 5.42		5.22 5.23		4.47 4.41			
Minimum		5.31 5.14		4.70 4.95		4.33 4.28			
Maximum		5.77 5.62		5.72 5.54		4.65 4.51			
UNT2 C.V.(%)		2.03 2.26		5.27 3.31		2.13 1.93			
Modulus (Msi)									
No. Specimens		17		18		18			
No. Prepreg Lots		3		3		3			

2.3.11 Unnotched Tension 3 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				Unnotched Tension 3 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0,45,0,90,0,45,0,-45]s		
Resin content:	41.31 % vol	Comp. density: 1.58 [g/cc]				
Fiber volume:	58.69 % vol					
Ply count:	20					
Test method:	ASTM D3039M-00 ^{E1}	Modulus calculation: linear fit from 1000 to 3000 micro in/in				
Normalized by:	0.0072 in CPT					
	CTD (B)	RTD (A)		ETW (D)		
Test Temperature [°F]	-65F	70F		250F		
Moisture Conditioning	dry	dry		equilibrium		
Equilibrium at T, RH				160 F,85%		
Source code	HFICXXXXB	HFICXXXXA		HFICXXXXD		
	Normalized	Measured	Normalized	Measured	Normalized	Measured
Mean	174.18	173.12	175.63	176.22	187.43	187.30
Minimum	159.91	160.82	159.04	158.49	161.56	172.30
Maximum	188.80	187.85	188.00	190.86	203.39	199.33
UNT3 C.V.(%)	4.47	4.74	4.78	4.21	5.84	4.33
Strength (ksi)						
No. Specimens	19		22		19	
No. Prepreg Lots	3		3		3	
Mean	13.11	13.02	13.15	13.20	13.14	13.15
Minimum	12.57	12.36	11.50	11.40	11.69	12.48
Maximum	13.60	13.41	15.13	14.84	14.41	13.90
UNT3 C.V.(%)	1.98	2.17	6.04	5.63	4.65	2.68
Modulus (Msi)						
No. Specimens	19		22		22	
No. Prepreg Lots	3		3		3	

2.3.12 Unnotched Compression 1 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		<div>Unnotched Compression 1 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]2S</div>					
Resin content:	40.04 % vol					Comp. density: 1.58 [g/cc]	
Fiber volume:	59.96 % vol						
Ply count:	16						
Test method: ASTM D6641-01 ^{E1}		Modulus calculation: linear fit from 1000 to 3000 micro in/in					
Normalized by: 0.0072 in CPT							
		RTD (A)		ETW (D)			
Test Temperature [°F]	70F	250 F					
Moisture Conditioning	dry	equilibrium					
Equilibrium at T, RH		160 F,85%					
Source code	HFIWXXXXA	HFIWXXXXD					
	Normalized	Measured	Normalized	Measured	Normalized	Measured	
UNC1 Strength (ksi)	Mean	87.05	86.95	57.68	57.09		
	Minimum	68.07	73.46	48.72	48.54		
	Maximum	97.04	96.78	72.23	70.98		
	C.V.(%)	9.32	7.51	11.02	10.87		
	No. Specimens	16		30			
	No. Prepreg Lots	3		3			
UNC1 Modulus (Msi)	Mean	7.86	7.86	7.13	7.06		
	Minimum	6.89	7.20	6.85	6.79		
	Maximum	8.41	8.61	7.34	7.38		
	C.V.(%)	4.75	4.86	1.80	2.28		
	No. Specimens	16		16			
	No. Prepreg Lots	3		3			
vUNC1	Mean	0.334		0.356			
	No. Specimens	16		16			
	No. Prepreg Lots	3		3			

2.3.13 Unnotched Compression 2 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		Unnotched Compression 2 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,-45,0,45,-45,90,45,-45,45,-45]S	
Resin content:	38.98 % vol	Comp. density:	1.58 [g/cc]
Fiber volume:	61.02 % vol		
Ply count:	20		
Test method: ASTM D6641-01 ^{E1}		Modulus calculation: linear fit from 1000 to 3000 micro in/in	
Normalized by: 0.0072 in CPT			
	RTD (A)	ETW	
Test Temperature [°F]	70F	250F	
Moisture Conditioning	DRY	equilibrium	
Equilibrium at T, RH		160 F,85%	
Source code	HFIXXXXXA	HFIXXXXXD	
	Normalized	Measured	Normalized
Mean	66.44	67.49	40.61
Minimum	57.29	60.87	31.19
Maximum	72.61	73.01	50.34
UNC2 C.V.(%)	7.36	5.53	10.91
Strength (ksi)			
No. Specimens	16		31
No. Prepreg Lots	3		3
Mean	4.90	4.98	4.10
Minimum	4.35	4.58	3.96
Maximum	5.35	5.33	4.25
UNC2 C.V.(%)	6.10	4.84	2.21
Modulus (Msi)			
No. Specimens	16		16
No. Prepreg Lots	3		3
Mean	0.587		0.665
vUNC2 No. Specimens	16		16
No. Prepreg Lots	3		3

2.3.14 Unnotched Compression 3 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		<div>Unnotched Compression 3 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,90,0,-45,0,45,0,-45,0]S</div>			
Resin content:	40.22 % vol			Comp. density:	1.58 [g/cc]
Fiber volume:	59.78 % vol				
Ply count	20				
Test method:	ASTM D6641-01 ^{E1}				
Normalized by: 0.0072 in CPT		Modulus calculation: linear fit from 1000 to 3000 micro in/in			
		RTD (A)	ETW		
Test Temperature [°F]	70F	250F			
Moisture Conditioning	dry	equilibrium			
Equilibrium at T, RH		160 F,85%			
Source code	HFYXXXXA	HFYXXXXD			
	Normalized	Measured	Normalized Measured		
UNC3 Strength (ksi)	Mean	120.84 121.06	79.42 78.79		
	Minimum	108.20 111.74	68.05 67.56		
	Maximum	136.09 137.70	96.63 94.50		
	C.V.(%)	5.86 5.53	10.31 9.99		
	No. Specimens	16	27		
	No. Prepreg Lots	3	3		
UNC3 Modulus (Msi)	Mean	11.90 11.93	11.77 11.66		
	Minimum	10.32 11.20	11.24 11.22		
	Maximum	12.58 12.74	12.22 11.96		
	C.V.(%)	4.35 3.38	2.35 2.09		
	No. Specimens	17	15		
	No. Prepreg Lots	3	3		
vUNC3	Mean	0.423	0.416		
	No. Specimens	17	15		
	No. Prepreg Lots	3	3		

2.3.15 Laminate Short Beam Strength Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		Laminate Short Beam Strength Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]3s	
Resin content:	34.55 % vol		
Fiber volume:	65.45 % vol		
Ply count:	24		
Test method: ASTM D2344-00 ^{E1}			
Normalized by: NA			
	RTD (A)	ETW (D)	
Test Temperature [°F]	70F	250F	
Moisture Conditioning	dry	equilibrium	
Equilibrium at T, RH		160 F,85%	
Source code	HFqXXXA	HFqXXXD	
	Normalized	Measured	Normalized
			Measured
Mean	12.13	6.99	
Minimum	9.55	6.63	
Maximum	12.98	7.70	
LSBS	6.85	3.65	
C.V.(%)			
(ksi)			
No. Specimens	21	19	
No. Prepreg Lots	3	3	

physical testing only available from batch A cure 1

2.3.16 Open Hole Tension 1 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				Open Hole Tension 1 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]2S			
Resin content:	42.20 % vol	Comp. density: 1.57 [g/cc]					
Fiber volume:	57.80 % vol						
Ply count:	16						
Test method:	ASTM D5766M-02a						
Normalized by:	0.0072 in CPT						
		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFIDXXXXB		HFIDXXXXA		HFIDXXXXD	
		Normalized	Measured	Normalized	Measured	Normalized	Measured
Mean		57.75	57.28	59.00	58.70	66.97	66.48
Minimum		53.64	53.27	54.12	53.32	62.15	62.21
Maximum		62.52	61.67	64.61	64.44	72.59	72.59
OHT1 C.V.(%)		4.21	3.95	3.98	4.07	4.26	4.29
Strength (ksi)							
No. Specimens		19		19		20	
No. Prepreg Lots		3		3		3	

2.3.17 Open Hole Tension 2 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG			<div>Open Hole Tension 2 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,-45,0,45,-45,90,45,-45,45,-45]s</div>					
Resin content:	40.64 % vol	Comp. densit 1.58 [g/cc]						
Fiber volume:	59.36 % vol							
Ply count	20							
Test method: ASTM D5766-02a								
Normalized by: 0.0072 in CPT								
			CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]			-65F		70F		250F	
Moisture Conditioning			dry		dry		equilibrium	
Equilibrium at T, RH							160 F,85%	
Source code			HFIEXXXB		HFIEXXXA		HFIEXXXD	
			Normalized	Measured	Normalized	Measured	Normalized	Measured
OHT2	Mean		45.95	45.63	43.65	43.65	38.39	38.34
	Minimum		44.04	43.88	39.91	41.05	36.27	36.18
	Maximum		47.20	47.02	45.96	45.86	40.71	40.04
	C.V.(%)		1.92	2.16	3.28	2.77	3.10	3.11
	Strength (ksi)							
	No. Specimens		19		19		18	
	No. Prepreg Lots		3		3		3	

2.3.18 Open Hole Tension 3 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		<div>Open Hole Tension 3 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0.45,0.90,0,-45.0,45.0,-45]S</div>					
Resin content:	40.45					Comp. density 1.58 [g/cc]	
Fiber volume:	59.55						
Ply count:	20						
Test method: ASTM D5766-02a							
Normalized by: 0.0072 in CPT							
		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]	-65F		70F		250F		
Moisture Conditioning	dry		dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code	HFIFXXXB		HFIFXXXA		HFIFXXXD		
	Normalized	Measured	Normalized	Measured	Normalized	Measured	
OHT3	Mean	78.75	77.97	86.59	86.627	114.86	113.87
	Minimum	72.41	70.75	78.90	79.07	105.04	102.24
	Maximum	84.29	84.38	95.17	94.49	129.75	128.78
	C.V.(%)	5.03	6.01	5.46	5.72	5.95	6.37
	Strength (ksi)						
	No. Specimens	19		19		20	
	No. Prepreg Lots	3		3		3	

2.3.19 Filled-Hole Tension 1 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				Filled-Hole Tension 1 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]2S			
Resin content:		40.79 % vol		Comp. density:		1.58 [g/cc]	
Fiber volume:		59.21 % vol					
Ply count:		16					
Test method:		ASTM D6742M-02					
Normalized by:		0.0072 in CPT					
		CTD (B)		RTD (A)		ETW(D)	
Test Temperature [°F]		-65F		70F		250F	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		HFXXXXB		HF4XXXXA		HF4XXXXD	
		Normalized	Measured	Normalized	Measured	Normalized	Measured
Mean		64.02	63.52	65.87	65.95	70.29	69.52
Minimum		58.00	57.30	59.20	59.60	65.17	64.29
Maximum		69.40	68.01	72.34	72.19	74.40	74.58
FHT1	C.V.(%)	4.39	4.86	4.95	5.41	3.24	3.90
Strength (ksi)							
No. Specimens		19		19		22	
No. Prepreg Lots		3		3		3	

2.3.20 Filled-Hole Tension 2 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		<div>Filled-Hole Tension 2 Gr/ Ep HEXCEL- IM7 UNI PREPREG [45,-45,0,45,-45,90,45,-45,45,-45]_s</div>					
Resin content:	39.04 % vol						
Fiber volume:	60.96 % vol						
Ply count:	20					Comp. density: 1.59 [g/cc]	
Test method: ASTM D6742M-02							
Normalized by: 0.0072 in CPT							
		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]	-65F		70F		250F		
Moisture Conditioning	dry		dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code	HF5XXXXB		HF5XXXXA		HF5XXXXD		
	Normalized	Measured	Normalized	Measured	Normalized	Measured	
FHT2 Strength (ksi)	Mean	52.25	52.05	48.15	48.08	42.63	42.30
	Minimum	48.54	50.23	44.59	44.67	41.22	40.75
	Maximum	54.64	54.73	50.79	50.24	43.75	43.54
	C.V.(%)	3.00	2.53	4.03	3.34	1.73	1.97
	No. Specimens	19		19		19	
	No. Prepreg Lots	3		3		3	

Note: The physical testing data is missing averages from Batch B cure cycle 1.

2.3.21 Filled-Hole Tension 3 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				<div>Filled-Hole Tension 3 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0,45,0,90,0,-45,0,45,0-45]s</div>					
Resin content: 40.33 % vol		Comp. density: 1.58 [g/cc]							
Fiber volume: 59.67 % vol									
Ply count: 20									
Test method: ASTM D6742M-02									
Normalized by: 0.0072 in CPT									
				CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]		-65F		70F		250F			
Moisture Conditioning		dry		dry		equilibrium			
Equilibrium at T, RH						160 F,85%			
Source code		HF16XXXXB		HF16XXXXA		HF16XXXXD			
		Normalized	Measured	Normalized	Measured	Normalized	Measured		
Mean		80.70	80.53	91.95	91.93	101.26	100.77		
Minimum		70.25	71.22	79.15	77.08	93.92	92.01		
Maximum		88.15	88.23	102.16	102.61	108.11	107.29		
FHT3	C.V.(%)	5.69	6.13	7.20	7.91	3.90	3.82		
Strength (ksi)									
No. Specimens		19		19		19			
No. Prepreg Lots		3		3		3			

2.3.22 Open Hole Compression 1 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				<div>Open Hole Compression 1 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]3S</div>			
Resin content: 41.74 % vol		Comp. density: 1.58 [g/cc]					
Fiber volume: 58.26% vol							
Ply count: 24							
Test method: ASTM D6484M-04							
Normalized by: 0.0072 in CPT							
		RTD (A)		ETW (D)			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HFIGXXXXA		HFIGXXXXD			
		Normalized	Measured	Normalized	Measured		
Mean		49.08	48.89	35.52	35.29		
Minimum		43.91	45.15	33.08	33.59		
Maximum		50.99	51.28	38.96	37.50		
OHC1 C.V.(%)		3.65	2.96	4.07	3.25		
Strength (ksi)							
No. Specimens		19		19			
No. Prepreg Lots		3		3			

2.3.23 Open Hole Compression 2 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		<div>Open Hole Compression 2 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,-45,0,45,-45,90,45,-45,45,-45]S</div>				
Resin content:	41.14 % vol	Comp. density:	1.58 [g/cc]			
Fiber volume:	58.86 % vol					
Ply count:	20					
Test method: ASTM D6484M-04						
Normalized by: 0.0072 in CPT						
		RTD (A)		ETW (D)		
Test Temperature [°F]	70F		250F			
Moisture Conditioning	dry		equilibrium			
Equilibrium at T, RH	160 F,85%					
Source code	HFIHXXXXA		HFIHXXXXD			
	Normalized	Measured	Normalized	Measured	Normalized	Measured
OHC2 Strength (ksi)	Mean	38.80	38.40	25.76	25.57	
	Minimum	36.25	35.93	22.36	22.24	
	Maximum	41.33	40.85	27.57	27.56	
	C.V.(%)	3.29	3.41	5.02	4.40	
	No. Specimens	18	20			
	No. Prepreg Lots	3	3			

2.3.24 Open Hole Compression 3 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		Open Hole Compression 3 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [0,45,0,90,0,-45,0,45,0,-45]S	
Resin content:	39.62 % vol		
Fiber volume:	60.38 % vol		
Ply count:	20		
Test method:	ASTM D6484M-04	Comp. density: 1.58 [g/cc]	
Normalized by:	0.0072 in CPT		
	RTD (A)	ETW (D)	
Test Temperature [°F]	70F	250F	
Moisture Conditioning	dry	equilibrium	
Equilibrium at T, RH		160 F,85%	
Source code	HFIIXXXA	HFIIXXXD	
	Normalized	Measured	Normalized
Mean	63.24	63.36	46.42
Minimum	56.63	59.06	42.01
Maximum	69.28	69.24	50.50
OHC3 C.V.(%)	4.54	4.28	4.55
Strength (ksi)			
No. Specimens	19		20
No. Prepreg Lots	3		3

2.3.25 Filled-Hole Compression 1 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				Filled-Hole Compression 1 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]3S			
Resin content: 41.85 % vol		Comp. density: 1.58 [g/cc]					
Fiber volume: 58.15 % vol							
Ply count: 24							
Test method: ASTM D6742M-02							
Normalized by: 0.0072 in CPT							
		RTD (A)		ETW (D)			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HF17XXXXA		HF17XXXXD			
		Normalized	Measured	Normalized	Measured	Normalized	Measured
FHC1 Strength (ksi)	Mean	69.19	69.30	51.68	51.61		
	Minimum	62.34	62.44	47.70	47.93		
	Maximum	76.17	76.20	55.60	54.57		
	C.V.(%)	5.34	5.56	4.41	3.85		
	No. Specimens	20		19			
	No. Prepreg Lots	3		3			

2.3.26 Filled-Hole Compression 2 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				<div>Filled-Hole Compression 2</div> <div>Gr/ Ep</div> <div>HEXCEL 8552 - IM7 UNI PREPREG</div> <div>[45,-45,0,45,-45,90,45,-45,45,-45]_s</div>			
Resin content:		41.09 % vol		Comp. density:		1.58 [g/cc]	
Fiber volume:		58.91 % vol					
Ply count:		20					
Test method:		ASTM D6742M-02					
Normalized by:		0.0072 in CPT					
		RTD (A)		ETW (D)			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HF18XXXXA		HF1XXXXD			
		Normalized	Measured	Normalized	Measured	Normalized	Measured
Mean		54.57	54.25	41.17	40.86		
Minimum		50.41	50.57	37.36	37.86		
Maximum		57.71	57.54	43.99	43.20		
FHC2 C.V.(%)		4.13	3.17	4.39	3.66		
Strength (ksi)							
No. Specimens		19		19			
No. Prepreg Lots		3		3			

2.3.27 Filled-Hole Compression 3 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				<div>Filled-Hole Compression 3</div> <div>Gr/ Ep</div> <div>HEXCEL 8552 - IM7 UNI PREPREG</div> <div>[0,45,0,90,0,-45,0,45,0,-45]s</div>			
Resin content:	41.63 % vol	Comp. density:	1.58 [g/cc]				
Fiber volume:	58.37 % vol						
Ply count	20						
Test method:	ASTM D6742M-02						
Normalized by:	0.0072 in CPT						
		RTD (A)		ETW (D)			
Test Temperature [°F]		70F		250F			
Moisture Conditioning		dry		equilibrium			
Equilibrium at T, RH				160 F,85%			
Source code		HF19XXXXA		HF19XXXXD			
		Normalized	Measured	Normalized	Measured	Normalized	Measured
Mean		98.57	98.16	72.79	72.20		
Minimum		89.45	87.81	69.47	68.99		
Maximum		106.54	104.25	78.09	77.22		
FHC3 C.V.(%)		4.61	4.25	3.03	3.14		
Strength (ksi)							
No. Specimens		18		19			
No. Prepreg Lots		3		3			

2.3.28 Single Shear Bearing 1 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		<div>Laminate Bearing 1 Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45,0,-45,90]2S</div>			
Resin content:	40.38 % vol	Comp. density:		1.58 [g/cc]	
Fiber volume:	59.62 % vol				
Ply count:	16				
Test method:	ASTM D5961M-05 ^{a1}				
Normalized by:	0.0072 in CPT				
		RTD (A)		ETW (D)	
Test Temperature [°F]	70F		250F		
Moisture Conditioning	dry		equilibrium		
Equilibrium at T, RH			160 F,85%		
Source code	HF1XXXXA		HF1XXXXD		
		Normalized	Measured	Normalized	Measured
SSB1	Mean	109.89	112.98	88.14	89.88
	Minimum	99.31	106.30	69.19	68.62
	Maximum	119.86	118.98	101.13	99.81
	C.V.(%)	5.51	3.56	10.10	9.49
	2% offset Strength (ksi)				
	No. Specimens	19		21	
	No. Prepreg Lots	3		3	

Ultimate Strength not obtained

2.3.29 Single Shear Bearing 2 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG			<div>Laminate Bearing 2</div> <div>Gr/ Ep</div> <div>HEXCEL 8552 - IM7 UNI PREPREG</div> <div>[45,-45,0,45,-45,90,45,-45,45,-45]S</div>			
Resin content:	40.40 % vol	Comp. density:				1.58 [g/cc]
Fiber volume:	59.60 % vol					
Ply count:	20					
Test method:	ASTM D5961M-05 ^{e1}					
Normalized by:	0.0072 in CPT					
	RTD (A)		ETW (D)			
Test Temperature [°F]	70F		250F			
Moisture Conditioning	dry		equilibrium			
Equilibrium at T, RH			160 F,85%			
Source code	HF12XXXXA		HF12XXXXD			
	Normalized	Measured	Normalized	Measured		
Mean	114.02	114.20	86.22	86.87		
Minimum	100.30	104.42	78.40	77.48		
Maximum	121.80	122.56	94.73	97.23		
SSB2 C.V.(%)	4.88	3.86	6.52	6.21		
2% offset Strength						
(ksi)	No. Specimens	19		19		
	No. Prepreg Lots	3		3		

Physical testing not available for Batch A Cure Cycle 1

Ultimate Strength not obtained

2.3.30 Single Shear Bearing 3 Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				<div>Laminate Bearing 3</div> <div>Gr/ Ep</div> <div>HEXCEL 8552 - IM7 UNI</div> <div>PREPREG</div> <div>[0,45,0,90,0,-45,0,45,0,-45]S</div>	
Resin content:	40.65 % vol	Comp. density: 1.58 [g/cc]			
Fiber volume:	59.35 % vol				
Ply thickness:	0.0067 - 0.0075				
Ply count:	20				
Test method:	ASTM D5961M-05 ^{e1}				
Normalized by:	0.0072				
		RTD (A)	ETW (D)		
Test Temperature [°F]	70F		250F		
Moisture Conditioning	dry		equilibrium		
Equilibrium at T, RH			160 F,85%		
Source code	HF13XXXXA		HF13XXXXD		
	Normalized	Measured	Normalized	Measured	
Mean	113.90	113.93	91.67	91.80	
Minimum	104.32	104.57	79.33	81.00	
Maximum	121.80	122.04	102.78	101.30	
SSB3 C.V.(%)	5.01	3.79	7.15	6.83	
2% offset Strength (ksi)					
No. Specimens	19		19		
No. Prepreg Lots	3		3		

Ultimate Strength not obtained

2.3.31 Compression after Impact Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG				Compression After Impact Gr/ Ep HEXCEL 8552 - IM7 UNI PREPREG [45.0,-45.90]3s	
Resin content:	41.6 % vol	Comp. density:	1.58 [g/cc]		
Fiber volume:	58.40 % vol				
Ply count:	24				
Test method: SACMA SRM 2R-94					
Normalized by: 0.0072 in CPT					
		RTD (A)			
Test Temperature [°F]		70F			
Moisture Conditioning		dry			
Equilibrium at T, RH					
Source code		HF1KXXXXA			
		Normalized	Measured	Normalized	Measured
CAI	Mean	31.45	30.96		
	Minimum	30.17	29.53		
	Maximum	33.80	33.43		
	C.V.(%)	4.16	4.65		
	No. Specimens	7			
	No. Prepreg Lots	1			
Strength (ksi)					

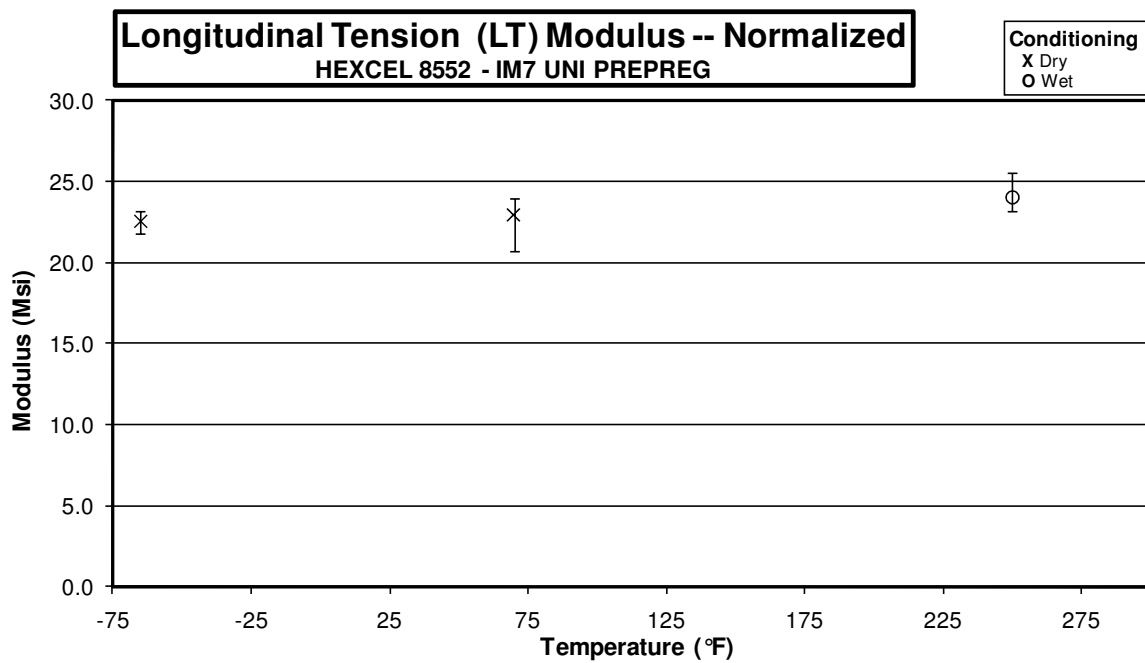
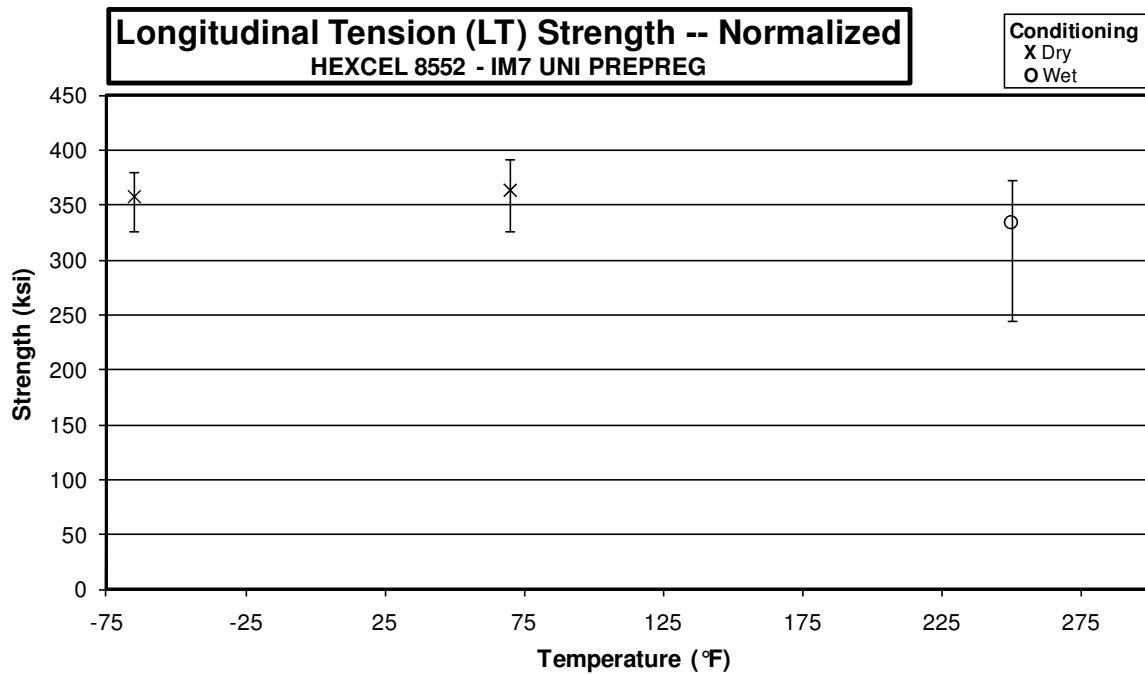
2.3.32 Interlaminar Tension Properties

Material: HEXCEL 8552 - IM7 UNI PREPREG		<div><div>Interlaminar Tension</div><div>Gr/ Ep</div><div>HEXCEL 8552 - IM7 UNI PREPREG</div><div>[0]22</div></div>					
Resin content:	42.83 % wt					Comp. density: 1.57 [g/cc]	
Fiber volume:	57.17 % vol						
Ply count:	22						
Test method:	ASTM D6415-99E ¹						
Normalized by:	NA						
		CTD (B)		RTD (A)		ETW (D)	
Test Temperature [°F]	-65F		70F		250F		
Moisture Conditioning	dry		dry		equilibrium		
Equilibrium at T, RH					160 F,85%		
Source code	HFIMXXXB		HFIMXXXA		HFIMXXXD		
		Normalized	Measured	Normalized	Measured	Normalized	Measured
ILT	Mean	11.96		11.04		6.46	
	Minimum	7.64		9.99		6.19	
	Maximum	14.71		13.25		6.71	
	C.V.(%)	20.68		10.41		3.08	
	Strength (ksi)						
	No. Specimens	8		7		7	
	No. Prepreg Lots	1		1		1	

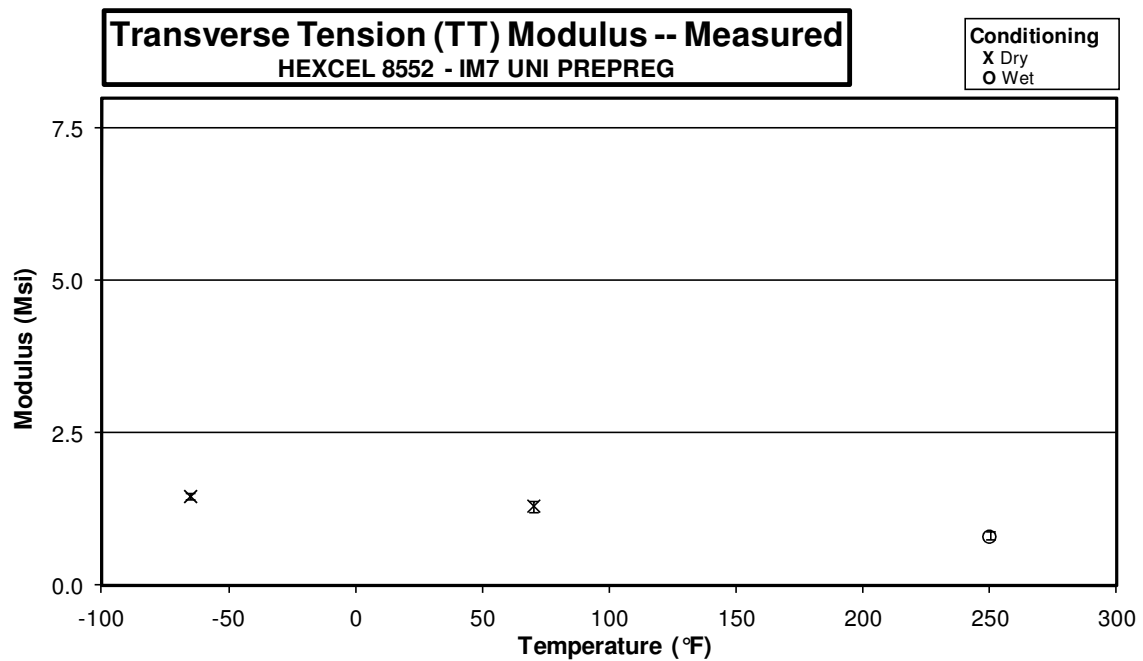
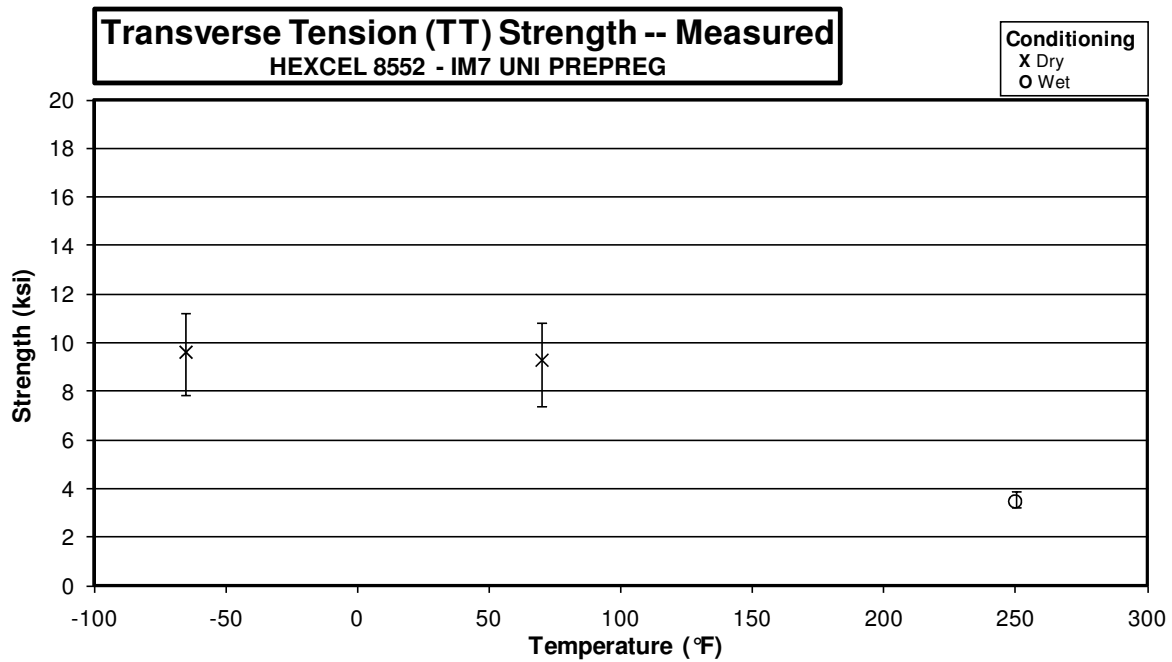
3. Individual Test Charts

These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

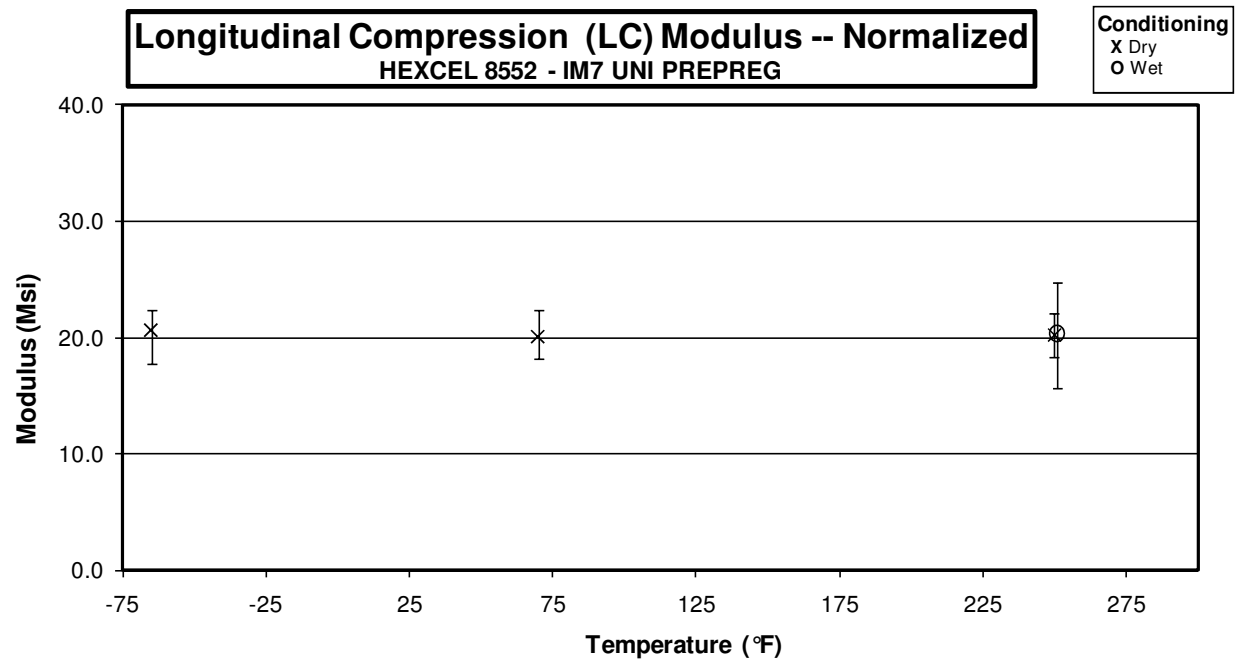
3.1 Longitudinal Tension Properties



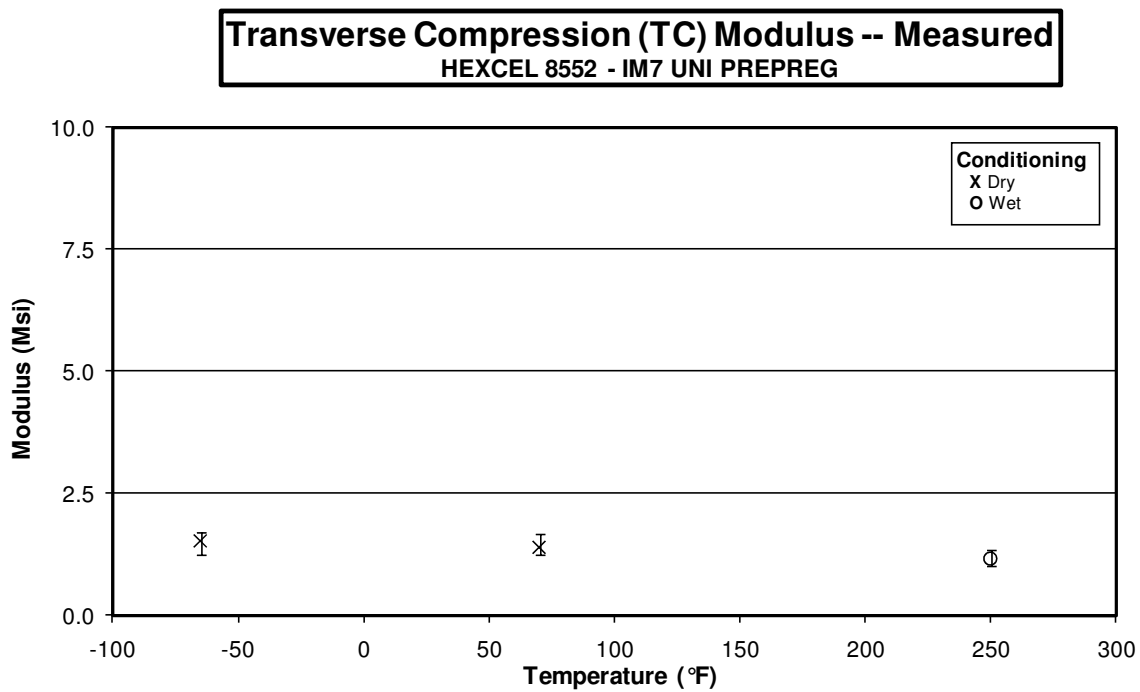
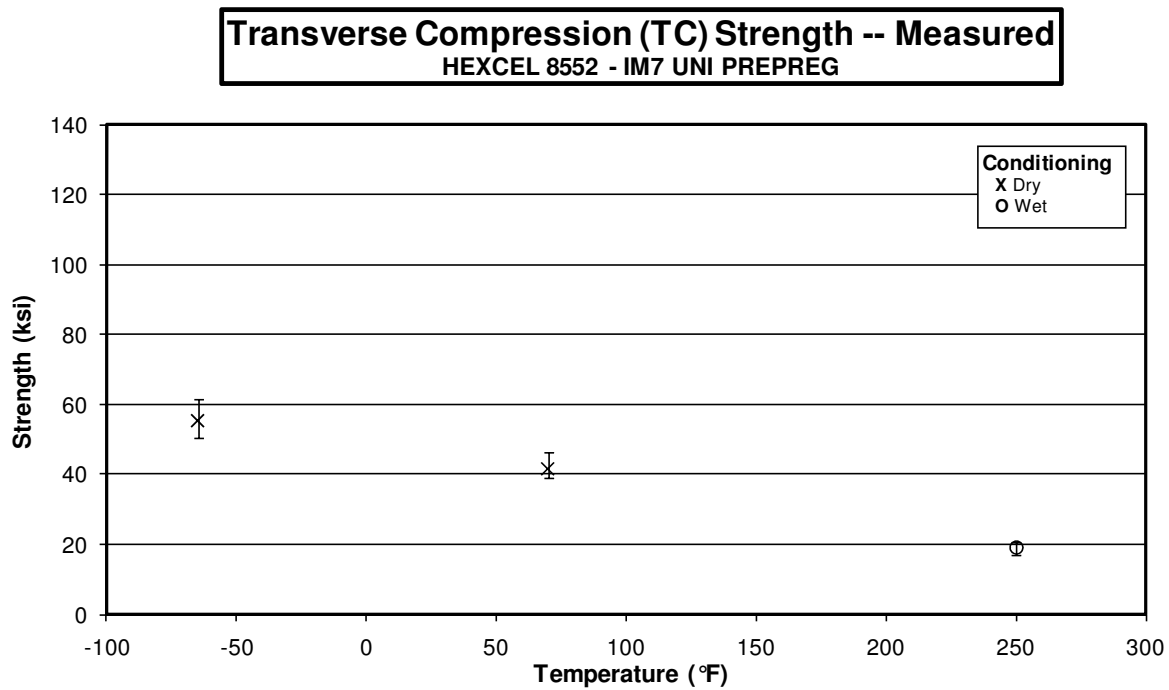
3.2 Transverse Tension Properties



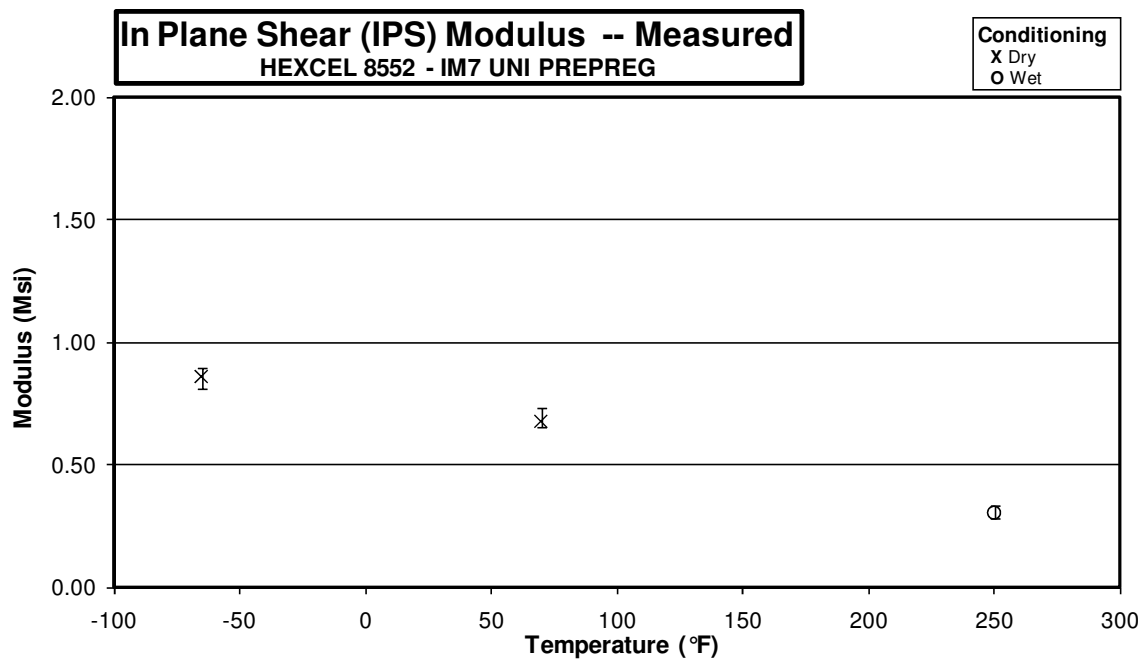
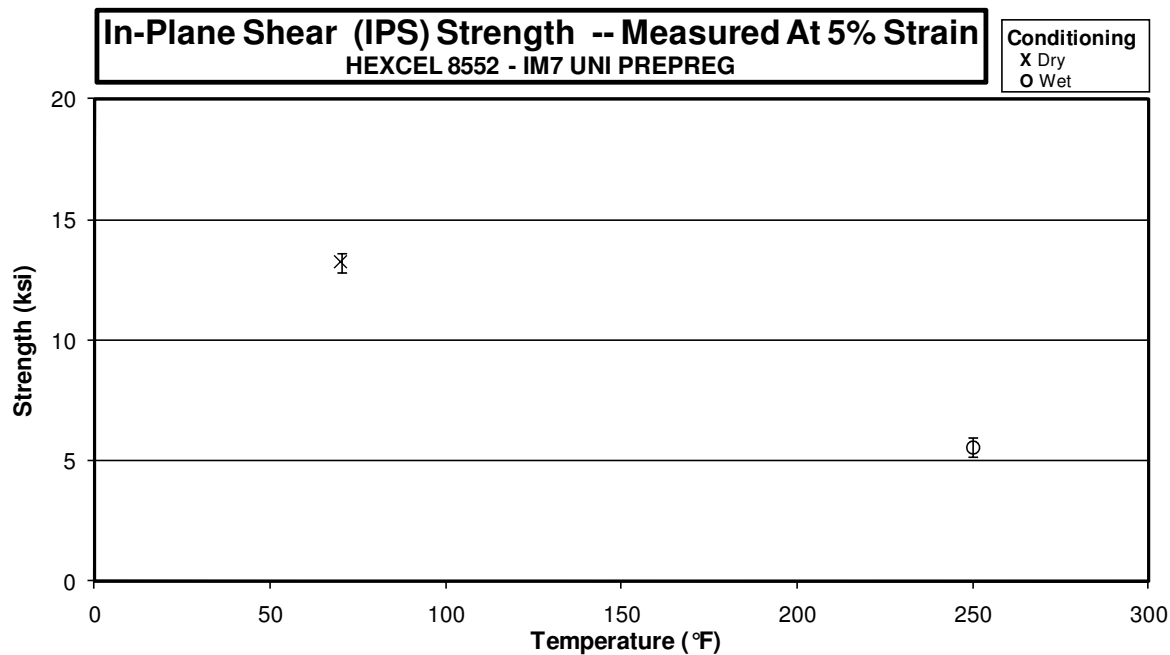
3.3 Longitudinal Compression Properties



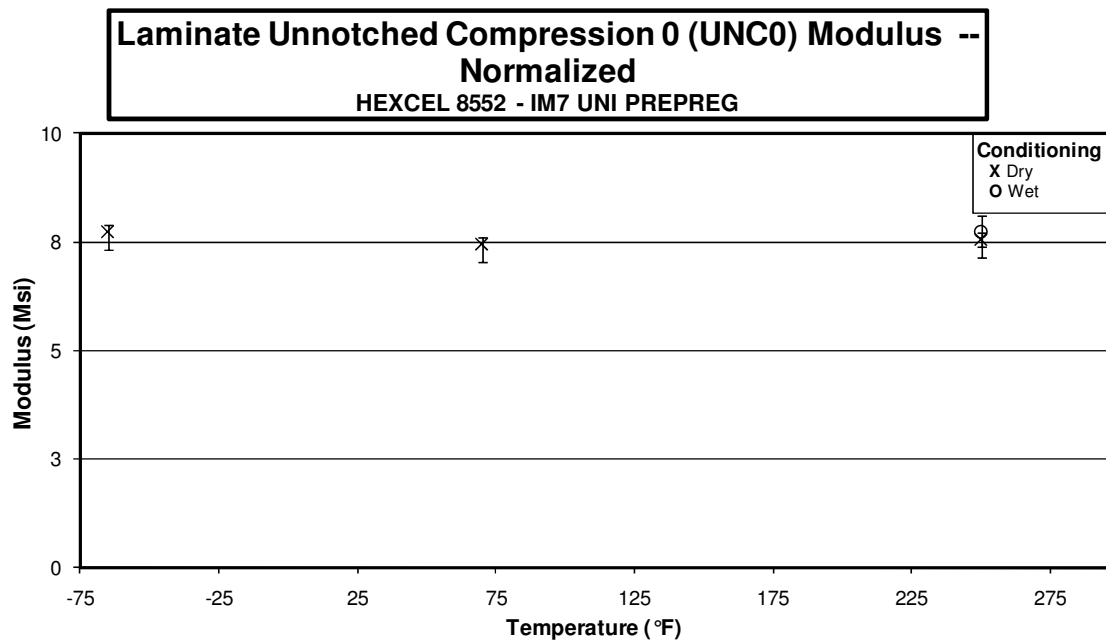
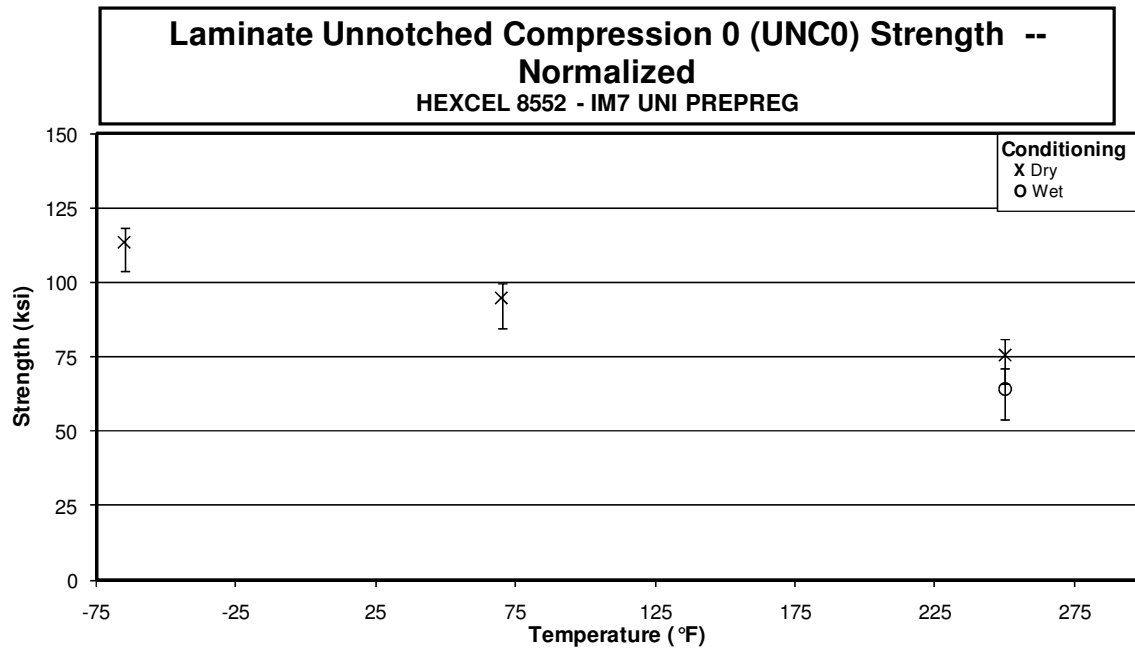
3.4 Transverse Compression Properties



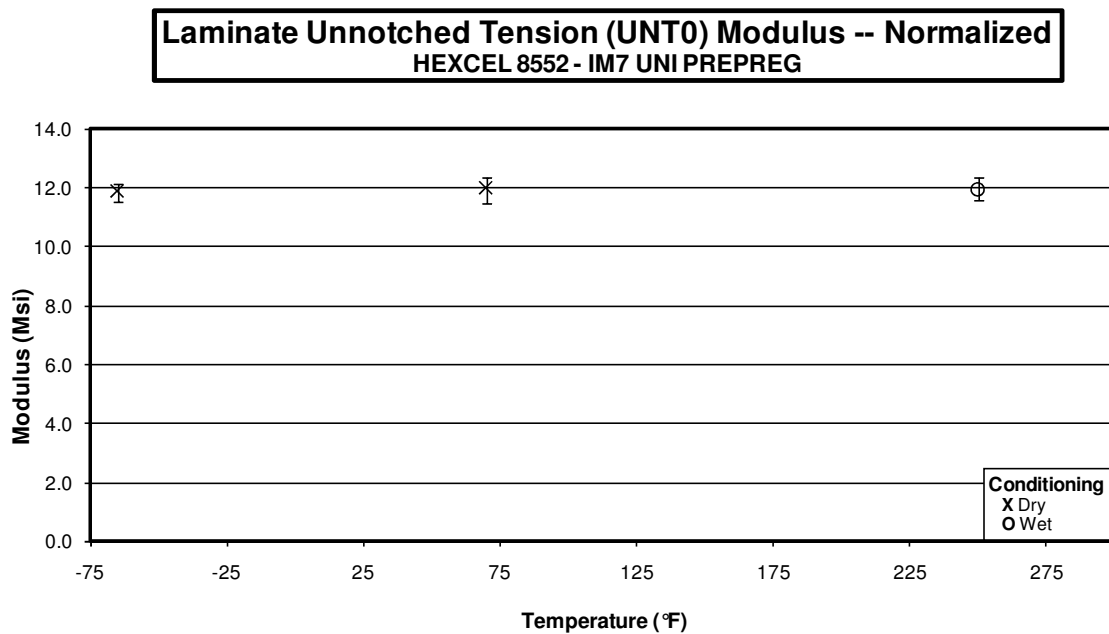
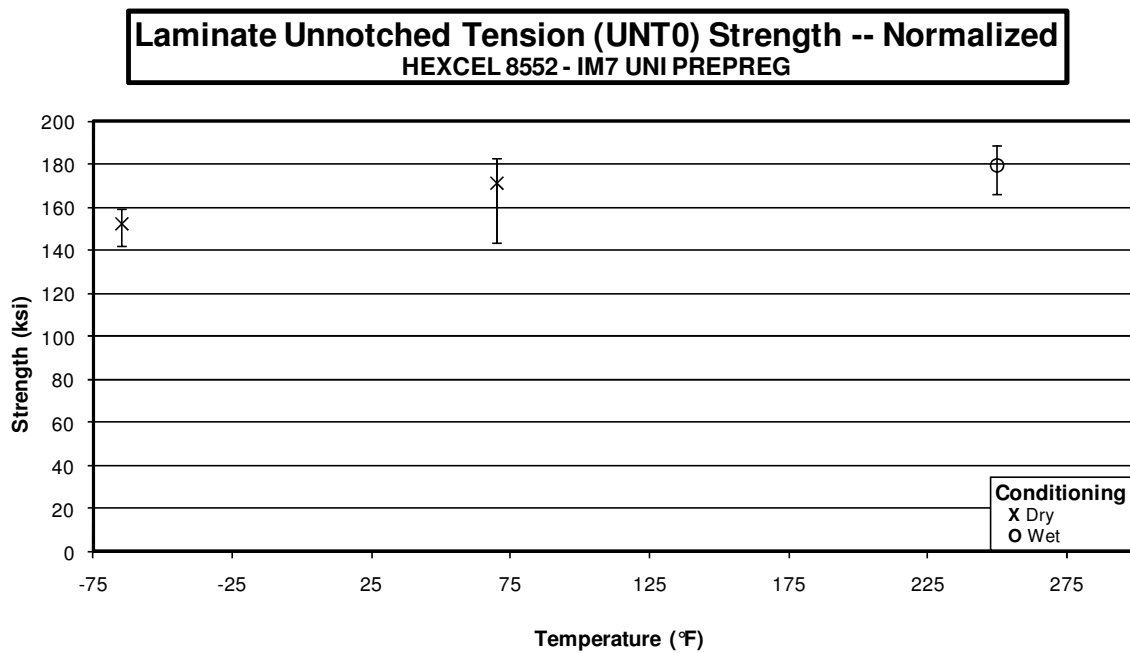
3.5 In-Plane Shear Properties



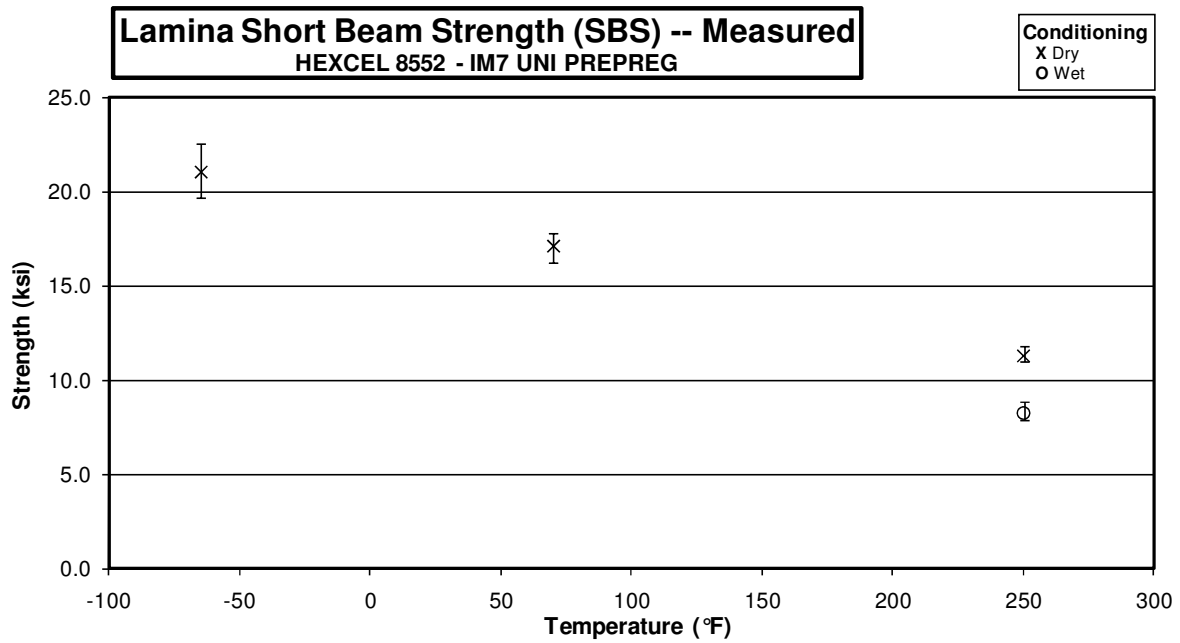
3.6 Unnotched Compression 0 Properties



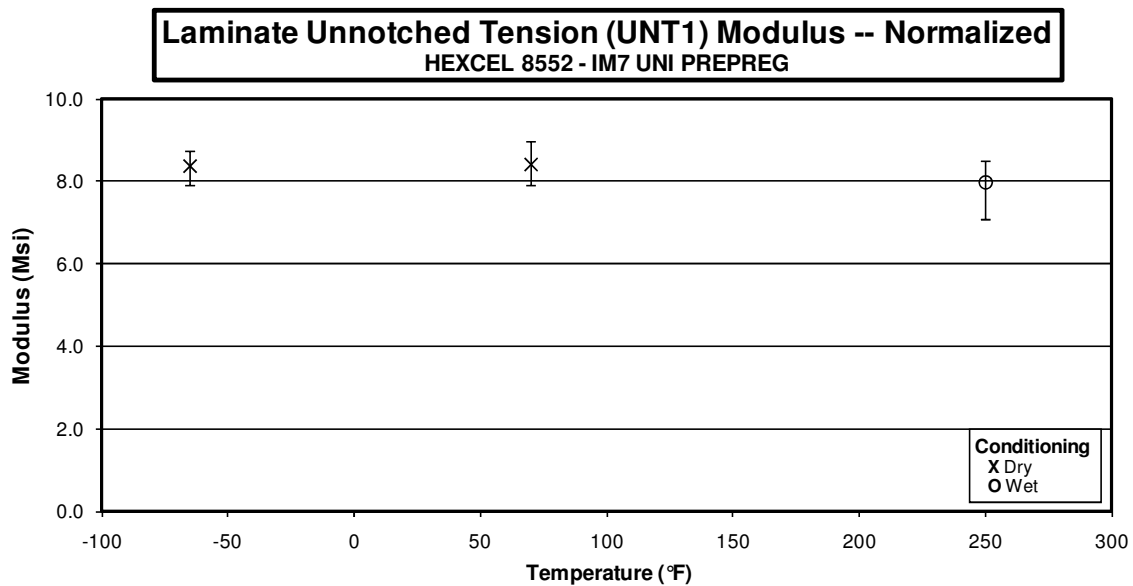
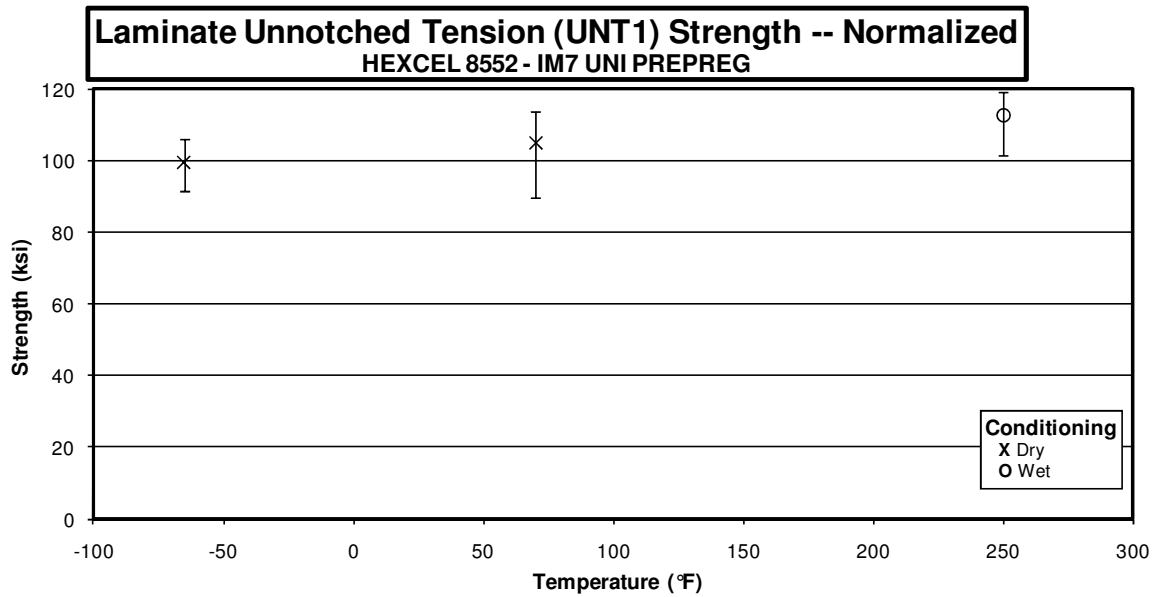
3.7 Unnotched Tension 0 Properties



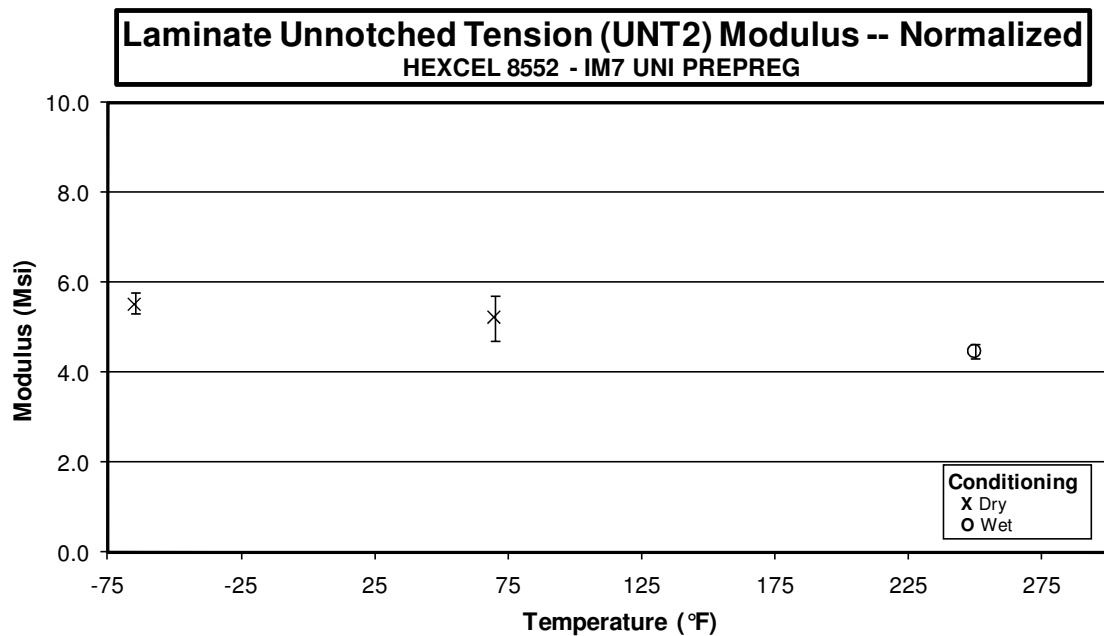
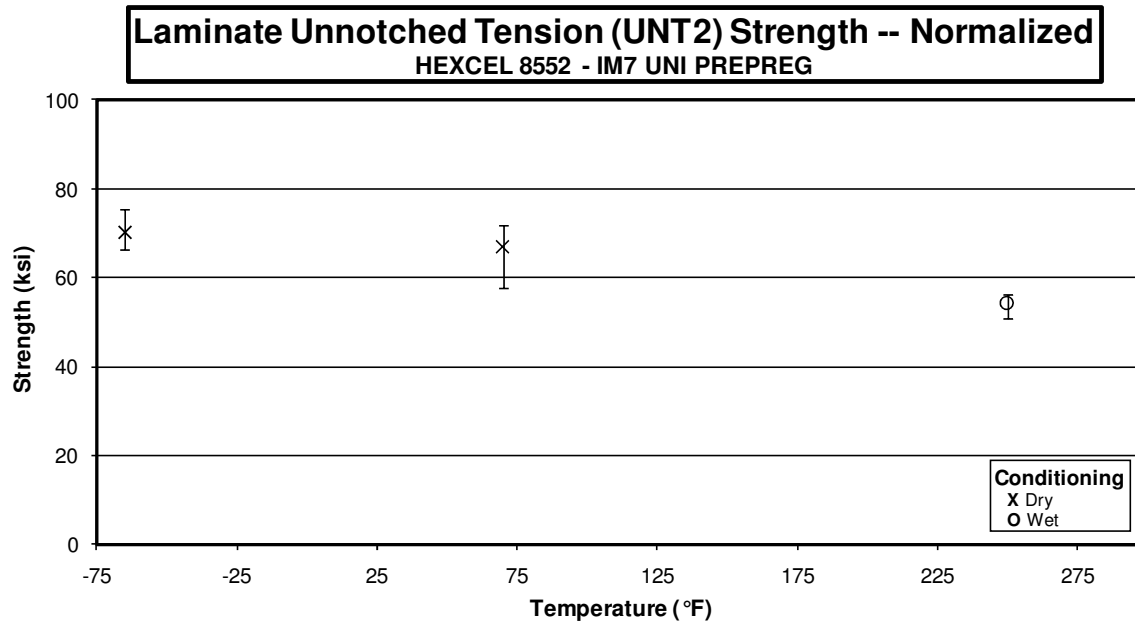
3.8 Lamina Short Beam Strength



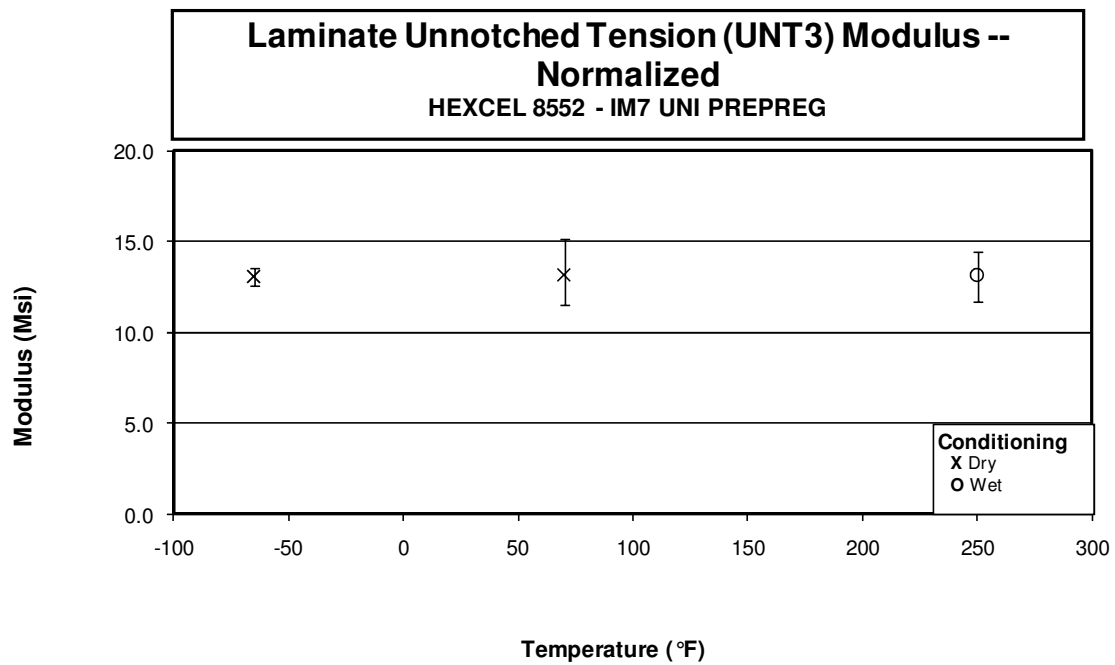
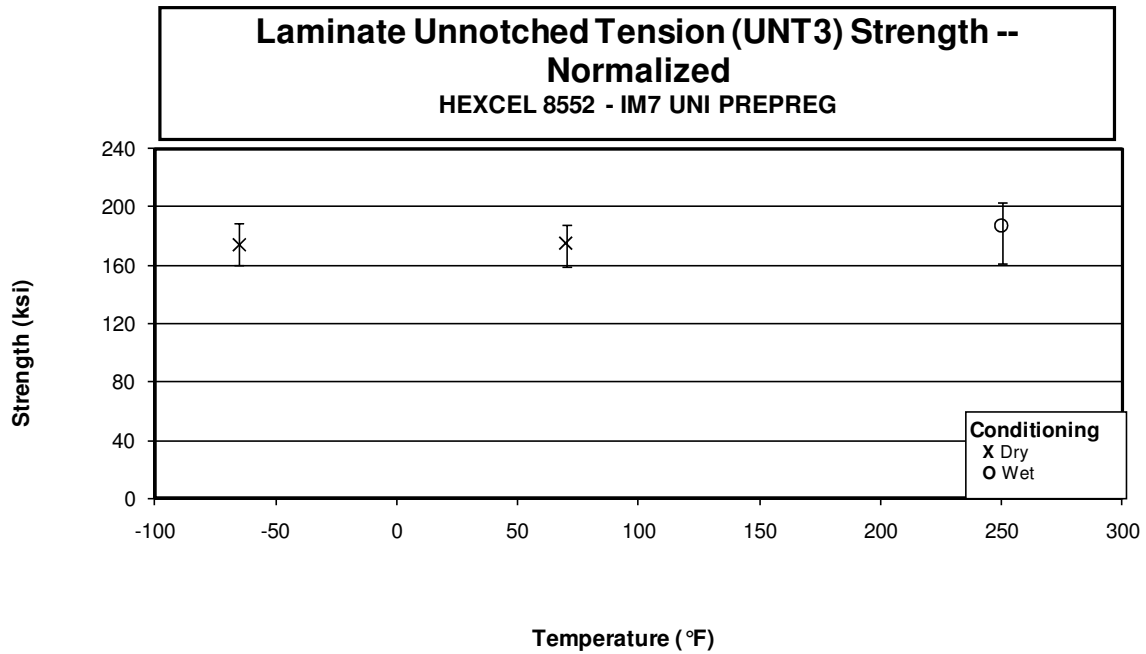
3.9 Unnotched Tension 1 Properties



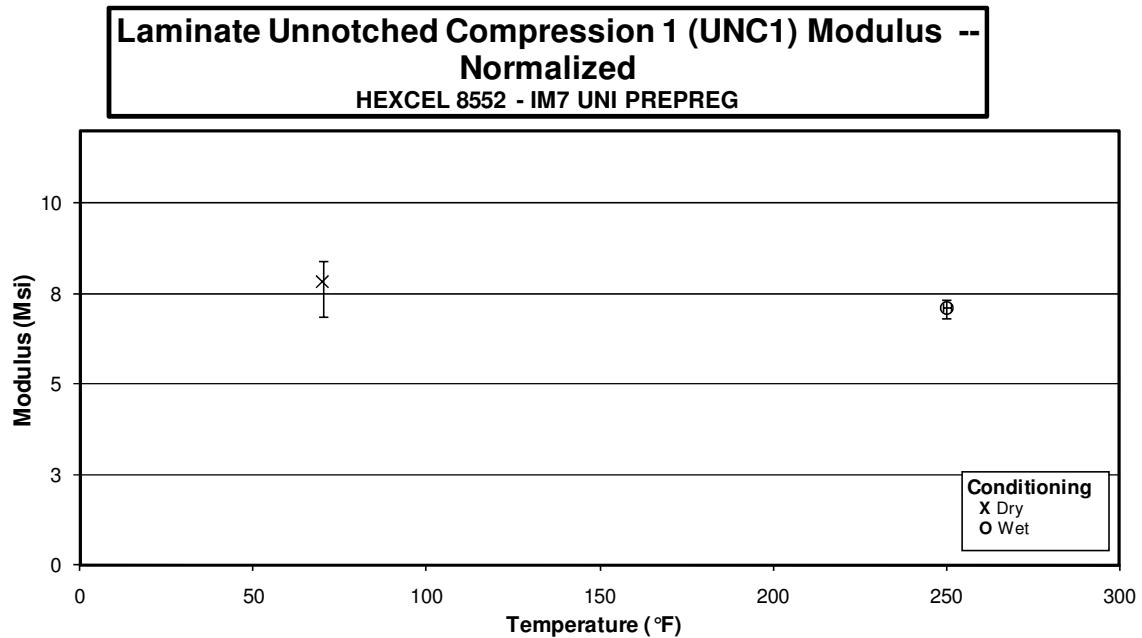
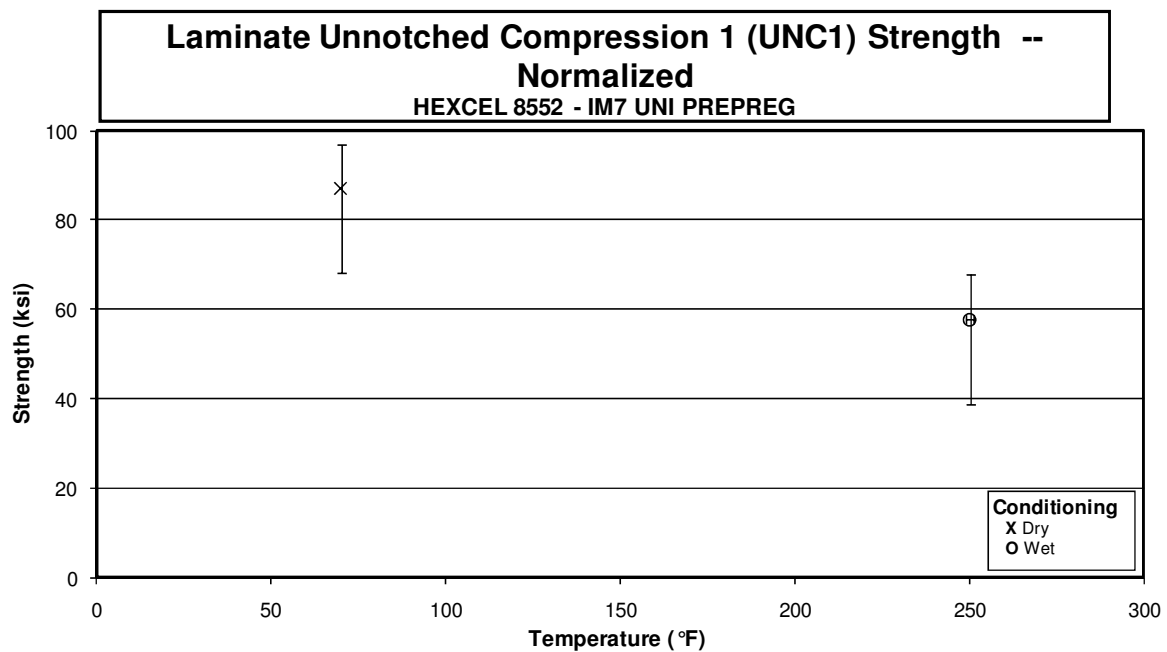
3.10 Unnotched Tension 2 Properties



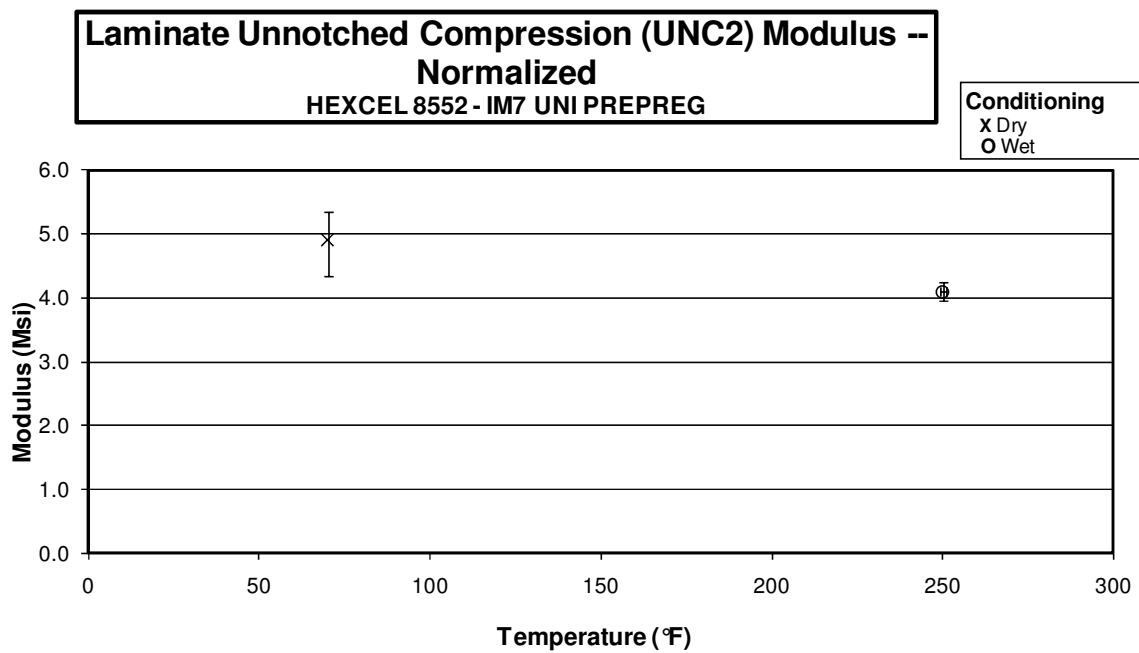
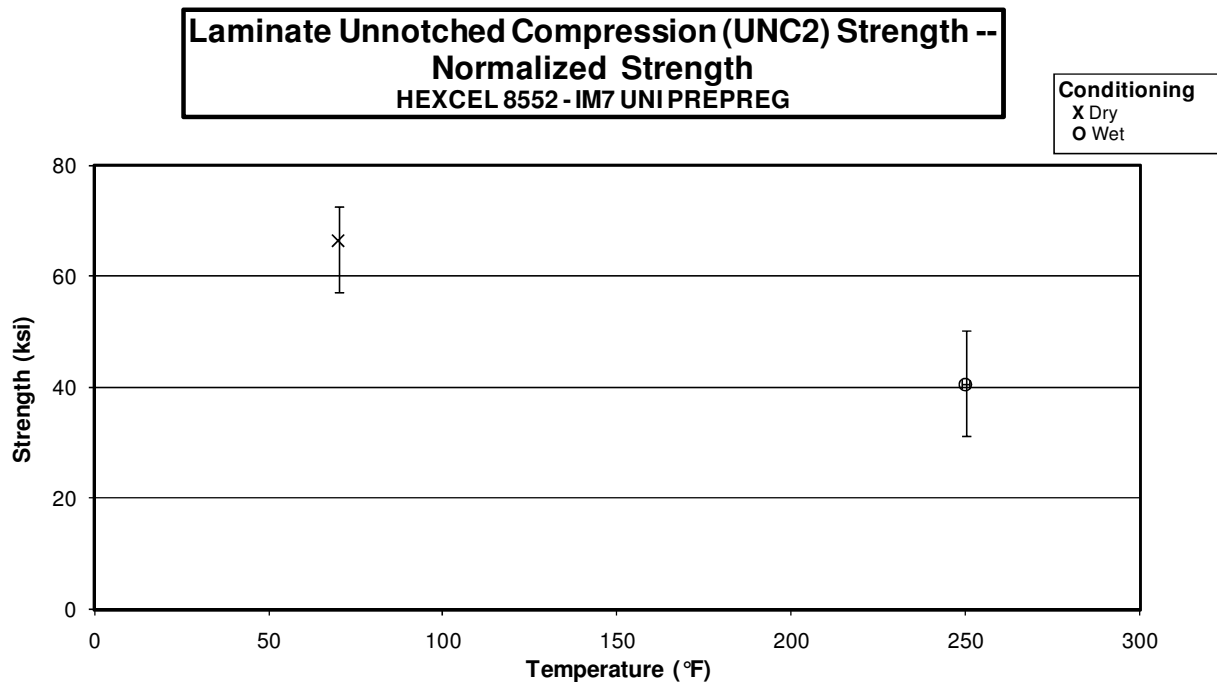
3.11 Unnotched Tension 3 Properties



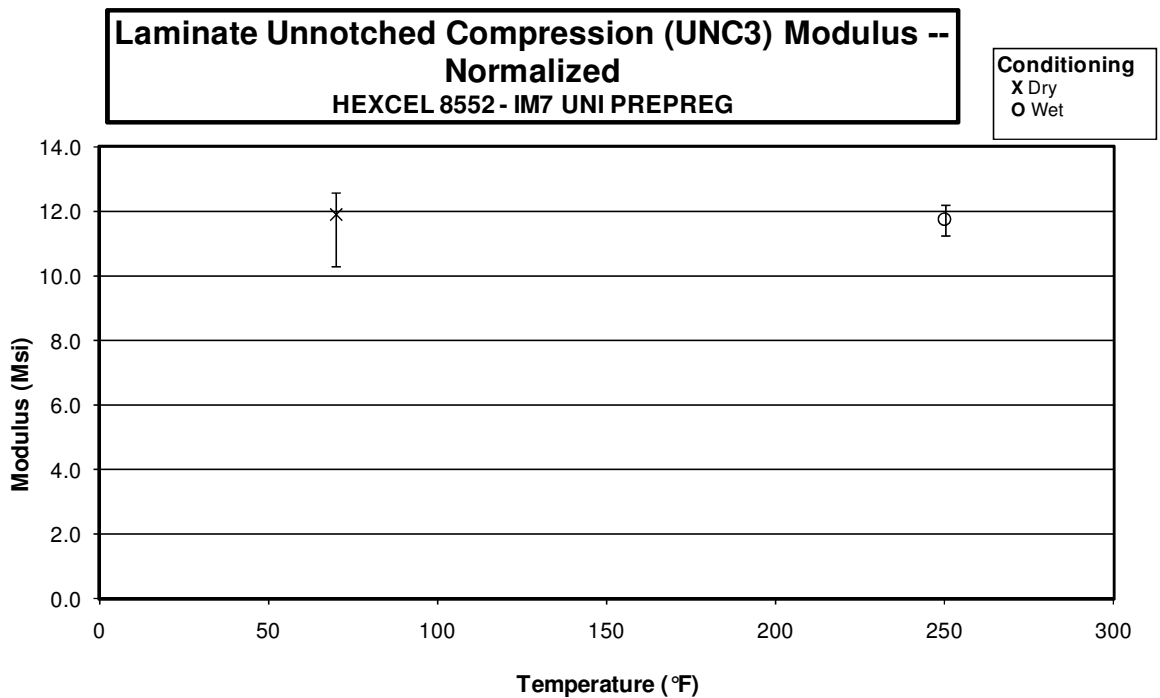
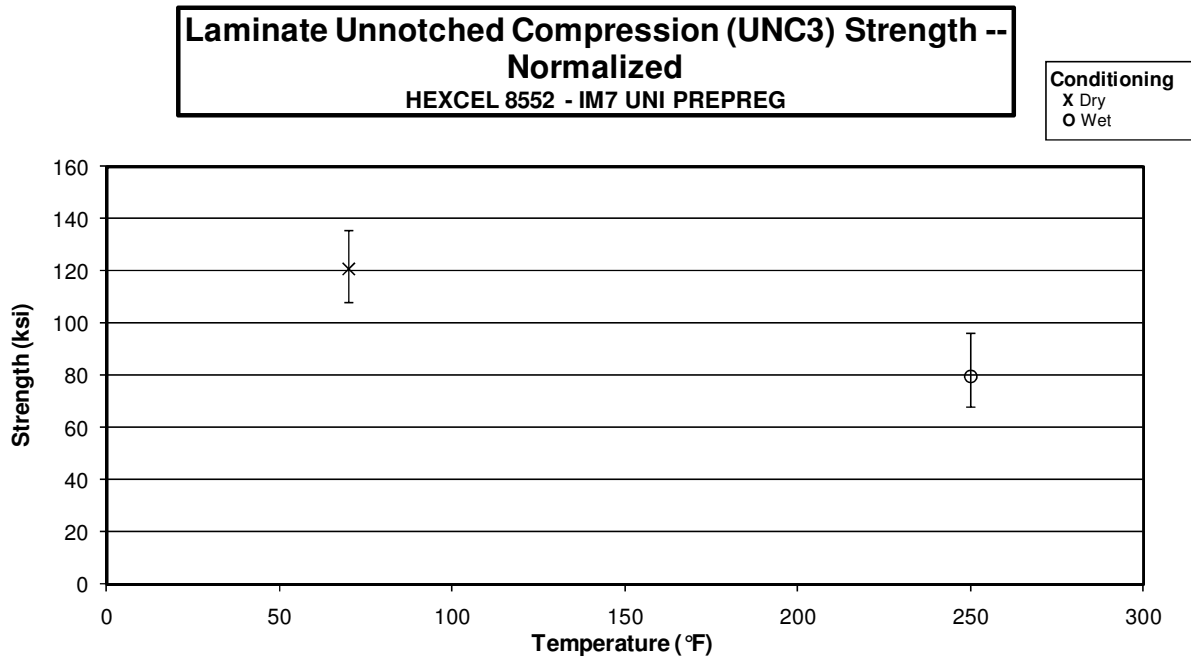
3.12 Unnotched Compression 1 Properties



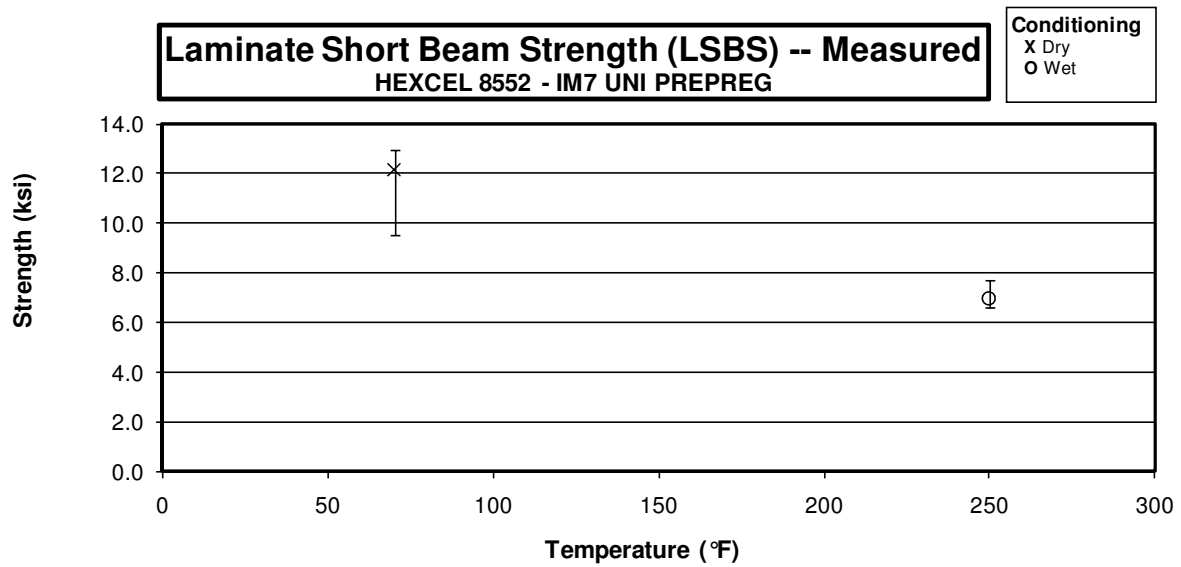
3.13 Unnotched Compression 2 Properties



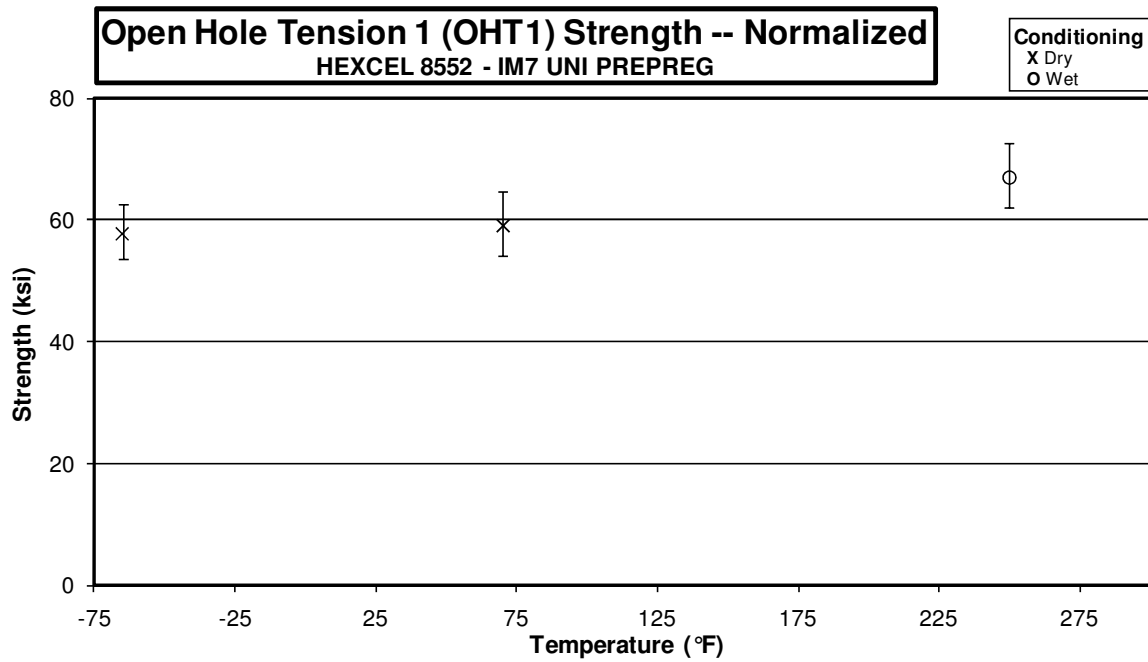
3.14 Unnotched Compression 3 Properties



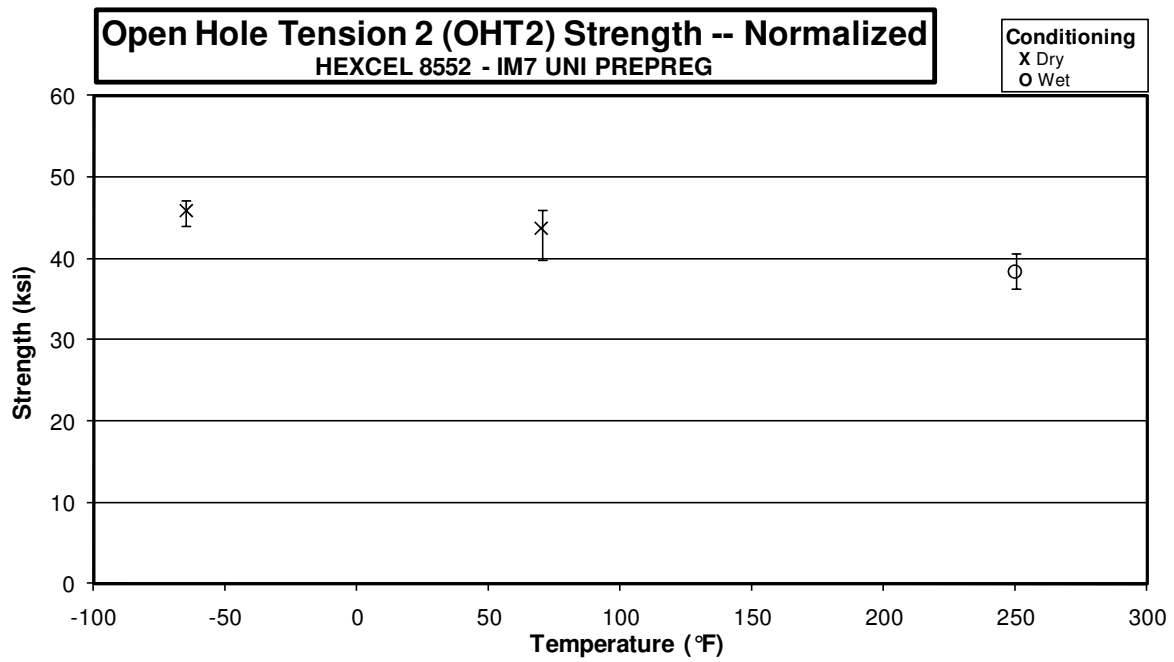
3.15 Laminate Short Beam Shear Properties



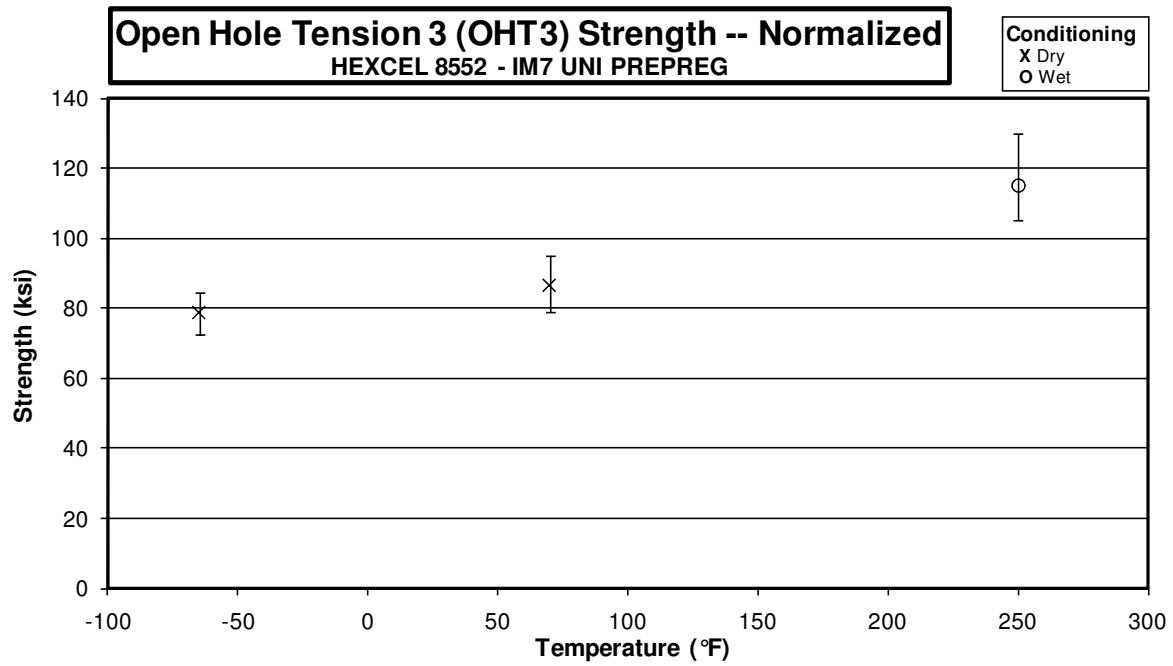
3.16 Open Hole Tension 1 Properties



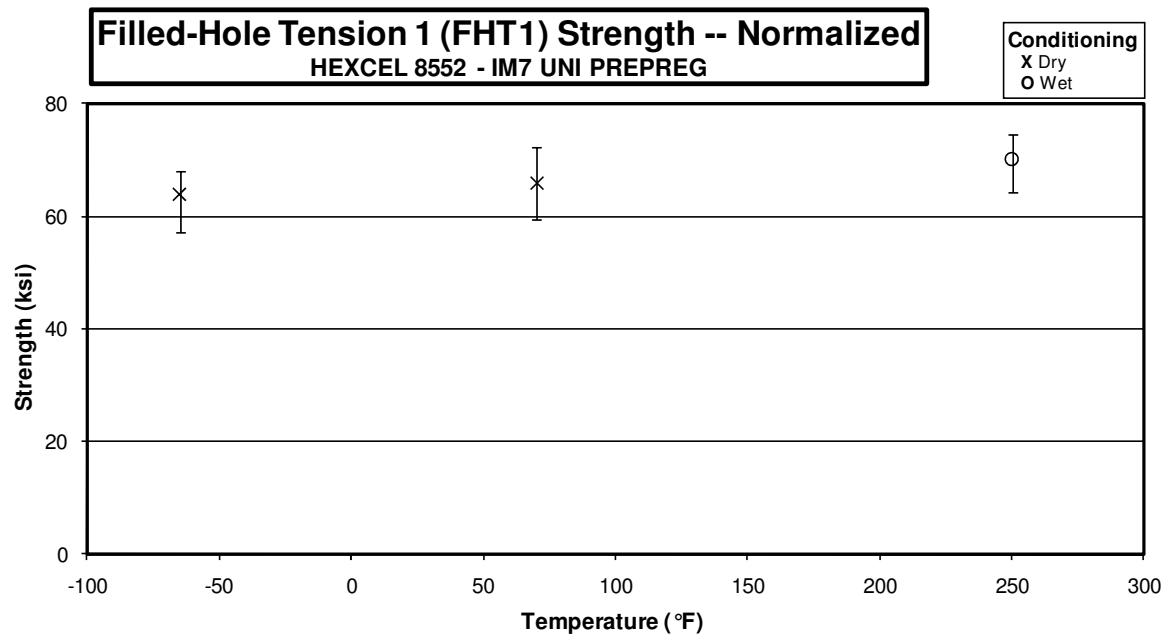
3.17 Open Hole Tension 2 Properties



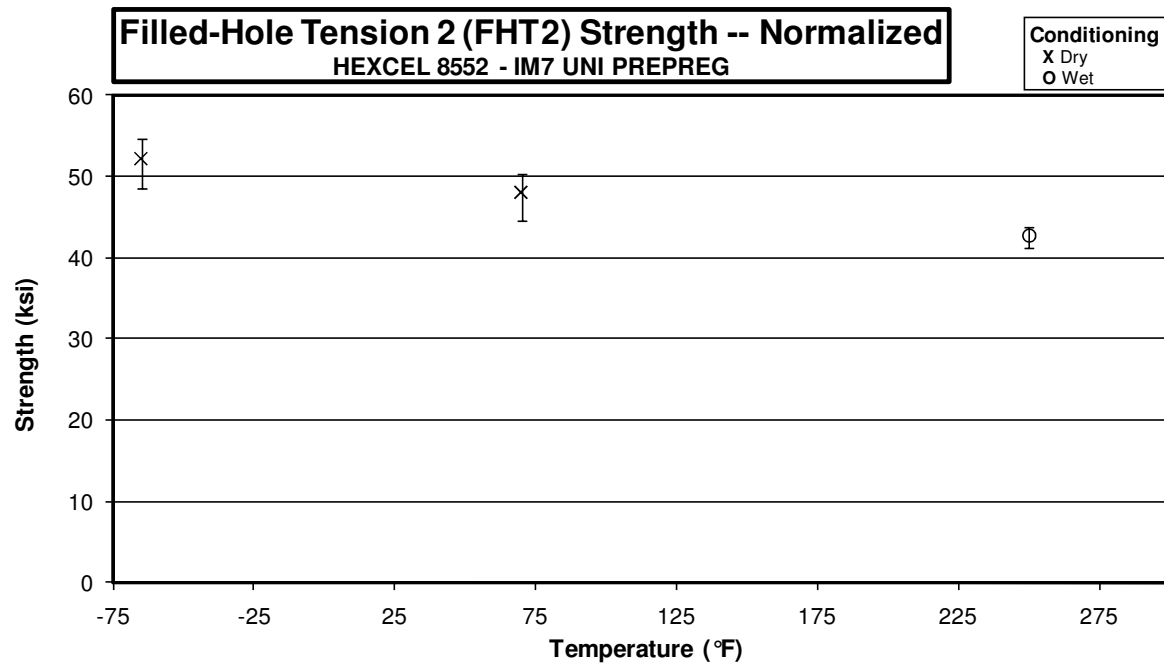
3.18 Open Hole Tension 3 Properties



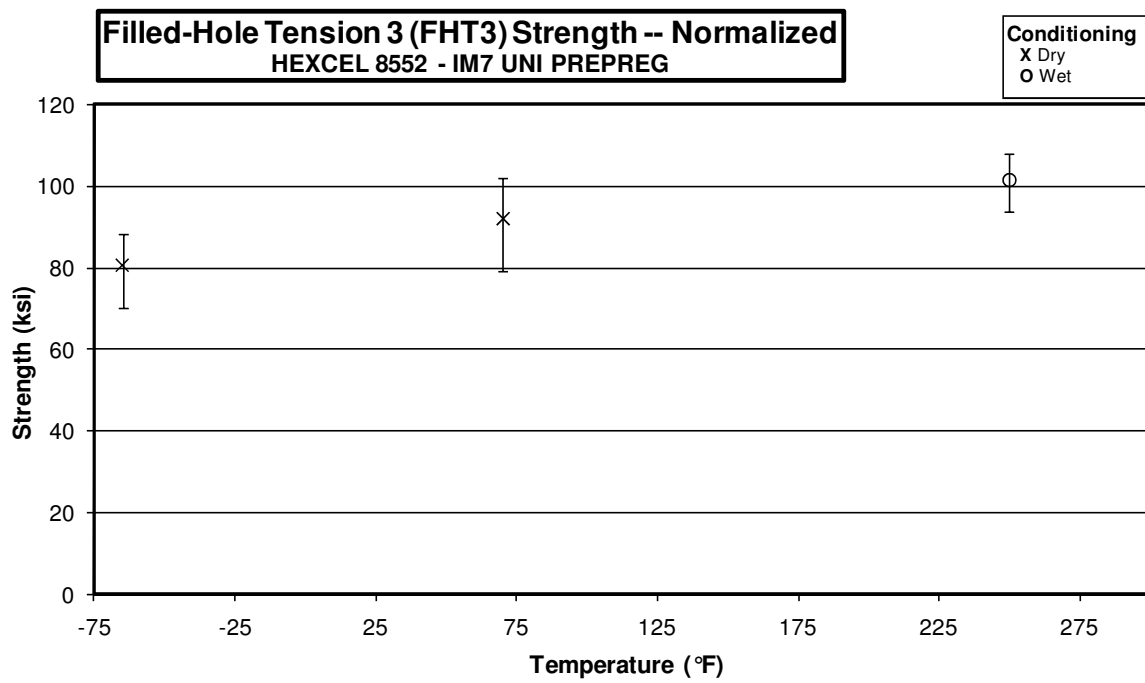
3.19 Filled-Hole Tension 1 Properties



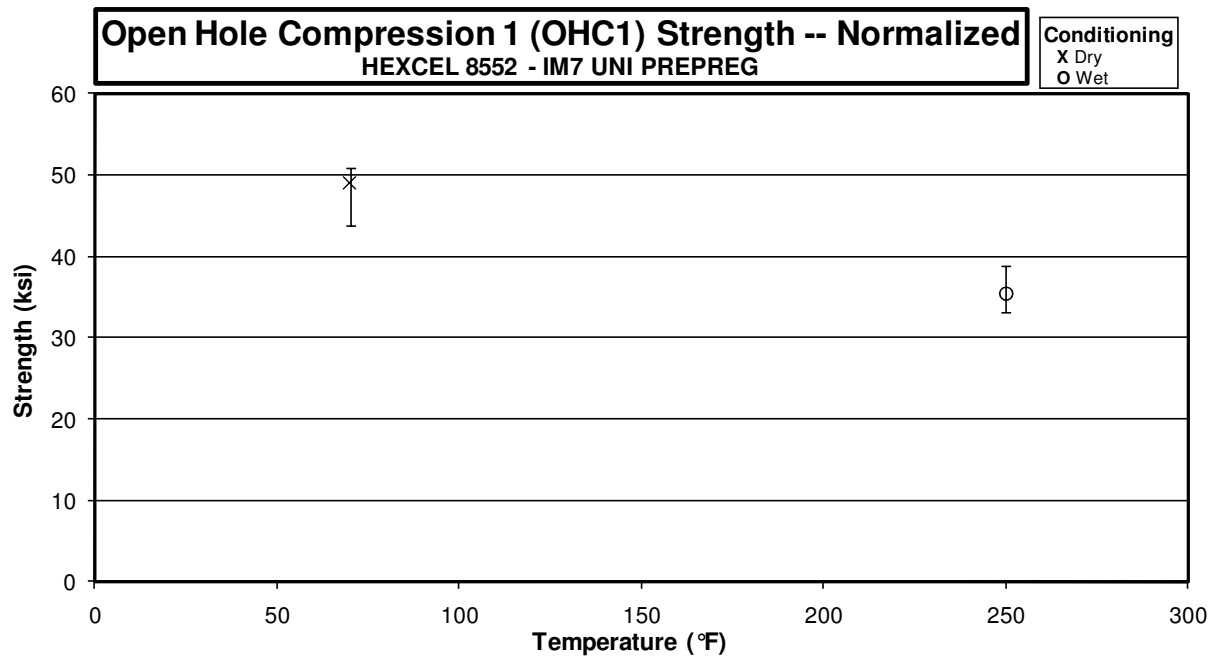
3.20 Filled-Hole Tension 2 Properties



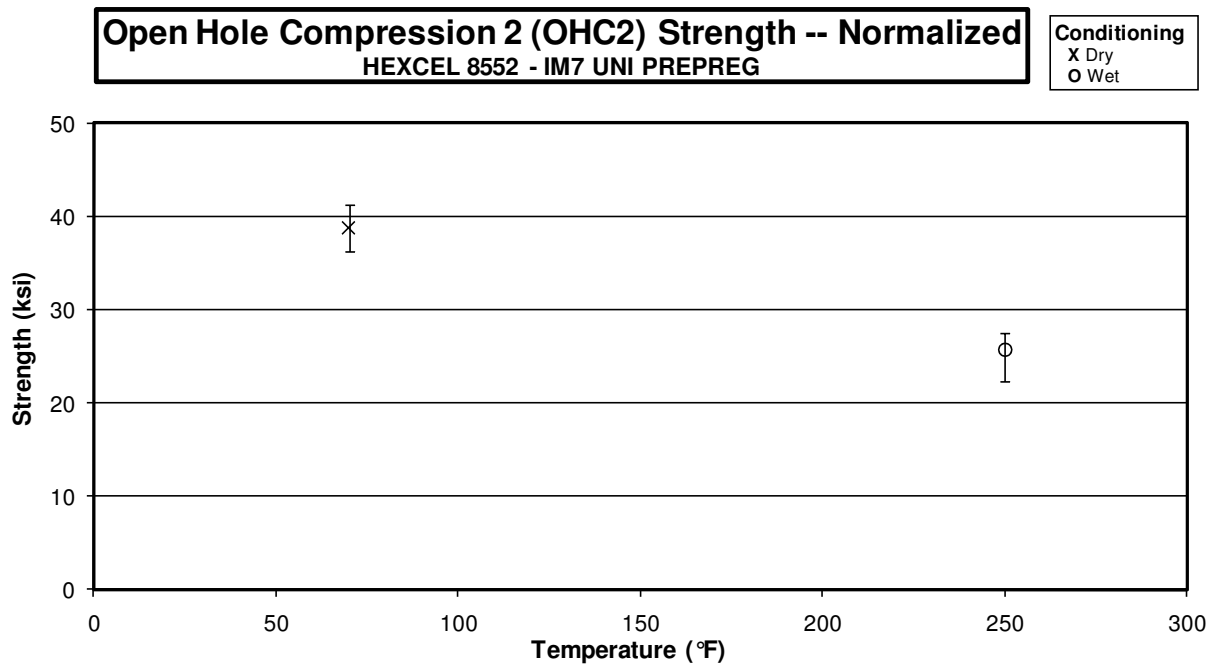
3.21 Filled-Hole Tension 3 Properties



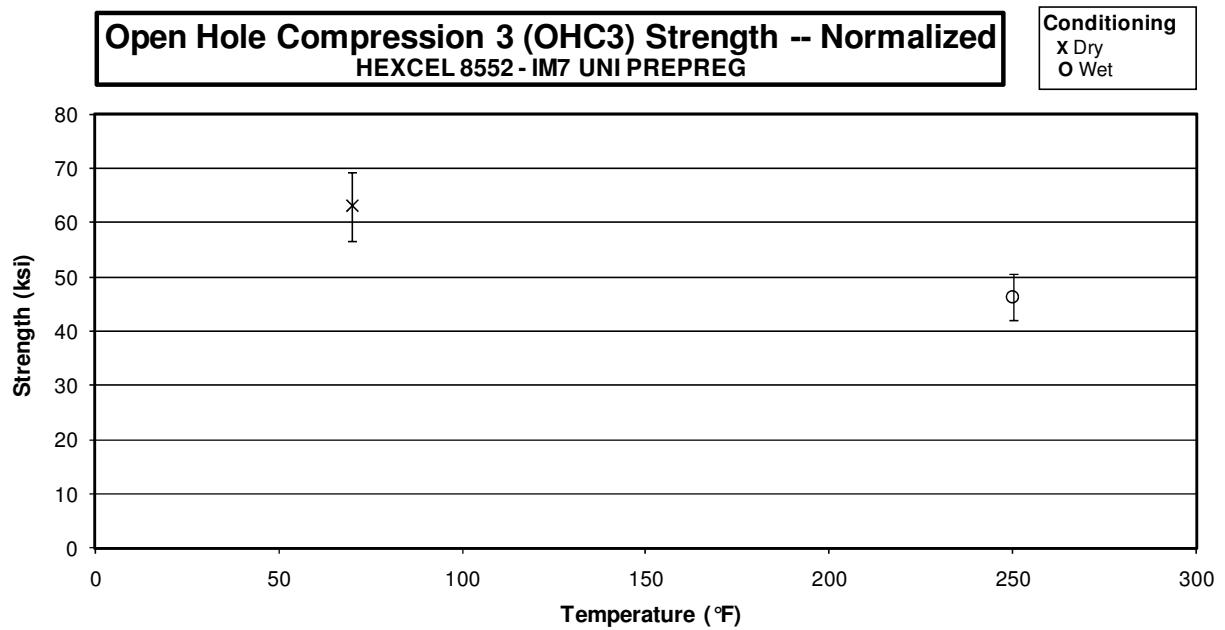
3.22 Open Hole Compression 1 Properties



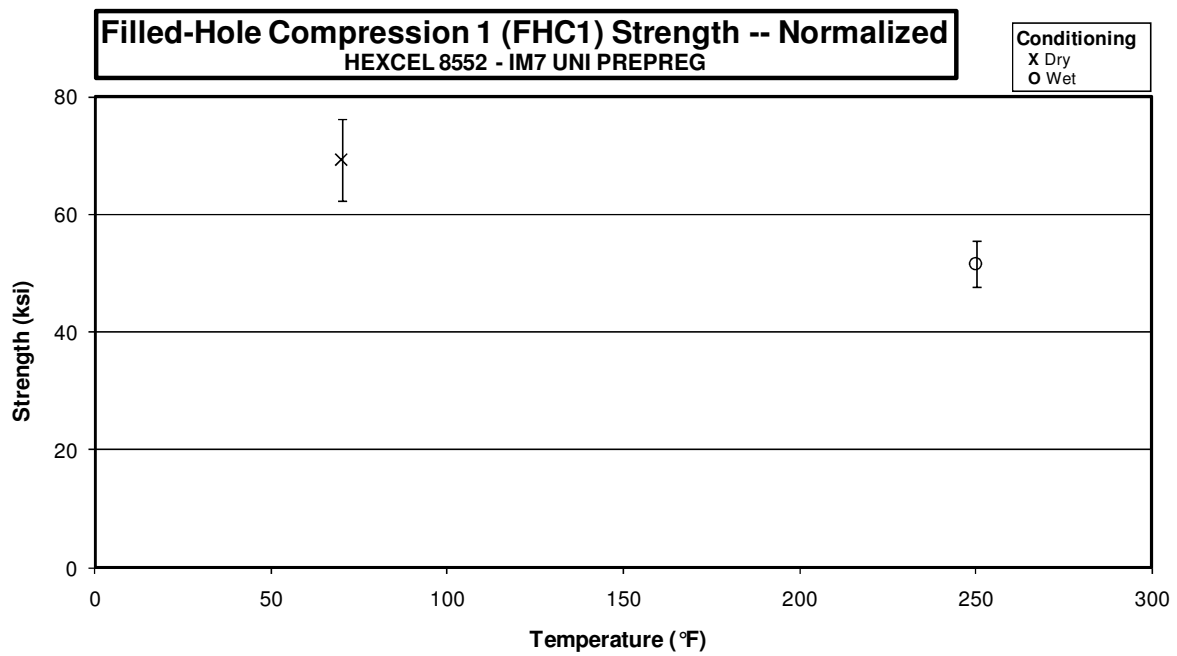
3.23 Open Hole Compression 2 Properties



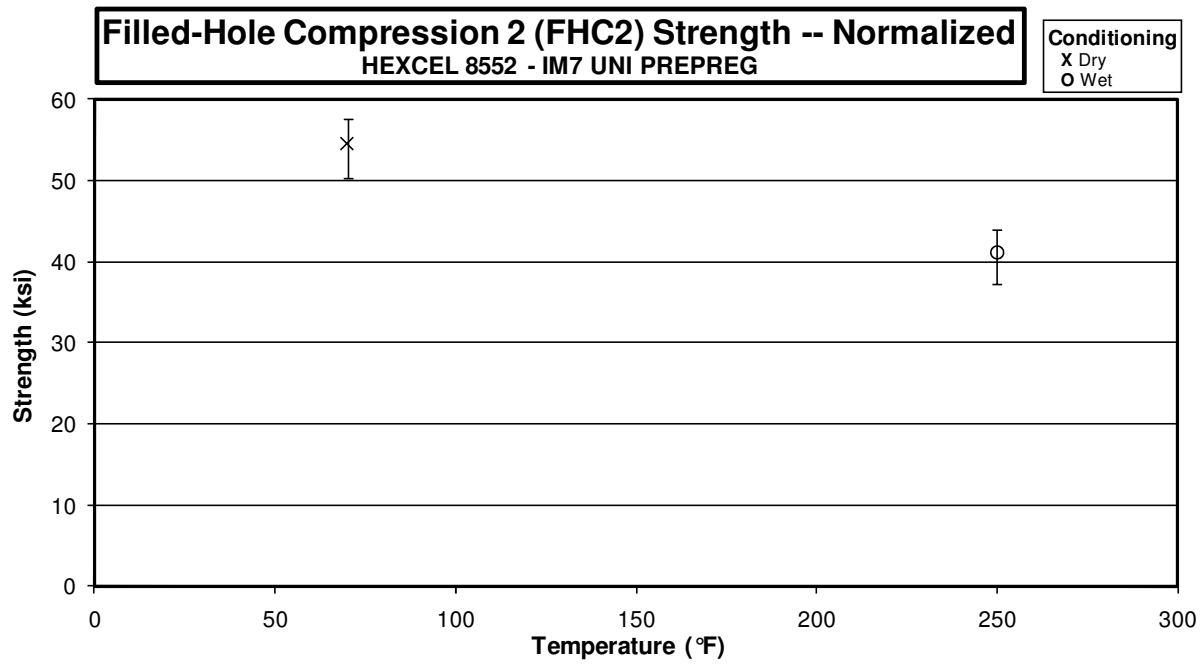
3.24 Open Hole Compression 3 Properties



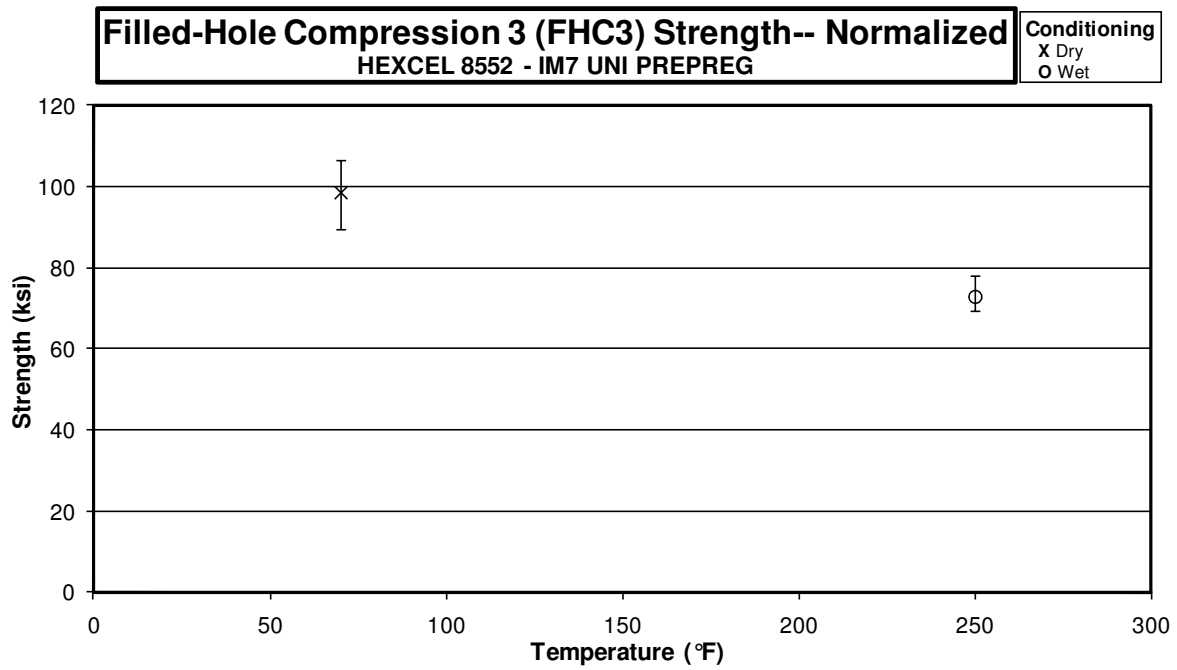
3.25 Filled-Hole Compression 1 Properties



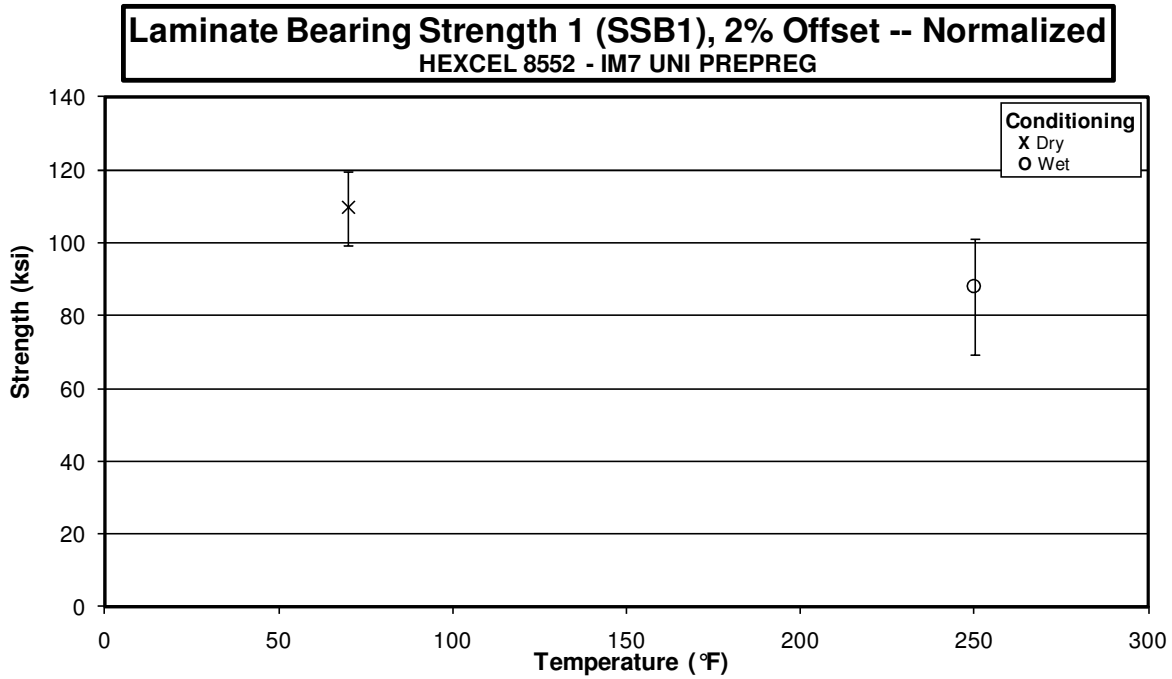
3.26 Filled-Hole Compression 2 Properties



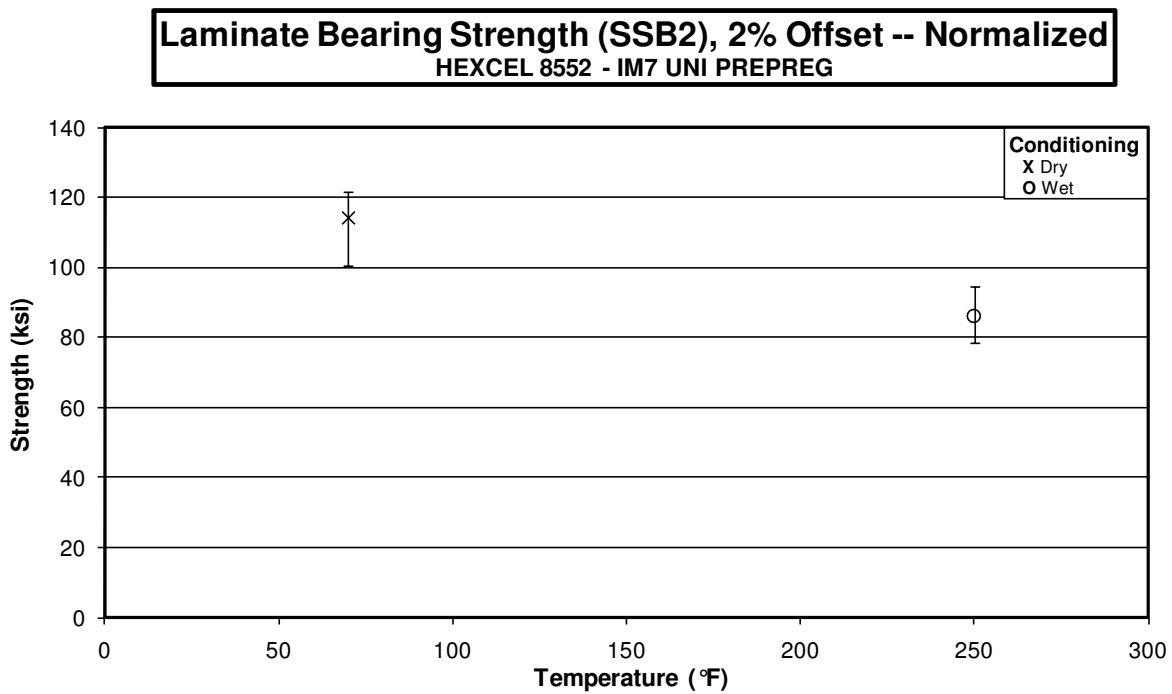
3.27 Filled-Hole Compression 3 Properties



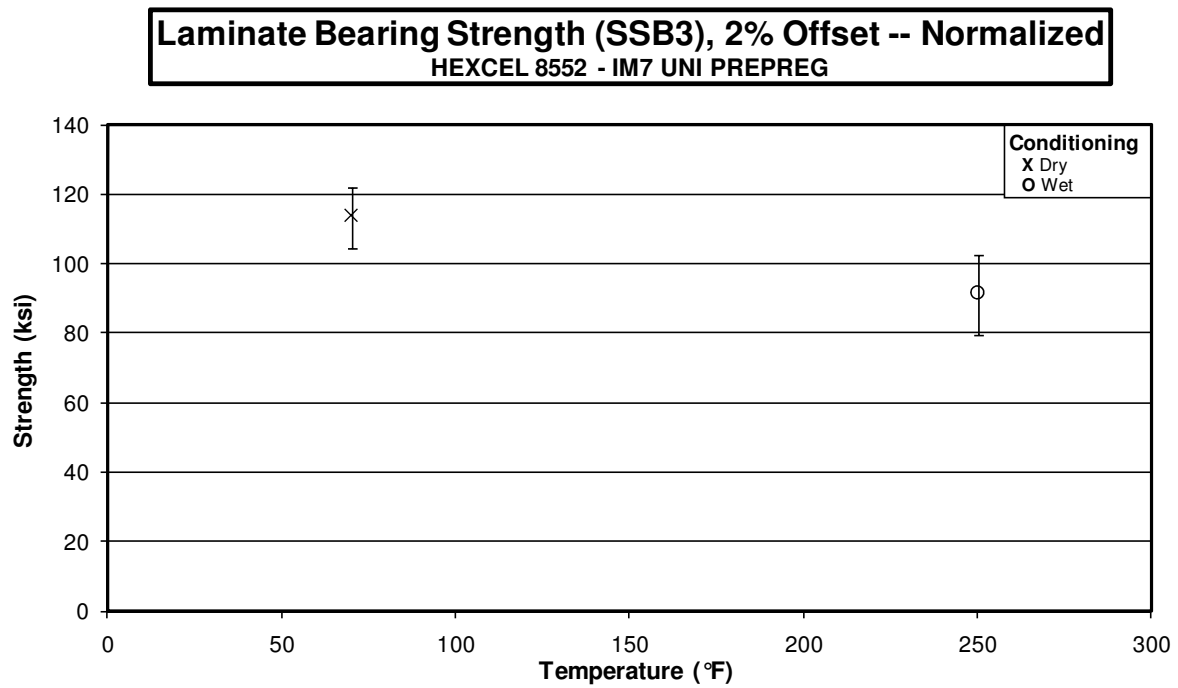
3.28 Single Shear Bearing Strength1 Properties



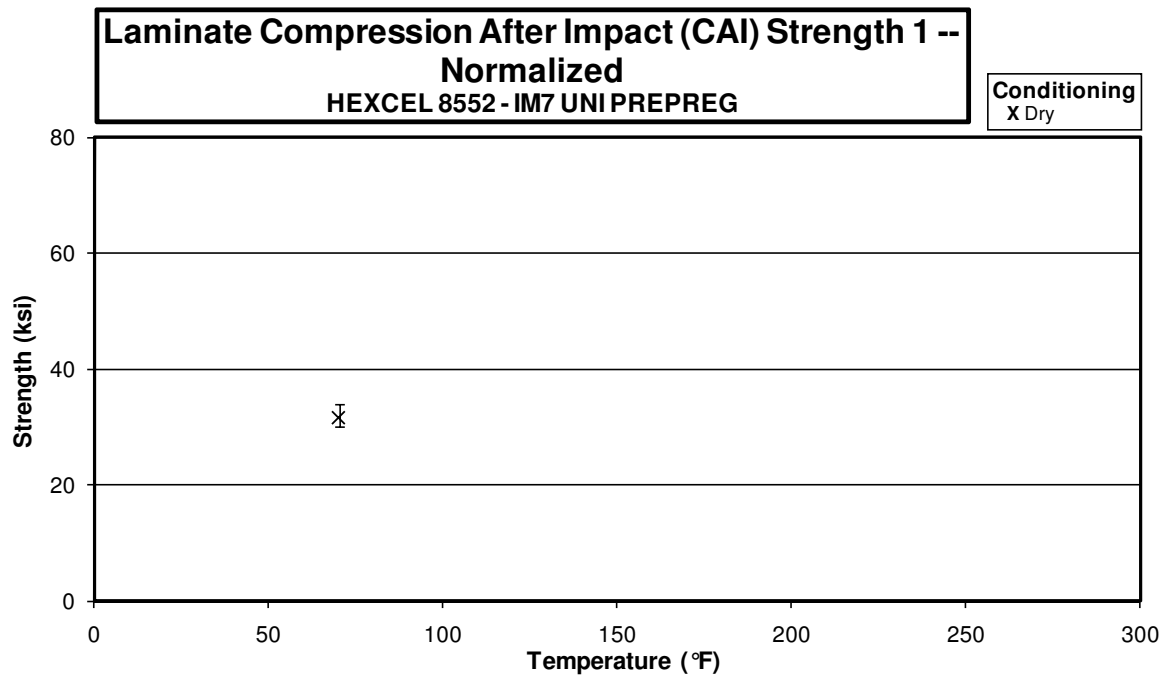
3.29 Single Shear Bearing Strength 2 Properties



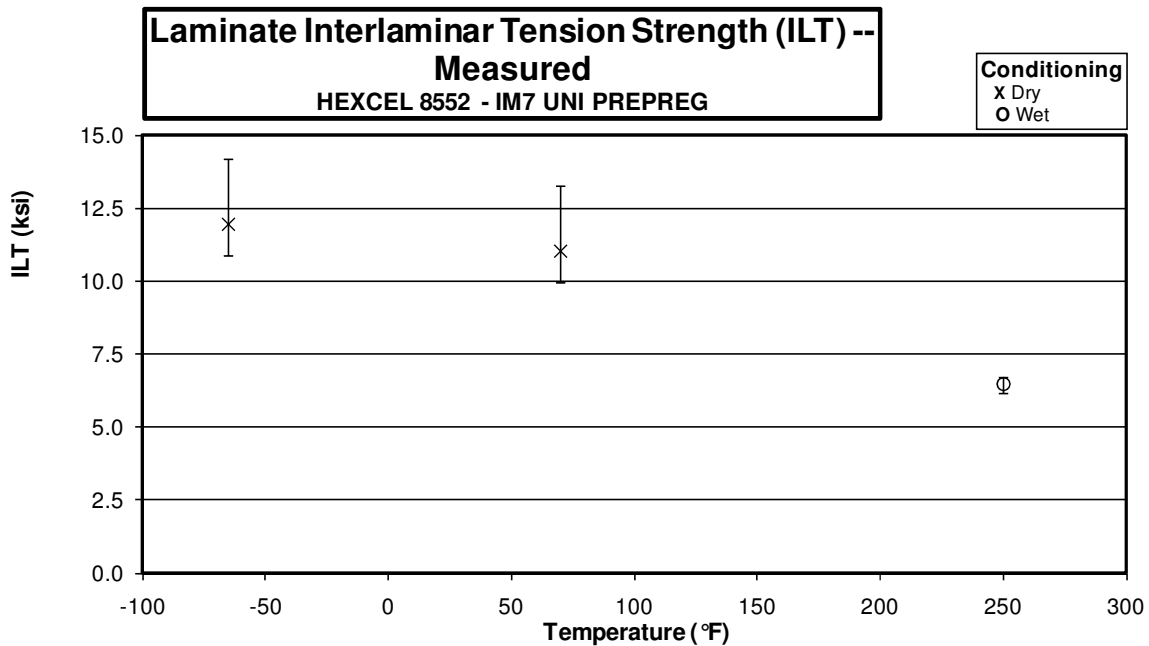
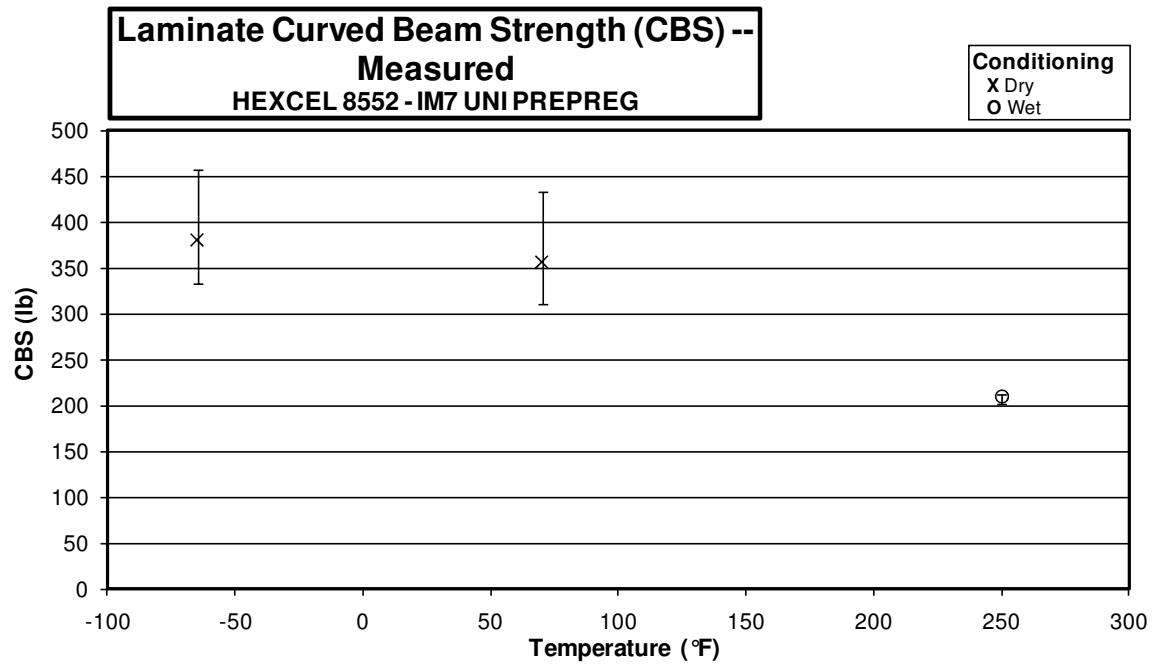
3.30 Single Shear Bearing 3 Properties



3.31 Compression Strength After Impact 1 Properties



3.32 Interlaminar Tension Properties



4. Raw Data

4.1 Longitudinal Tension Properties

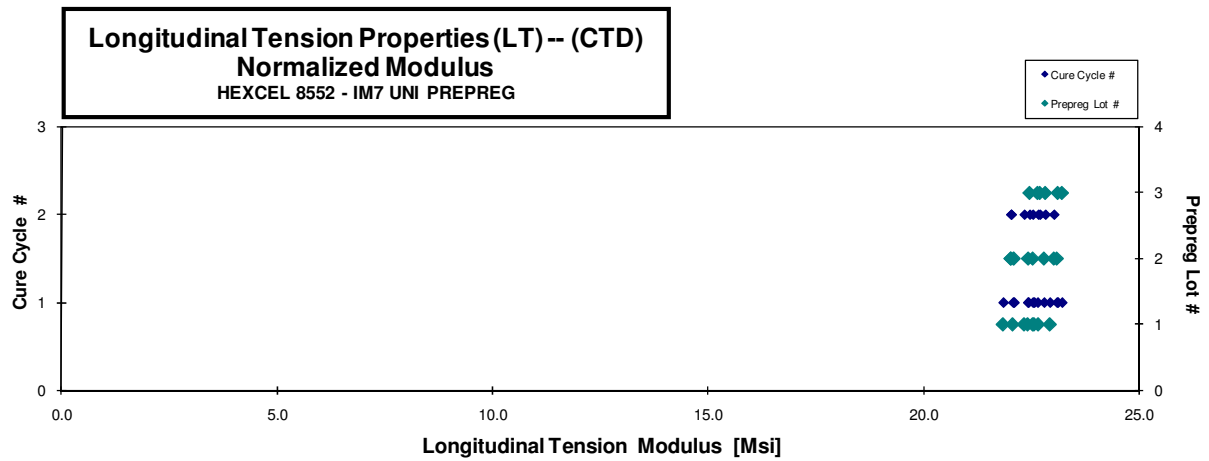
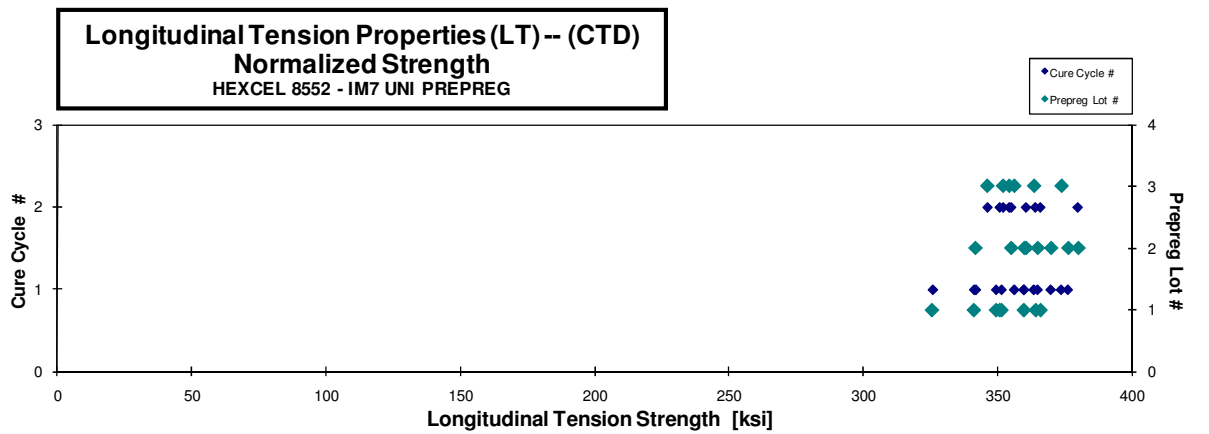
Longitudinal Tension Properties (LT) -- (CTD) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
[in]
0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFUA116B	A	M1	1	1	322.580	22.211	0.213	0.044	6	LGM/SGM	0.0073	325.692	22.425
HFUA117B	A	M1	1	1	344.115	21.742	0.260	0.044	6	LGM/SGM	0.0073	349.426	22.078
HFUA118B	A	M1	1	1	347.430	22.315	0.223	0.044	6	XGM	0.0073	351.451	22.573
HFUA119B	A	M1	1	1	357.922	22.822	0.241	0.043	6	XGM	0.0072	359.717	22.937
HFUA11AB	A	M1	1	1	340.005	21.777	0.271	0.043	6	LGM/SGM	0.0072	341.186	21.852
HFUA216B	A	M2	1	2	345.794	22.348	0.292	0.044	6	LGM/SGM	0.0073	350.730	22.667
HFUA217B	A	M2	1	2	357.079	21.911	0.270	0.044	6	LGM/SGM	0.0073	364.105	22.342
HFUA218B	A	M2	1	2	362.177	22.309	0.260	0.044	6	LGM/SGM	0.0073	365.950	22.541
HFUB116B	B	M1	2	1	372.292	22.689	0.249	0.043	6	XGM	0.0072	369.851	22.540
HFUB117B	B	M1	2	1	363.978	22.690	0.270	0.043	6	XGM	0.0071	359.906	22.436
HFUB118B	B	M1	2	1	372.635	22.583	0.273	0.044	6	XGM	0.0073	376.229	22.801
HFUB119B	B	M1	2	1	361.972	22.914	0.287	0.044	6	XGM	0.0073	364.904	23.099
HFUB11AB	B	M1	2	1	336.611	21.767	0.263	0.044	6	LGM/SGM	0.0073	341.805	22.103
HFUB216B	B	M2	2	2	356.433	22.119	0.282	0.043	6	XGM	0.0072	355.058	22.034
HFUB217B	B	M2	2	2	378.947	22.968	0.260	0.043	6	LGM/SGM	0.0072	379.970	23.030
HFUB218B	B	M2	2	2	357.856	21.870	0.259	0.044	6	XGM	0.0073	360.617	22.039
HFUC116B	C	M1	3	1	351.051	22.324	0.265	0.044	6	XGM	0.0073	356.197	22.651
HFUC117B	C	M1	3	1	350.530	22.293	0.299	0.045	6	XGM	0.0075	363.513	23.119
HFUC118B	C	M1	3	1	363.478	22.583	0.297	0.044	6	XGM	0.0074	373.715	23.219
HFUC216B	C	M2	3	2	342.104	22.203	0.316	0.044	6	SGM/LGM	0.0073	346.196	22.468
HFUC217B	C	M2	3	2	346.534	22.476	0.299	0.044	6	XGM	0.0073	352.015	22.832
HFUC218B	C	M2	3	2	349.867	22.421	0.295	0.044	6	XGM	0.0073	354.321	22.706

Average 353.700 22.333 0.270
Standard Dev. 13.087 0.368 0.025
Coeff. of Var. [%] 3.700 1.646 9.317
Min. 322.580 21.742 0.213
Max. 378.947 22.968 0.316
Number of Spec. 22 22 22

Average_{norm} 0.0073 357.389 22.568
Standard Dev._{norm} 12.620 0.387
Coeff. of Var. [%]_{norm} 3.531 1.717
Min. 0.0071 325.692 21.852
Max. 0.0075 379.970 23.219
Number of Spec. 22 22



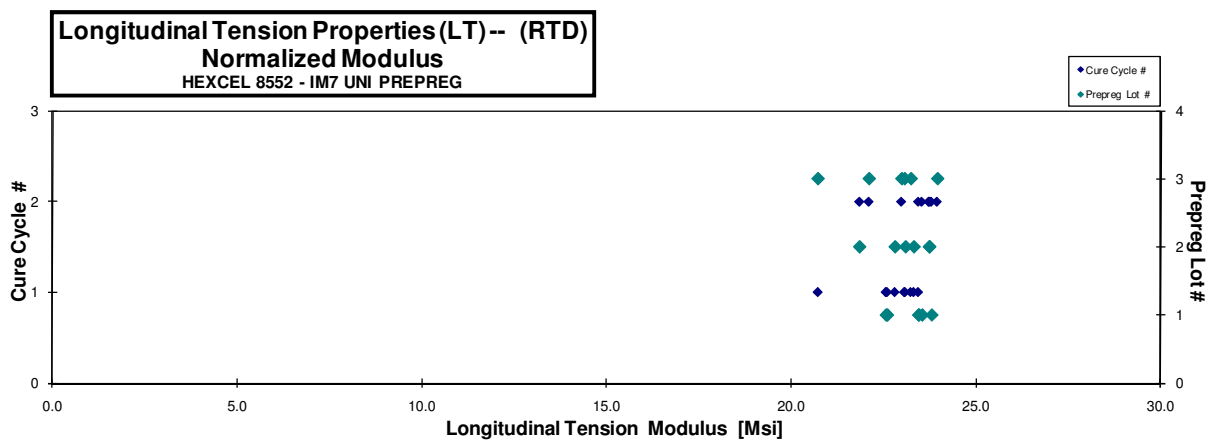
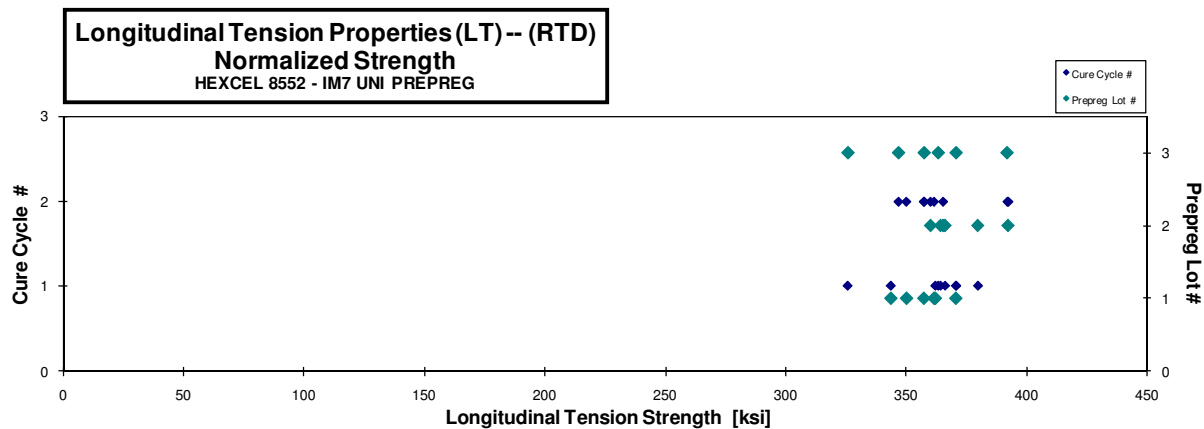
Longitudinal Tension Properties (LT) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFUA111A	A	M1	1	1	363.189	23.841	0.300	0.041	6	XGM	0.0068	343.573	22.553
HFUA112A	A	M1	1	1	374.161	23.658	0.283	0.043	6	XGM	0.0071	370.552	23.430
HFUA113A	A	M1	1	1	368.425	22.987	0.312	0.042	6	XGM	0.0071	362.029	22.588
HFUA211A	A	M2	1	2	370.513	24.377	0.356	0.042	6	XGM	0.0070	361.507	23.785
HFUA212A	A	M2	1	2	340.311	22.783	0.306	0.044	6	XGM	0.0074	350.027	23.433
HFUA213A	A	M2	1	2	348.015	22.918	0.325	0.044	6	XGM	0.0074	357.280	23.528
HFUB111A	B	M1	2	1	389.234	24.235	0.316	0.041	6	XGM	0.0068	366.109	22.795
HFUB112A	B	M1	2	1	381.337	23.404	0.308	0.043	6	XGM	0.0072	379.719	23.305
HFUB113A	B	M1	2	1	361.174	22.881	0.308	0.044	6	XGM	0.0073	364.239	23.076
HFUB211A	B	M2	2	2	401.224	24.332	0.315	0.039	6	XGM	0.0065	360.049	21.835
HFUB212A	B	M2	2	2	391.416	23.661	0.326	0.043	6	XGM	0.0072	392.322	23.716
HFUB213A	B	M2	2	2	359.564	23.361	0.319	0.044	6	XGM	0.0073	365.251	23.731
HFUC111A	C	M1	3	1	368.314	23.417	0.315	0.038	6	XGM	0.0064	325.685	20.707
HFUC112A	C	M1	3	1	378.487	24.196	0.354	0.041	6	XGM	0.0069	363.301	23.225
HFUC112A	C	M1	3	1	367.440	22.850	0.314	0.044	6	XGM	0.0073	370.700	23.053
HFUC211A	C	M2	3	2	372.821	23.749	0.306	0.040	6	XGM	0.0067	346.787	22.090
HFUC212A	C	M2	3	2	359.372	23.098	0.306	0.043	6	XGM	0.0072	357.431	22.973
HFUC213A	C	M2	3	2	384.495	23.488	0.312	0.044	6	XGM	0.0073	391.912	23.941

Average 371.083 23.513 0.316
 Standard Dev. 15.227 0.533 0.017
 Coeff. of Var. [%] 4.103 2.267 5.450
 Min. 340.311 22.783 0.283
 Max. 401.224 24.377 0.356
 Number of Spec. 18 18 18

Average_{norm} 0.0070 362.693 22.987
 Standard Dev._{norm} 16.057 0.812
 Coeff. of Var. [%]_{norm} 4.427 3.532
 Min. 0.0064 325.685 20.707
 Max. 0.0074 392.322 23.941
 Number of Spec. 18 18



Longitudinal Tension Properties (LT) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}

[in]

0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFUA11BD	A	M1	1	1	331.955	23.036	0.431	0.044	6	SGM	0.0073	335.541	23.285
HFUA11CD	A	M1	1	1	301.489	23.846	0.435	0.043	6	XGM	0.0072	303.117	23.975
HFUA11DD*	A	M1	1	1		23.922	0.400	0.043	6	SGM / SIT	0.0072		23.793
HFUA11FD*	A	M1	1	1		23.564	0.396	0.043	6	SGM / SIT	0.0071		23.382
HFUA11GD	A	M1	1	1	256.064	26.174	0.470	0.042	6	XGM	0.0070	250.235	25.578
HFUA21BD	A	M2	1	2	351.042	23.311	0.428	0.044	6	XGM	0.0073	357.814	23.761
HFUA21CD	A	M2	1	2	330.067	24.009	0.217	0.044	6	XGM	0.0073	335.288	24.389
HFUA21DD	A	M2	1	2	241.828	23.023	0.189	0.044	6	SGM	0.0073	244.533	23.281
HFUA21ED	A	M2	1	2	337.005	23.286	0.359	0.044	6	XGM	0.0074	347.016	23.977
HFUA21FD	A	M2	1	2	352.193	22.694	0.334	0.045	6	SGM	0.0075	366.596	23.622
HFUB11BD**	B	M1	2	1	292.200			0.044	6	XGM	0.0073	296.033	
HFUB11CD*	B	M1	2	1		24.475	0.443	0.044	6	XGM / SIT	0.0073		24.702
HFUB11DD**(*)	B	M1	2	1		23.469		0.043	6	SGM/SIT	0.0072		23.496
HFUB11ED	B	M1	2	1	343.230	23.122	0.353	0.044	6	XGM	0.0074	352.102	23.719
HFUB11FD	B	M1	2	1	345.534	23.158	0.365	0.044	6	XGM	0.0074	355.532	23.828
HFUB21BD*	B	M2	2	2		23.704	0.477	0.043	6	SIT	0.0072		23.558
HFUB21CD*	B	M2	2	2		24.072	0.491	0.043	6	XGM / SIT	0.0071		23.738
HFUB21DD**(*)	B	M2	2	2		24.203		0.043	6	SGM / SIT	0.0072		24.063
HFUB21ED*	B	M2	2	2		24.319	0.426	0.043	6	SGM / SIT	0.0072		24.356
HFUB21FD	B	M2	2	2	360.612	22.912	0.364	0.044	6	XGM	0.0073	365.481	23.222
HFUC11BD	C	M1	3	1	341.059	24.199	0.430	0.043	6	DGM	0.0072	342.901	24.329
HFUC11CD	C	M1	3	1	331.939	24.406	0.432	0.043	6	XGM	0.0072	331.555	24.378
HFUC11DD**	C	M1	3	1	308.746	23.422		0.043	6	XGM	0.0072	309.103	23.449
HFUC11ED	C	M1	3	1		24.622	0.412	0.044	6	SGM / SIT	0.0073		24.831
HFUC11FD	C	M1	3	1	366.864	23.363	0.363	0.044	6	XGM	0.0073	373.234	23.769
HFUC21BD	C	M2	3	2		23.810	0.409	0.043	6	SGM / SIT	0.0072		23.930
HFUC21CD	C	M2	3	2		23.857	0.440	0.044	6	SGM / SIT	0.0073		24.023
HFUC21DD**	C	M2	3	2		24.376		0.044	6	SGM / SIT	0.0073		24.790
HFUC21ED	C	M2	3	2	359.071	23.347	0.380	0.044	6	XGM	0.0074	369.461	24.023
HFUC21FD	C	M2	3	2	352.438	23.761	0.382	0.045	6	XGM	0.0075	367.531	24.778

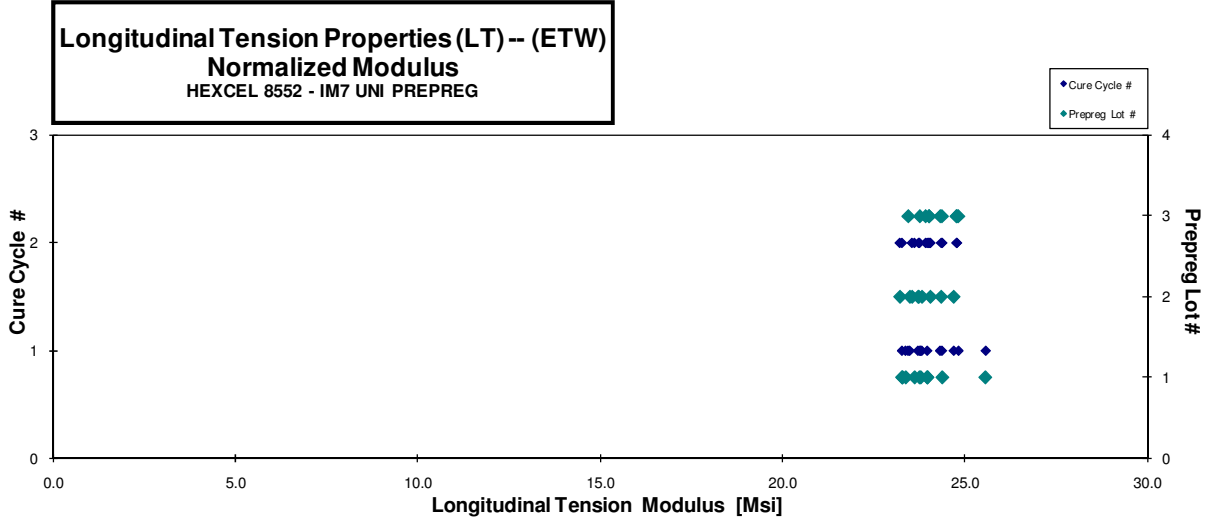
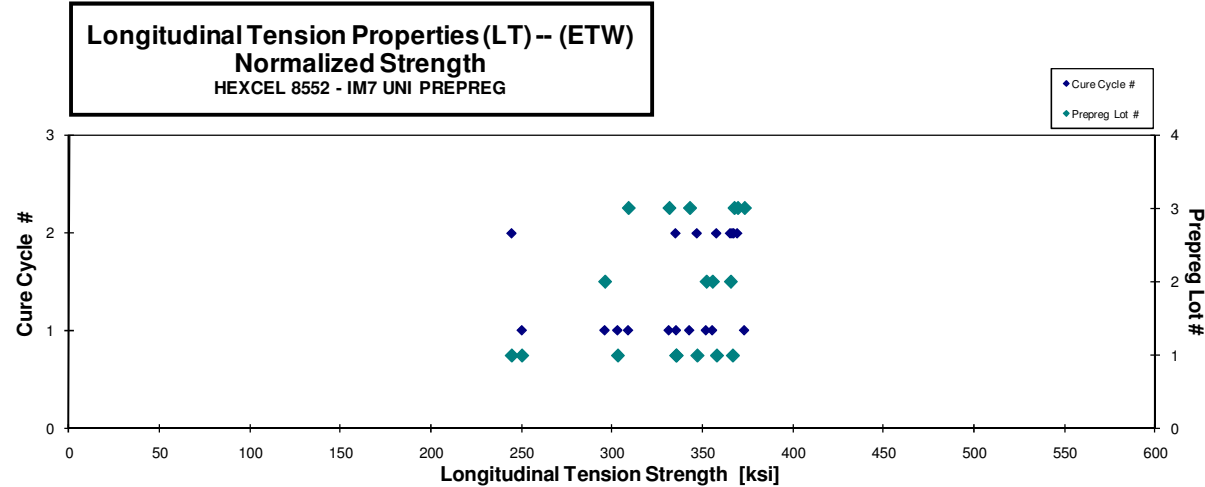
HIGH FREQUENCY OF UNACCEPTABLE FAILURES. ADHESIVE USED TO BOND TABS APPEARS TO BE INADEQUATE

*COUPONS EXPERIENCED AN UN ACCEPTABLE FAILURE AND THE STRENGTH WAS REMOVED

**MODULUS AND/OR POISSONS RATIO WAS REMOVED DUE TO NON-LINEARITY

Average	327.963	23.775	0.393
Standard Dev.	35.176	0.693	0.070
Coeff. of Var. [%]	10.726	2.917	17.820
Min.	241.828	22.694	0.189
Max.	366.864	26.174	0.491
Number of Spec.	18	29	25

Average _{norm}	0.0073	333.504	24.001
Standard Dev. _{norm}		38.823	0.557
Coeff. of Var. [%] _{norm}		11.641	2.321
Min.	0.0070	244.533	23.222
Max.	0.0075	373.234	25.578
Number of Spec.		18	29

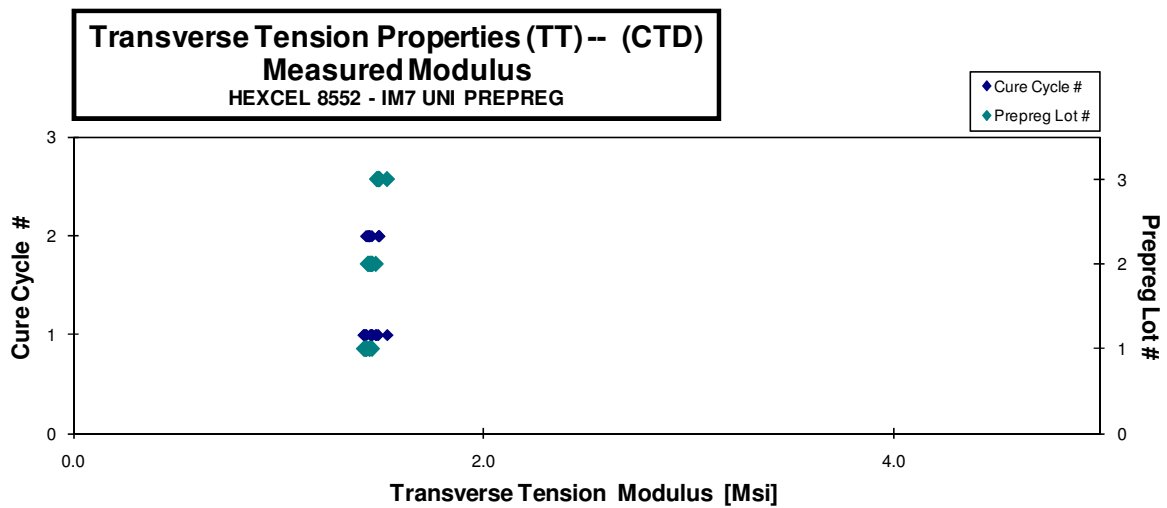
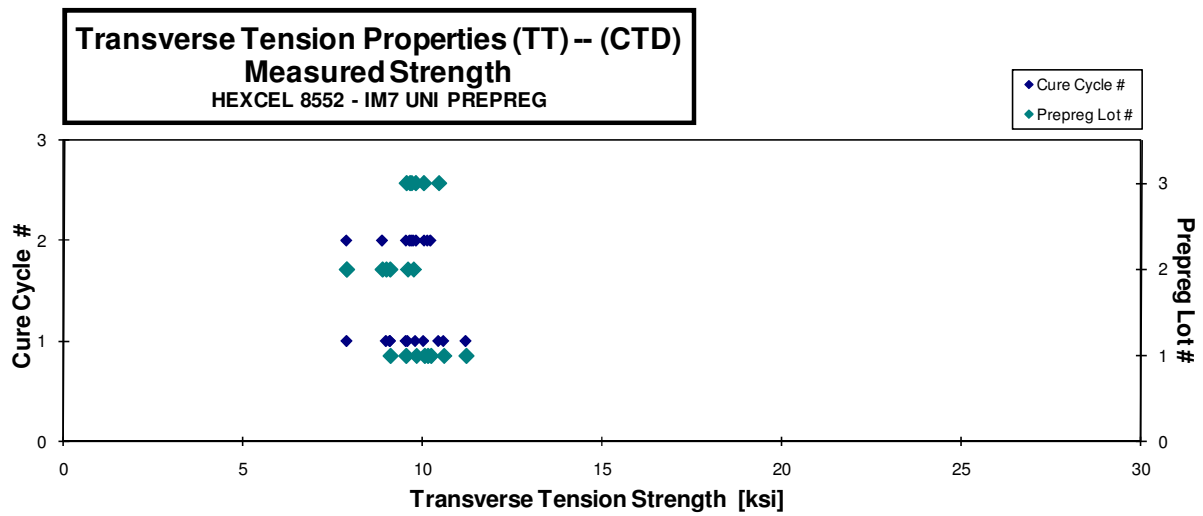


4.2 Transverse Tension Properties

Transverse Tension Properties (TT) -- (CTD) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG
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Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIUA116B	A	M1	1	1	9.090	1.431	0.081	11	0.0074	LGM
HFIUA117B	A	M1	1	1	9.524	1.421	0.081	11	0.0074	LAT
HFIUA118B	A	M1	1	1	11.192	1.425	0.082	11	0.0075	LAB
HFIUA119B	A	M1	1	1	10.574	1.417	0.082	11	0.0075	LAT/LWB
HFIUA215B	A	M2	1	2	9.812	1.446	0.081	11	0.0073	LGM
HFIUA216B	A	M2	1	2	10.127	1.445	0.081	11	0.0074	LGM/LAT
HFIUA217B	A	M2	1	2	10.039	1.458	0.081	11	0.0073	LGM
HFIUA218B	A	M2	1	2	10.215	1.430	0.082	11	0.0075	LGM
HFIUB115B	B	M1	2	1	9.082	1.460	0.078	11	0.0071	LAB
HFIUB116B	B	M1	2	1	8.976	1.476	0.078	11	0.0071	LAB
HFIUB117B	B	M1	2	1	7.881	1.450	0.078	11	0.0071	LAB
HFIUB118B	B	M1	2	1	9.574	1.455	0.080	11	0.0072	LGM
HFIUB215B	B	M2	2	2	7.876	1.441	0.079	11	0.0072	LWT
HFIUB216B	B	M2	2	2	9.734	1.448	0.079	11	0.0072	LWT
HFIUB217B	B	M2	2	2	8.869	1.436	0.078	11	0.0071	LAT
HFIUC115B	C	M1	3	1	9.790	1.488	0.081	11	0.0074	LWB
HFIUC116B	C	M1	3	1	10.432	1.532	0.076	11	0.0069	LAT
HFIUC117B	C	M1	3	1	10.014	1.481	0.080	11	0.0072	LAB
HFIUC215B	C	M2	3	2	9.632	1.491	0.080	11	0.0073	LWT
HFIUC216B	C	M2	3	2	9.535	1.491	0.080	11	0.0073	LWT
HFIUC217B	C	M2	3	2	9.681	1.494	0.079	11	0.0072	LGM

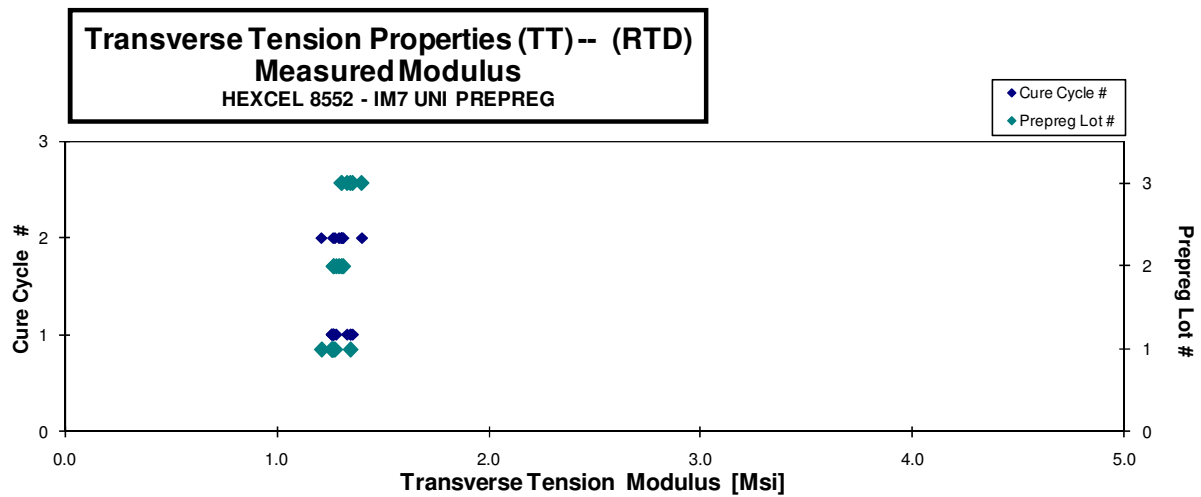
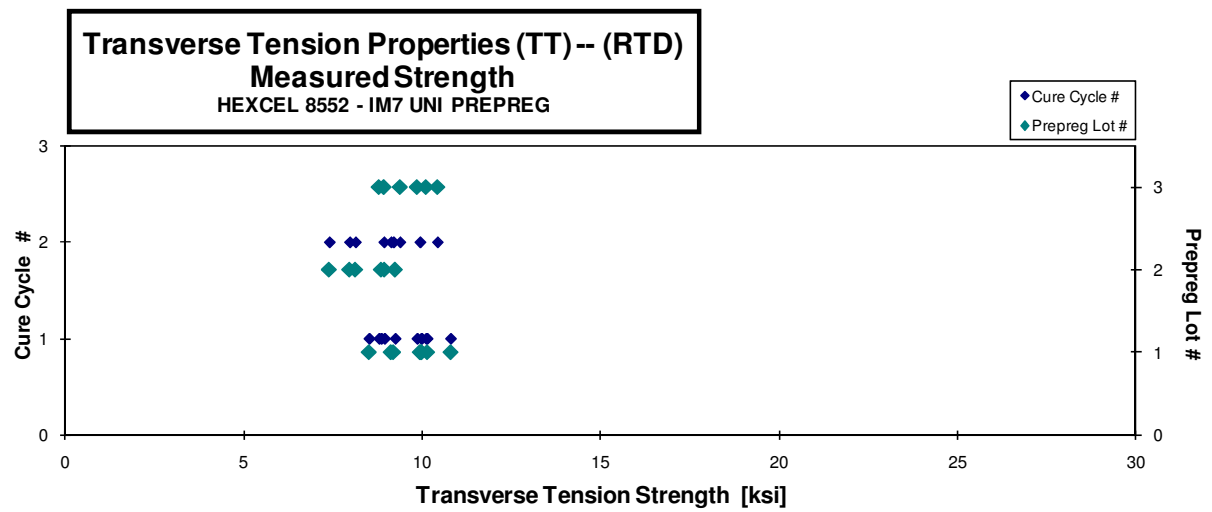
Average	9.602	1.458	0.0073
Standard Dev.	0.797	0.030	
Coeff. of Var. [%]	8.297	2.037	
Min.	7.876	1.417	0.0069
Max.	11.192	1.532	0.0075
Number of Spec.	21	21	



Transverse Tension Properties (TT) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIUA111A	A	M1	1	1	9.972	1.350	0.075	11	0.0068	LAT
HFIUA112A	A	M1	1	1	10.801	1.263	0.083	11	0.0076	LWT
HFIUA113A	A	M1	1	1	8.514	1.271	0.083	11	0.0075	LGM
HFIUA114A	A	M1	1	1	9.987	1.262	0.081	11	0.0074	LAB
HFIUA115A	A	M1	1	1	10.145	1.262	0.082	11	0.0074	LAT
HFIUA212A	A	M2	1	2	9.127	1.276	0.082	11	0.0075	LGM
HFIUA213A	A	M2	1	2	9.942	1.214	0.082	11	0.0075	LGM
HFIUA214A	A	M2	1	2	9.195	1.268	0.081	11	0.0073	LGM
HFIUB112A	B	M1	2	1	8.853	1.269	0.079	11	0.0072	LGM
HFIUB113A	B	M1	2	1	8.946	1.270	0.080	11	0.0072	LWB
HFIUB114A	B	M1	2	1	9.246	1.282	0.078	11	0.0071	LWB
HFIUB212A	B	M2	2	2	7.397	1.295	0.080	11	0.0073	LGM
HFIUB213A	B	M2	2	2	7.967	1.307	0.079	11	0.0072	LAB
HFIUB214A	B	M2	2	2	8.132	1.315	0.078	11	0.0071	LAT
HFIUC111A	C	M1	3	1	9.860	1.359	0.078	11	0.0071	LGM
HFIUC112A	C	M1	3	1	8.791	1.333	0.080	11	0.0073	LAT
HFIUC113A	C	M1	3	1	10.109	1.348	0.080	11	0.0072	LAT
HFIUC211A	C	M2	3	2	8.929	1.401	0.075	11	0.0068	LGM
HFIUC212A	C	M2	3	2	10.430	1.307	0.081	11	0.0074	LGM
HFIUC213A	C	M2	3	2	9.381	1.307	0.080	11	0.0073	LAT

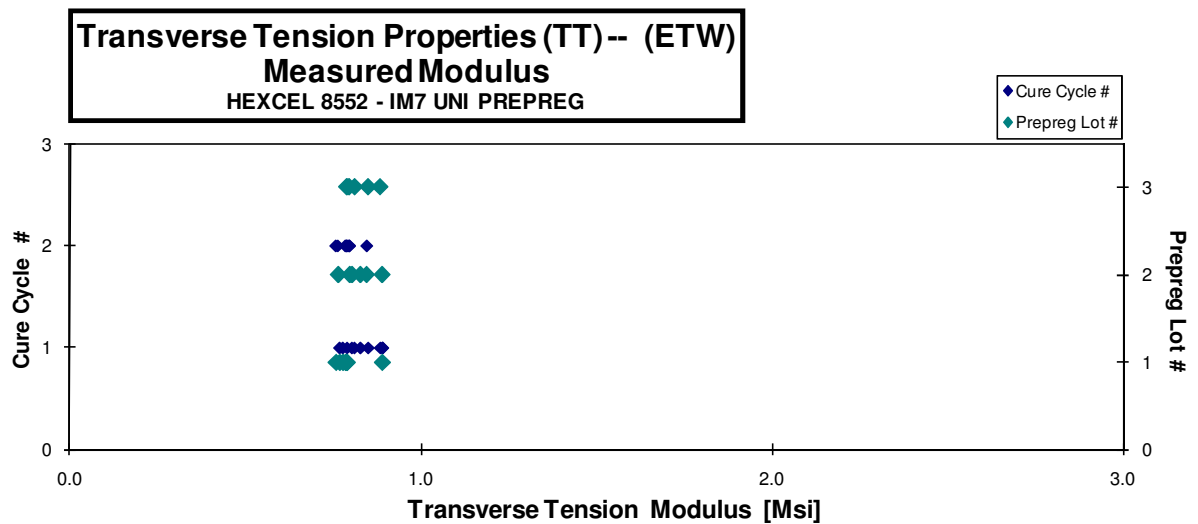
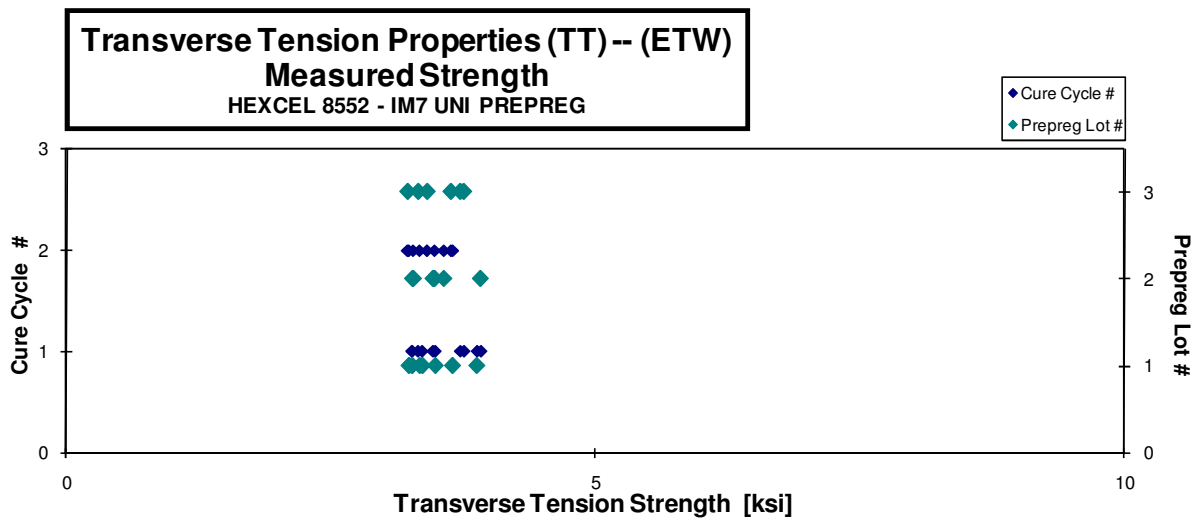
Average	9.286	1.298	0.0073
Standard Dev.	0.879	0.044	
Coeff. of Var. [%]	9.470	3.365	
Min.	7.397	1.214	0.0068
Max.	10.801	1.401	0.0076
Number of Spec.	20	20	



Transverse Tension Properties (TT) -- (ETW) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG
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Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIUA11AD	A	M1	1	1	3.879	0.891	0.076	11	0.0069	LGM
HFIUA11BD	A	M1	1	1	3.265	0.791	0.082	11	0.0074	LGM
HFIUA11CD	A	M1	1	1	3.362	0.769	0.081	11	0.0074	LGM
HFIUA11DD	A	M1	1	1	3.486	0.778	0.080	11	0.0073	LGM
HFIUA219D	A	M2	1	2	3.337	0.786	0.081	11	0.0074	LGM
HFIUA21BD	A	M2	1	2	3.236	0.759	0.083	11	0.0075	LGM
HFIUA21CD	A	M2	1	2	3.649	0.789	0.082	11	0.0075	LGM
HFIUB119D	B	M1	2	1	3.464	0.804	0.080	11	0.0073	LGM
HFIUB11AD	B	M1	2	1	3.269	0.828	0.076	11	0.0069	LGM
HFIUB11BD	B	M1	2	1	3.915	0.890	0.072	11	0.0065	LGM
HFIUB218D	B	M2	2	2	3.566	0.798	0.079	11	0.0072	LGM
HFIUB219D	B	M2	2	2	3.277	0.765	0.080	11	0.0073	LGM
HFIUB21BD	B	M2	2	2	3.478	0.846	0.073	11	0.0067	LGM
HFIUC118D	C	M1	3	1	3.756	0.850	0.080	11	0.0073	LGM
HFIUC119D	C	M1	3	1	3.323	0.811	0.081	11	0.0074	LGM
HFIUC11AD	C	M1	3	1	3.721	0.884	0.075	11	0.0068	LGM
HFIUC218D	C	M2	3	2	3.633	0.793	0.080	11	0.0073	LGM
HFIUC219D	C	M2	3	2	3.223	0.796	0.081	11	0.0074	LGM
HFIUC21BD	C	M2	3	2	3.408	0.789	0.081	11	0.0074	LGM

Average	3.487	0.811	0.0072
Standard Dev.	0.219	0.042	
Coeff. of Var. [%]	6.281	5.149	
Min.	3.223	0.759	0.0065
Max.	3.915	0.891	0.0075
Number of Spec.	19	19	

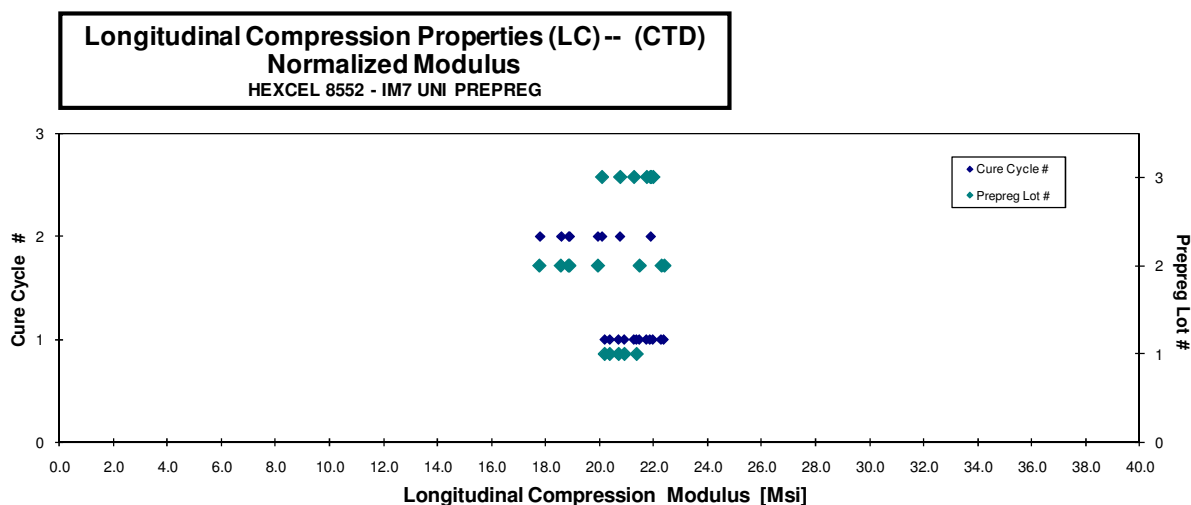


4.3 Longitudinal Compression Properties

Longitudinal Compression Properties (LC)-- (CTD) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG									normalizing t_{ply} [in] 0.0072	
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Modulus _{norm} [Msi]
HFILA115B	A	M1	1	1	20.088	0.451	0.104	14	0.0074	20.709
HFILA116B	A	M1	1	1	20.307	0.404	0.104	14	0.0074	20.925
HFILA117B	A	M1	1	1	21.024	0.287	0.102	14	0.0073	21.375
HFILA118B	A	M1	1	1	20.317	0.335	0.101	14	0.0072	20.384
HFILA119B	A	M1	1	1	20.148	0.364	0.101	14	0.0072	20.201
HFILA215B*	A	M2	1	2				14		
HFILA216B*	A	M2	1	2				14		
HFILA217B*	A	M2	1	2				14		
HFILB115B	B	M1	2	1	20.258	0.362	0.107	14	0.0076	21.484
HFILB116B	B	M1	2	1	20.915	0.335	0.108	14	0.0077	22.392
HFILB117B	B	M1	2	1	20.967	0.289	0.107	14	0.0077	22.291
HFILB215B	B	M2	2	2	21.136	0.331	0.095	14	0.0068	19.952
HFILB216B	B	M2	2	2	19.971	0.466	0.094	14	0.0067	18.584
HFILB217B	B	M2	2	2	19.049	0.305	0.094	14	0.0067	17.796
HFILB218B	B	M2	2	2	20.368	0.447	0.093	14	0.0067	18.866
HFILB219B	B	M2	2	2	20.413	0.354	0.093	14	0.0067	18.901
HFILC115B	C	M1	3	1	20.998	0.411	0.105	14	0.0075	21.873
HFILC116B	C	M1	3	1	21.288	0.351	0.104	14	0.0074	21.989
HFILC117B	C	M1	3	1	21.291	0.355	0.103	14	0.0074	21.745
HFILC118B	C	M1	3	1	20.974	0.378	0.102	14	0.0073	21.280
HFILC215B	C	M2	3	2	21.130	0.372	0.105	14	0.0075	21.916
HFILC216B	C	M2	3	2	19.562	0.301	0.104	14	0.0074	20.099
HFILC217B	C	M2	3	2	20.370	0.332	0.103	14	0.0073	20.767

Specimens have uneven grip marks so values are removed

Average	20.529	0.362	Average _{norm}	0.0072	20.676
Standard Dev.	0.603	0.052	Standard Dev. _{norm}		1.323
Coeff. of Var. [%]	2.935	14.482	Coeff. of Var. [%] _{norm}		6.396
Min.	19.049	0.287		0.0067	17.796
Max.	21.291	0.466		0.0077	22.392
Number of Spec.	20	20			20



Longitudinal Compression Properties (LC) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Modulus _{norm} [Msi]
HFILA111A*	A	M1	1	1				14		
HFILA112A	A	M1	1	1	20.248	0.352	0.095	14	0.0068	18.993
HFILA113A	A	M1	1	1	19.799	0.366	0.101	14	0.0072	19.839
HFILA114A	A	M1	1	1	19.957	0.372	0.103	14	0.0074	20.439
HFILA211A*	A	M2	1	2				14		
HFILA212A*	A	M2	1	2				14		
HFILA213A	A	M2	1	2	20.235	0.360	0.093	14	0.0067	18.742
HFILB111A	B	M1	2	1	20.667	0.423	0.108	14	0.0077	22.099
HFILB112A	B	M1	2	1	20.777	0.335	0.109	14	0.0078	22.429
HFILB113A	B	M1	2	1	20.230	0.310	0.108	14	0.0077	21.618
HFILB211A*	B	M2	2	2				14		
HFILB212A	B	M2	2	2	20.534	0.335	0.089	14	0.0064	18.188
HFILB213A	B	M2	2	2	20.256	0.310	0.093	14	0.0066	18.702
HFILC111A	C	M1	3	1	20.888	0.332	0.088	14	0.0063	18.325
HFILC112A	C	M1	3	1	20.446	0.369	0.096	14	0.0069	19.526
HFILC113A	C	M1	3	1	20.737	0.393	0.102	14	0.0073	20.898
HFILC211A	C	M2	3	2	20.745	0.358	0.094	14	0.0067	19.445
HFILC212A	C	M2	3	2	20.430	0.365	0.100	14	0.0071	20.221
HFILC213A	C	M2	3	2	20.658	0.365	0.103	14	0.0074	21.088

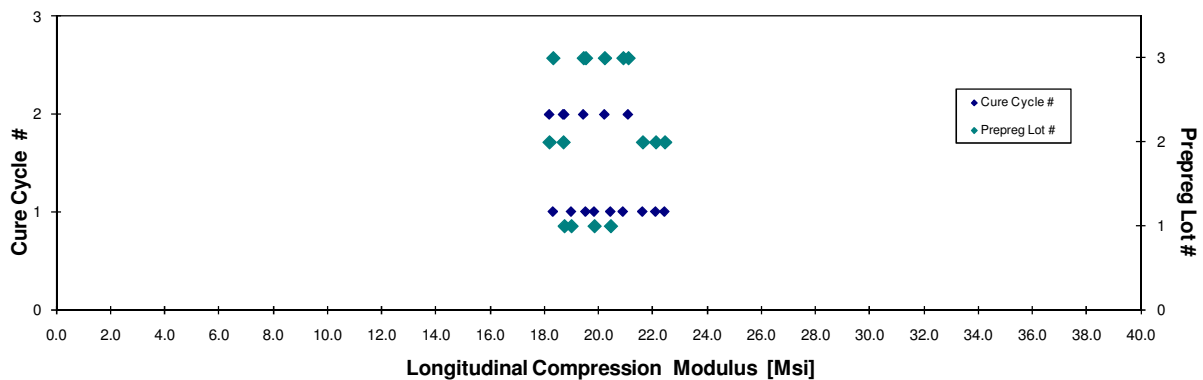
Specimens have thickness taper on edge of coupon, so values were removed.

near edge thickness taper

Average 20.440 0.356
 Standard Dev. 0.317 0.029
 Coeff. of Var. [%] 1.549 8.278
 Min. 19.799 0.310
 Max. 20.888 0.423
 Number of Spec. 15 15

Average_{norm} 0.0071 20.037
 Standard Dev._{norm} 1.365
 Coeff. of Var. [%]_{norm} 6.810
 0.0063 18.188
 0.0078 22.429
 15

Longitudinal Compression Properties (LC) -- (RTD)
Normalized Modulus
 HEXCEL 8552 - IM7 UNI PREPREG



Longitudinal Compression Properties (LC)-- (ETD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

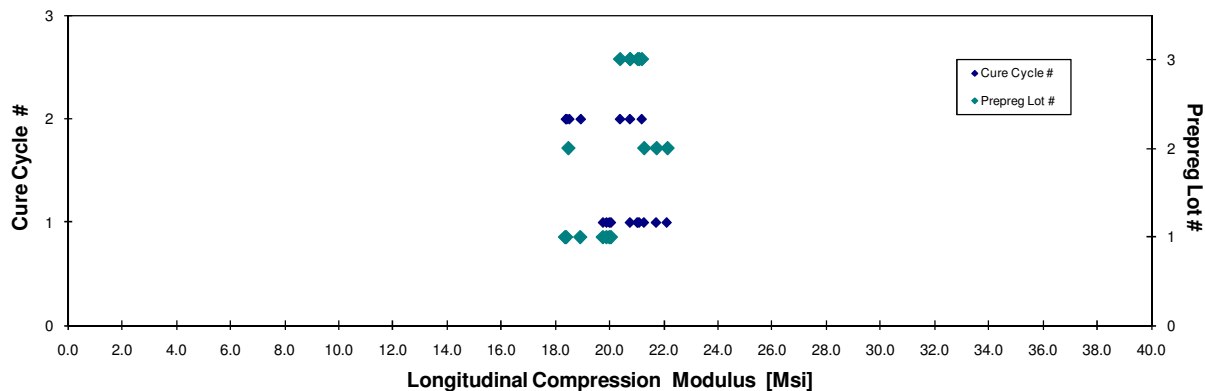
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Modulus _{norm} [Msi]
HFILA1ROC	A	M1	1	1	19.773	0.385	0.101	14	0.0072	19.883
HFILA1RPC	A	M1	1	1	19.556	0.372	0.102	14	0.0073	19.753
HFILA1RQC	A	M1	1	1	19.564	0.369	0.103	14	0.0074	19.990
HFILA1RRC	A	M1	1	1	19.375	0.394	0.104	14	0.0075	20.048
HFILA218C	A	M2	1	2	19.534	0.396	0.095	14	0.0068	18.404
HFILA219C	A	M2	1	2	19.663	0.373	0.094	14	0.0067	18.369
HFILA21DC	A	M2	1	2	19.759	0.354	0.097	14	0.0069	18.923
HFILB118C	B	M1	2	1	20.919	0.401	0.107	14	0.0076	22.123
HFILB119C	B	M1	2	1	20.483	0.391	0.107	14	0.0076	21.722
HFILB11DC	B	M1	2	1	19.776	0.338	0.108	14	0.0077	21.271
HFILB21DC	B	M2	2	2	19.877	0.357	0.094	14	0.0067	18.493
HFILB2RMC*	B	M2	2	2			0.084	14		
HFILB2RNC*	B	M2	2	2			0.090	14		
HFILC11DC	C	M1	3	1	20.062	0.381	0.104	14	0.0074	20.756
HFILC114C	C	M1	3	1	20.358	0.360	0.104	14	0.0074	21.031
HFILC1RPC	C	M1	3	1	20.297	0.376	0.105	14	0.0075	21.092
HFILC21DC	C	M2	3	2	19.978	0.357	0.105	14	0.0075	20.754
HFILC218C	C	M2	3	2	20.084	0.366	0.102	14	0.0073	20.386
HFILC219C	C	M2	3	2	20.913	0.396	0.102	14	0.0073	21.190

Specimens have thickness taper on edge of coupon, so values were removed.

Average 19.998 0.374
 Standard Dev. 0.463 0.018
 Coeff. of Var. [%] 2.313 4.781
 Min. 19.375 0.338
 Max. 20.919 0.401
 Number of Spec. 17 17

Average_{norm} 0.0073 20.246
 Standard Dev_{norm} 1.165
 Coeff. of Var. [%]_{norm} 5.757
 0.0067 18.369
 0.0077 22.123
 17

Longitudinal Compression Properties (LC)-- (ETD)
Normalized Modulus
 HEXCEL 8552 - IM7 UNI PREPREG



Longitudinal Compression Properties (LC) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Modulus	Poisson's	Avg. Specimen	# Plies in Laminate	Avg. t_{ply} [in]	Modulus _{norm} [Msi]
HFILA11GD	A	M1	1	1	19.933	0.379	0.100	14	0.0071	19.758
HFILA11HD	A	M1	1	1	20.124	0.409	0.094	14	0.0067	18.723
HFILA11ID	A	M1	1	1	19.455	0.335	0.103	14	0.0074	19.863
HFILA21ED	A	M2	1	2	19.539	0.351	0.097	14	0.0069	18.793
HFILA21FD	A	M2	1	2	19.888	0.342	0.097	14	0.0069	19.040
HFILA21GD	A	M2	1	2	19.229	0.344	0.094	14	0.0067	17.865
HFILB11ED*	B	M1	2	1	20.777	0.346	0.106	14	0.0076	21.880
HFILB11FD*	B	M1	2	1	20.158	0.336	0.101	14	0.0072	20.188
HFILB11GD*	B	M1	2	1	21.348	0.359	0.095	14	0.0068	20.077
HFILB21ED	B	M2	2	1	20.248	0.341	0.094	14	0.0067	18.899
HFILB21FD	B	M2	2	2	20.131	0.341	0.095	14	0.0068	18.973
HFILB21GD	B	M2	2	2	26.641	0.412	0.093	14	0.0066	24.518
HFILC11ED	C	M1	3	1	20.987	0.322	0.105	14	0.0075	21.833
HFILC11FD	C	M1	3	1	20.445	0.329	0.103	14	0.0074	20.939
HFILC11GD	C	M1	3	1	24.827	0.466	0.098	14	0.0070	24.195
HFILC11HD	C	M1	3	1	20.498	0.362	0.093	14	0.0066	18.847
HFILC11ID	C	M1	3	1	17.674	0.355	0.089	14	0.0064	15.614
HFILC21ED	C	M2	3	2	20.085	0.310	0.105	14	0.0075	20.925
HFILC21FD	C	M2	3	2	20.112	0.352	0.103	14	0.0074	20.558
HFILC21GD	C	M2	3	2	19.741	0.324	0.099	14	0.0071	19.330
HFILA11JD	A	M1	1	1	19.858	0.392	0.105	14	0.0075	20.744
HFILA11KD	A	M1	1	1	19.580	0.416	0.106	14	0.0075	20.499
HFILA1RMD	A	M1	1	1	19.955	0.529	0.101	14	0.0072	20.070
HFILA1RND	A	M1	1	2	20.050	0.412	0.101	14	0.0072	20.120
HFILA21HD*	A	M2	1	2				14		
HFILA214D	A	M2	1	2	26.053	0.509	0.096	14	0.0068	24.761
HFILB11HD	B	M1	2	1	20.996	0.379	0.107	14	0.0076	22.187
HFILB11ID	B	M1	2	1	20.077	0.399	0.109	14	0.0078	21.687
HFILB114D	B	M1	2	1	19.972	0.390	0.108	14	0.0077	21.349
HFILB21ID*	B	M2	2	1				14		
HFILB214D	B	M2	2	2	20.822	0.376	0.095	14	0.0068	19.586
HFILC1RMD	C	M1	3	1	21.213	0.451	0.096	14	0.0069	20.261
HFILC1RND	C	M1	3	1	20.134	0.403	0.101	14	0.0072	20.220
HFILC1ROD	C	M1	3	1	20.821	0.446	0.105	14	0.0075	21.692
HFILC21HD	C	M2	3	1	20.601	0.370	0.092	14	0.0066	18.778
HFILC21ID	C	M2	3	1	20.282	0.402	0.094	14	0.0067	18.897
HFILC214D	C	M2	3	2	20.436	0.413	0.104	14	0.0075	21.159

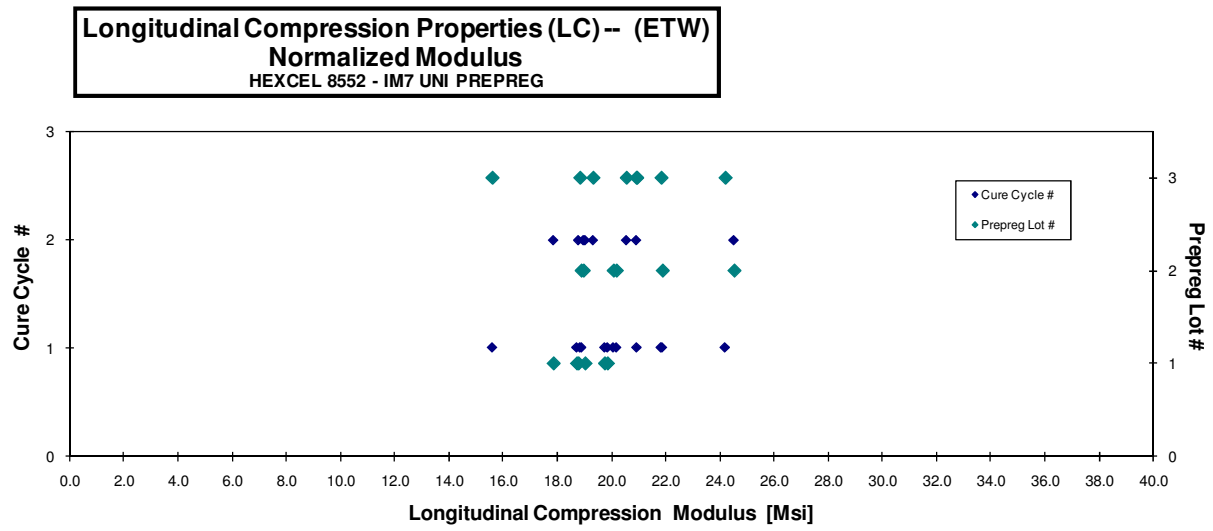
*Specimens have thickness taper on edge of coupon, so values were removed.

DATA WAS NOT REPORTED FOR HFILA11FD DUE TO BAD FAILURE

HFILB21HD STRAIN GAGE WENT BAD HENCE THE MODULUS AND POISSONS RATIO WAS REMOVED

Shaded portion was originally tested with improper strain gage adhesive

Average	20.648	0.383	0.099	Average _{norm}	0.0071	20.367
Standard Dev.	1.754	0.051	0.005	Standard Dev. _{norm}		1.834
Coeff. of Var. [%]	8.494	13.446	5.383	Coeff. of Var. [%] _{norm}		9.005
Min.	17.674	0.310	0.089		0.0064	15.614
Max.	26.641	0.529	0.109		0.0078	24.761
Number of Spec.	35	35	35		35	35



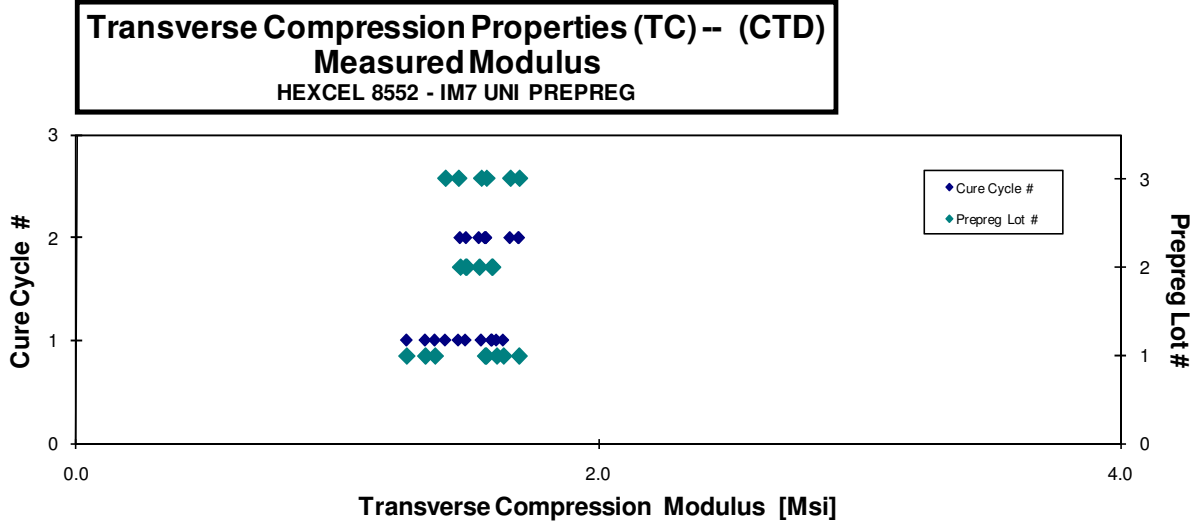
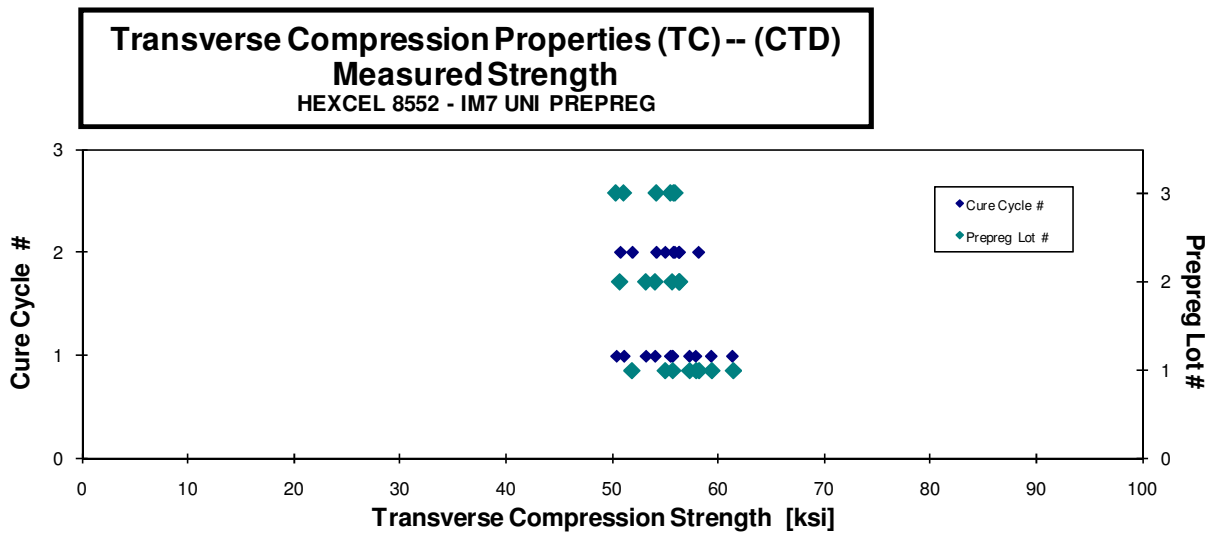
4.4 Transverse Compression Properties

Transverse Compression Properties (TC) -- (CTD) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIZA116B	A	M1	1	1	59.383	1.609	0.027	0.099	14	0.0071	HAT/HIT
HFIZA117B	A	M1	1	1	61.395	1.373	0.021	0.099	14	0.0071	HGM
HFIZA118B	A	M1	1	1	55.734	1.264	0.028	0.100	14	0.0071	HGM/HIB
HFIZA119B	A	M1	1	1	57.917	1.336	0.027	0.100	14	0.0072	HGM/HIB/HIT
HFIZA11AB	A	M1	1	1	57.316	1.635	0.031	0.100	14	0.0072	HAT
HFIZA217B	A	M2	1	2	55.031	1.565	0.025	0.100	14	0.0071	HGM
HFIZA218B	A	M2	1	2	51.915	1.569	0.032	0.100	14	0.0072	HGM
HFIZA219B	A	M2	1	2	58.191	1.694	0.030	0.101	14	0.0072	HGM
HFIZB115B	B	M1	2	1	53.205	1.592	0.027	0.102	14	0.0073	HGM
HFIZB116B*	B	M1	2	1	55.667	1.590	0.031	0.101	14	0.0072	HGM/HAB/HIB
HFIZB117B*	B	M1	2	1	54.068	1.490	0.028	0.101	14	0.0072	HGM/HIT/HIB
HFIZB216B	B	M2	2	2	56.320	1.494	0.026	0.099	14	0.0071	HGM
HFIZB217B	B	M2	2	2	56.367	1.543	0.029	0.099	14	0.0071	HGM
HFIZB218B	B	M2	2	2	50.774	1.470	0.029	0.100	14	0.0071	HGM
HFIZC117B	C	M1	3	1	55.515	1.551	0.028	0.102	14	0.0073	HGM
HFIZC118B	C	M1	3	1	51.129	1.463	0.018	0.102	14	0.0073	HGM
HFIZC119B	C	M1	3	1	50.408	1.413	0.031	0.103	14	0.0073	HGM
HFIZC216B	C	M2	3	2	54.186	1.662	0.027	0.101	14	0.0072	HAT
HFIZC217B	C	M2	3	2	55.937	1.696	0.032	0.100	14	0.0072	HAT
HFIZC218B	C	M2	3	2	55.812	1.570	0.029	0.102	14	0.0073	HAT

* Bad failures occurred secondary to the first failure

Average	55.313	1.529	0.028	0.0072
Standard Dev.	2.873	0.117	0.004	
Coeff. of Var. [%]	5.194	7.641	12.744	
Min.	50.408	1.264	0.018	0.0071
Max.	61.395	1.696	0.032	0.0073
Number of Spec.	20	20	20	

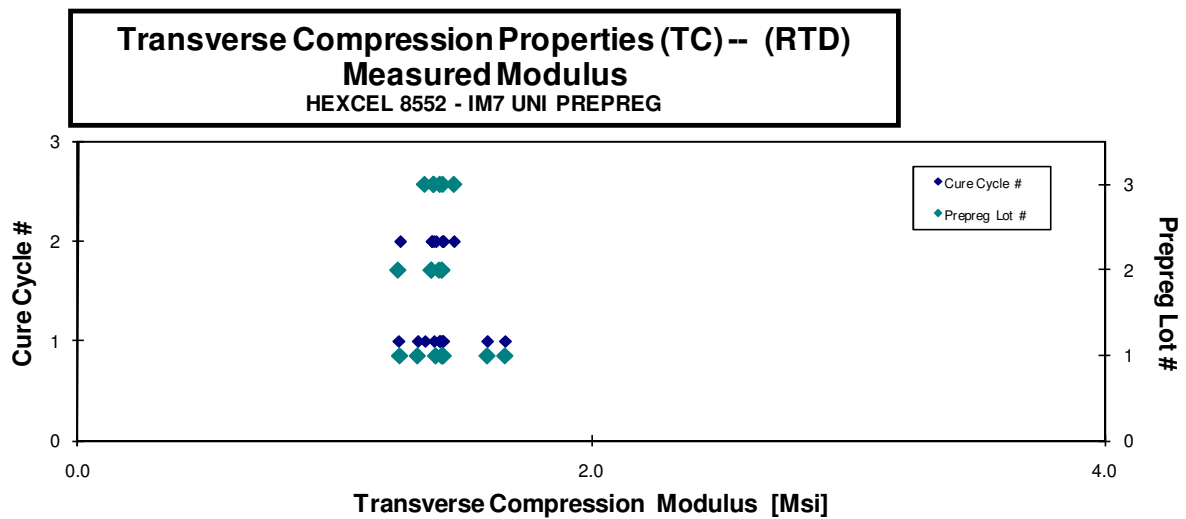
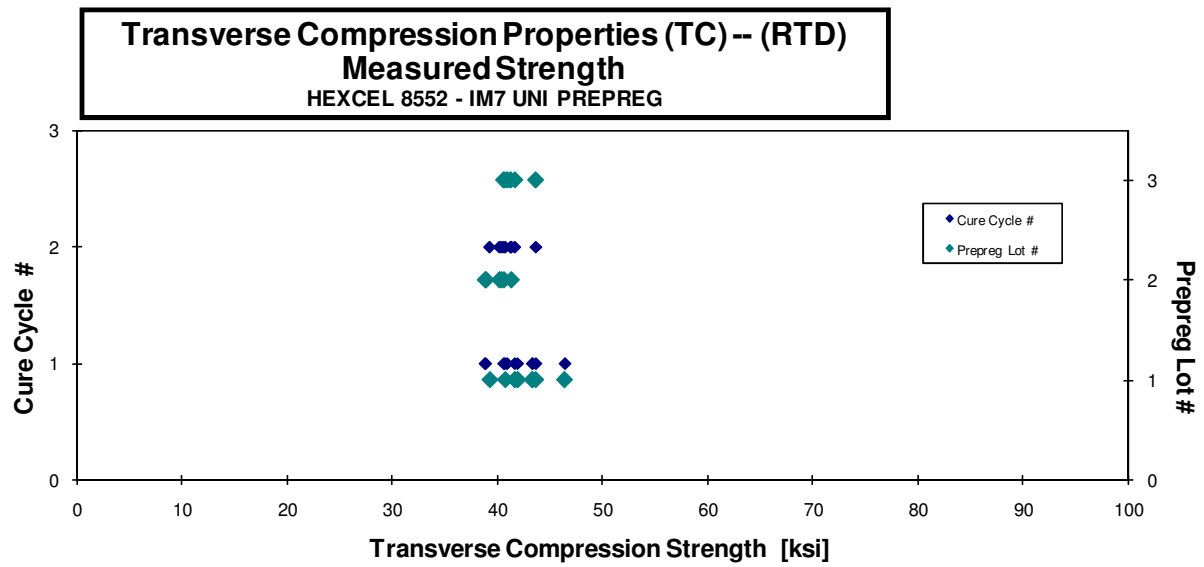


Transverse Compression Properties (TC)-- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIZA111A	A	M1	1	1	46.403	1.664	0.022	0.089	14	0.0063	BAB
HFIZA112A	A	M1	1	1	43.300	1.594	0.025	0.094	14	0.0067	BAB
HFIZA113A	A	M1	1	1	43.323	1.324	0.023	0.099	14	0.0071	BAB
HFIZA114A	A	M1	1	1	43.633	1.423	0.024	0.101	14	0.0072	BAB
HFIZA115A	A	M1	1	1	41.892	1.419	0.022	0.101	14	0.0072	BAB
HFIZA212A	A	M2	1	2	39.235	1.424	0.025	0.097	14	0.0069	HGM
HFIZA213A	A	M2	1	2	40.716	1.395	0.024	0.101	14	0.0072	BGM
HFIZA214A	A	M2	1	2	41.630	1.255	0.022	0.103	14	0.0074	HGM
HFIZB112A	B	M1	2	1	38.789	1.419	0.022	0.098	14	0.0070	BGM
HFIZB113A	B	M1	2	1	40.581	1.408	0.025	0.102	14	0.0073	BGM
HFIZB114A	B	M1	2	1	38.857	1.249	0.020	0.103	14	0.0073	BGM
HFIZB213A*	B	M2	2	2	40.340	1.378	0.023	0.102	14	0.0073	HGM / HIT
HFIZB214A*	B	M2	2	2	41.291	1.419	0.026	0.101	14	0.0072	HGM / HIT
HFIZB215A	B	M2	2	2	40.150	1.379	0.022	0.100	14	0.0072	HGM
HFIZC112A	C	M1	3	1	40.681	1.352	0.022	0.099	14	0.0071	HGM
HFIZC113A	C	M1	3	1	40.902	1.411	0.023	0.103	14	0.0074	HGM
HFIZC114A	C	M1	3	1	41.630	1.387	0.025	0.104	14	0.0074	HAT
HFIZC213A	C	M2	3	2	41.218	1.465	0.025	0.103	14	0.0073	HAB
HFIZC214A	C	M2	3	2	43.627	1.386	0.027	0.103	14	0.0074	BGM
HFIZC215A	C	M2	3	2	40.524	1.422	0.023	0.102	14	0.0073	BAT

* Bad failures occurred secondary to the first failure

Average	41.436	1.409	0.024	0.0072
Standard Dev.	1.864	0.093	0.002	
Coeff. of Var. [%]	4.497	6.634	7.615	
Min.	38.789	1.249	0.020	0.0063
Max.	46.403	1.664	0.027	0.0074
Number of Spec.	20	20	20	

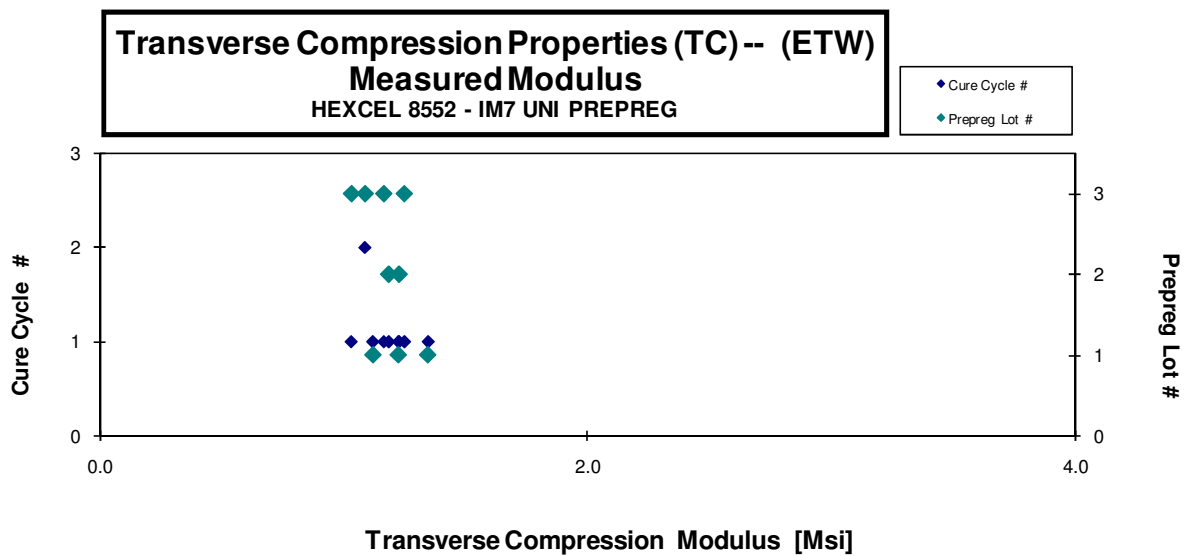
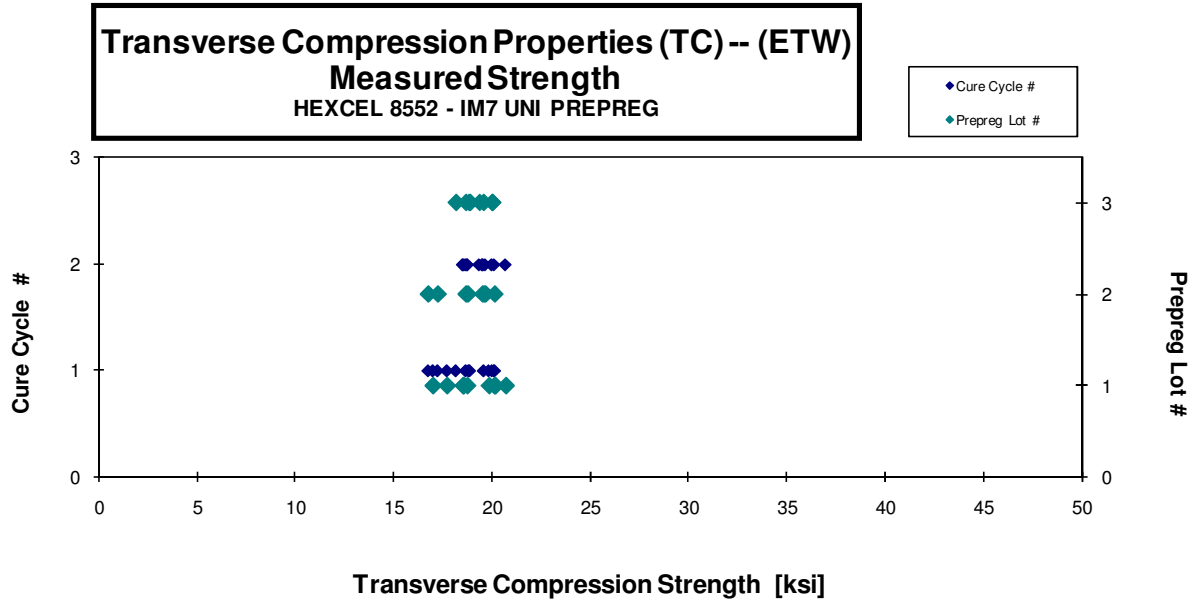


Transverse Compression Properties (TC)-- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus* [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HFIZA11BD	A	M1	1	1	20.168			0.099	14	0.0071	HGM
HFIZA11CD	A	M1	1	1	20.118			0.100	14	0.0071	HGM
HFIZA11DD	A	M1	1	1	17.022			0.100	14	0.0072	HGM
HFIZA11ED	A	M1	1	1	19.857			0.102	14	0.0073	HGM
HFIZA11FD	A	M1	1	1	17.733			0.102	14	0.0073	HGM
HFIZA21AD	A	M2	1	2	18.535			0.101	14	0.0072	HGM
HFIZA21BD	A	M2	1	2	18.757			0.101	14	0.0072	HGM
HFIZA21CD	A	M2	1	2	18.574			0.100	14	0.0072	HGM
HFIZA21ED	A	M2	1	2	20.702			0.102	14	0.0073	HGM
HFIZB119D	B	M1	2	1	17.259			0.101	14	0.0072	HGM
HFIZB11AD	B	M1	2	1	16.779			0.101	14	0.0072	HGM
HFIZB11BD	B	M1	2	1	18.688			0.100	14	0.0072	HGM
HFIZB11CD	B	M1	2	1	19.599			0.101	14	0.0072	HGM
HFIZB219D	B	M2	2	2	19.524			0.100	14	0.0071	HGM
HFIZB21AD	B	M2	2	2	19.676			0.100	14	0.0071	HGM
HFIZB21BD	B	M2	2	2	18.781			0.100	14	0.0071	HGM
HFIZB21CD	B	M2	2	2	20.132			0.100	14	0.0072	HGM
HFIZC11AD	C	M1	3	1	18.895			0.103	14	0.0073	HGM
HFIZC11BD	C	M1	3	1	18.186			0.102	14	0.0073	HGM
HFIZC11CD	C	M1	3	1	18.838			0.102	14	0.0073	HGM
HFIZC11FD	C	M1	3	1	20.021			0.104	14	0.0074	HGM
HFIZC21AD	C	M2	3	2	18.681			0.102	14	0.0073	HGM
HFIZC21BD	C	M2	3	2	19.567			0.102	14	0.0073	HGM
HFIZC21CD	C	M2	3	2	19.370			0.100	14	0.0072	HGM
HFIZC21DD	C	M2	3	2	20.011			0.101	14	0.0072	HGM
HFIZA215D*	A	M1	1	1		1.224	0.018	0.103	14	0.0074	HGM
HFIZA211D*	A	M1	1	1		1.346	0.018	0.087	14	0.0062	HGM
HFIZA216D*	A	M1	1	1		1.119	0.017	0.101	14	0.0072	HGM
HFIZB111D*	B	M1	2	1		1.184	0.017	0.091	14	0.0065	HGM
HFIZB118D*	B	M1	2	1		1.227	0.016	0.100	14	0.0072	HGM
HFIZC111D*	C	M1	3	1		1.249	0.018	0.092	14	0.0066	HGM
HFIZC115D*	C	M1	3	1		1.164	0.018	0.104	14	0.0074	HGM
HFIZC116D*	C	M1	3	1		1.031	0.017	0.103	14	0.0073	HGM
HFIZC219D*	C	M2	3	2		1.087	0.020	0.102	14	0.0073	HGM

* Modulus only coupons

Average	19.019	1.181	0.018	0.007
Standard Dev.	1.041	0.094	0.001	
Coeff. of Var. [%]	5.474	7.994	7.577	
Min.	16.779	1.031	0.016	0.006
Max.	20.702	1.346	0.020	0.007
Number of Spec.	25	9	9	34



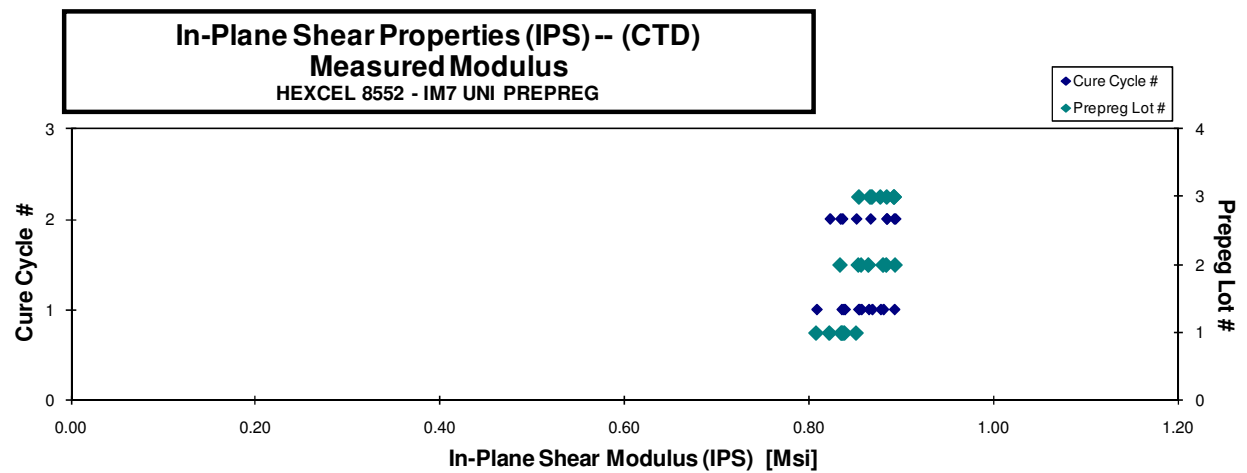
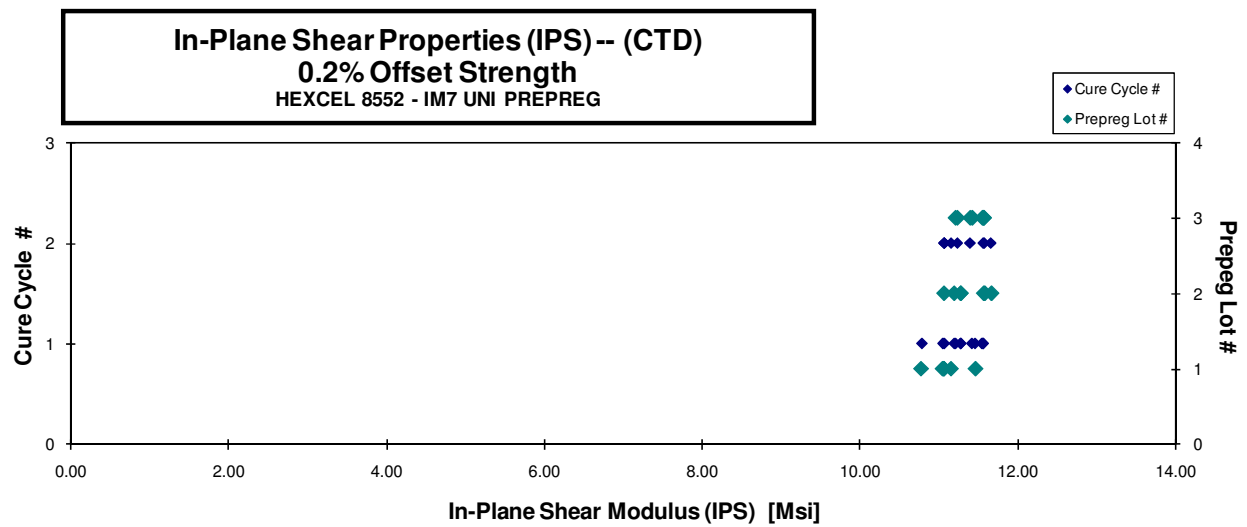
4.5 In-Plane Shear Properties

In-Plane Shear Properties (IPS)-- (CTD) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
HFINA11FB	A	M1	1	1	11.066	0.835	0.088	12	0.0073
HFINA11GB	A	M1	1	1	11.048	0.837	0.088	12	0.0073
HFINA11AB	A	M1	1	1	11.460	0.839	0.082	12	0.0068
HFINA1RMB	A	M1	1	1	10.779	0.808	0.088	12	0.0074
HFINA21EB	A	M2	1	2	11.063	0.836	0.088	12	0.0074
HFINA21FB	A	M2	1	2	11.154	0.851	0.088	12	0.0073
HFINA21AB	A	M2	1	2	11.065	0.822	0.089	12	0.0074
HFINB11FB	B	M1	2	1	11.277	0.854	0.087	12	0.0072
HFINB11AB	B	M1	2	1	11.275	0.865	0.083	12	0.0069
HFINB114B	B	M1	2	1	11.194	0.857	0.087	12	0.0072
HFINB21EB	B	M2	2	1	11.564	0.881	0.086	12	0.0072
HFINB21FB	B	M2	2	2	11.661	0.884	0.087	12	0.0072
HFINB219B	B	M2	2	2	11.067	0.834	0.088	12	0.0073
HFINB21AB	B	M2	2	2	11.578	0.894	0.081	12	0.0068
HFINC11EB	C	M1	3	1	11.549	0.893	0.085	12	0.0071
HFINC11FB	C	M1	3	1	11.420	0.878	0.086	12	0.0072
HFINC11AB	C	M1	3	1	11.565	0.869	0.080	12	0.0067
HFINC114B	C	M1	3	1	11.211	0.855	0.086	12	0.0071
HFINC21EB	C	M2	3	2	11.233	0.867	0.087	12	0.0073
HFINC21FB	C	M2	3	2	11.564	0.893	0.082	12	0.0068
HFINC219B	C	M2	3	2	11.395	0.885	0.081	12	0.0067

All specimens failed to reach 50,000 micro strain.

Average	11.29	0.86	Average	0.0071
Standard Dev.	0.24	0.02	Standard Dev.	
Coeff. of Var. [%]	2.10	2.90	Coeff. of Var. [%]	
Min.	10.78	0.81	Min.	0.0067
Max.	11.66	0.89	Max.	0.0074
Number of Spec.	21.00	21.00	Number of Spec.	21



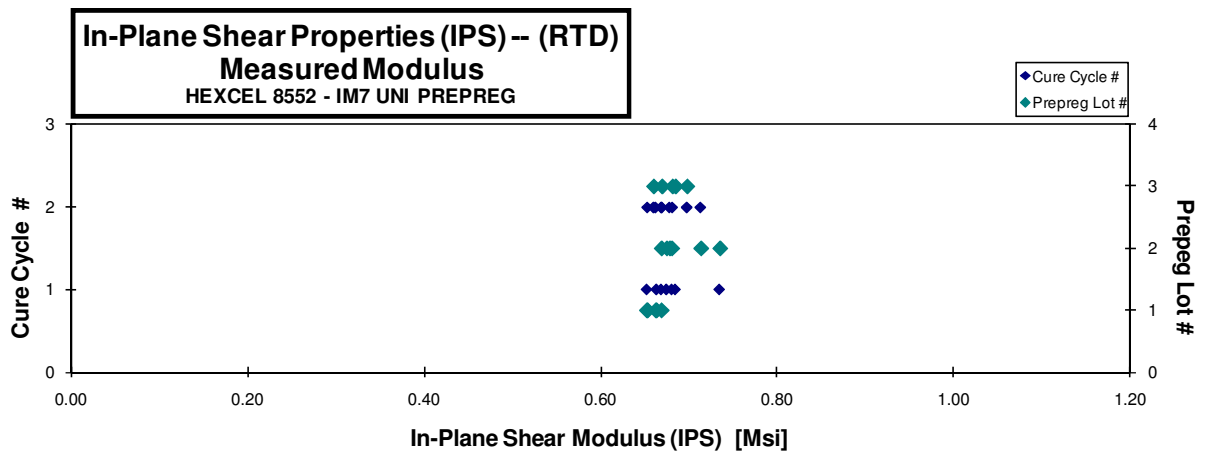
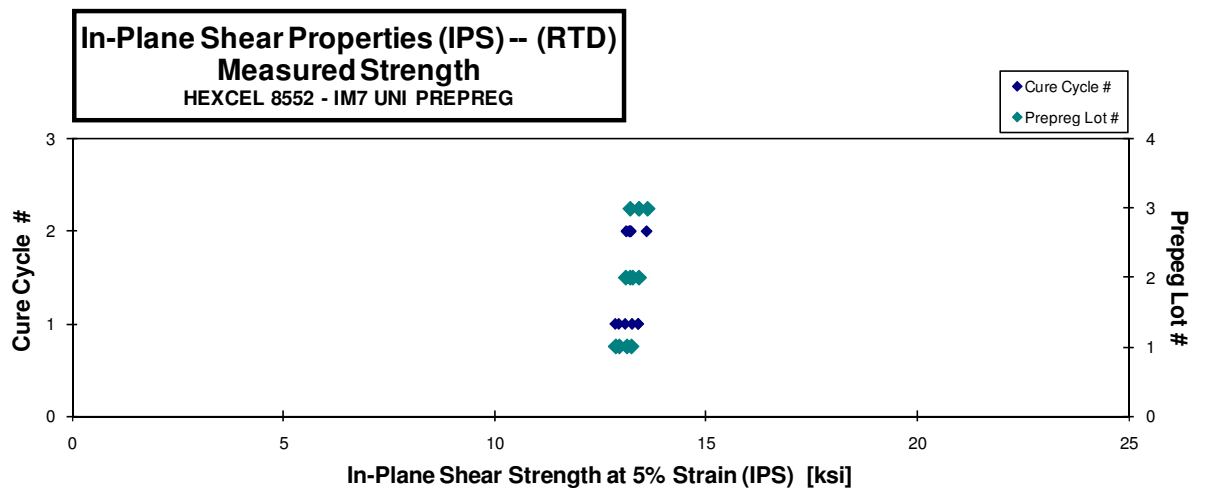
In-Plane Shear Properties (IPS) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
HFINA111A**	A	M1	1	1						
HFINA112A*	A	M1	1	1		7.698	0.668	0.090	12	0.0075
HFINA113A	A	M1	1	1	12.855	7.481	0.652	0.089	12	0.0074
HFINA114A	A	M1	1	1	12.939	7.603	0.663	0.088	12	0.0073
HFINA115A**	A	M1	1	1						
HFINA211A**	A	M2	1	2						
HFINA212A	A	M2	1	2	13.228	7.585	0.653	0.089	12	0.0074
HFINA213A	A	M2	1	2	13.121	7.589	0.662	0.088	12	0.0073
HFINB111A	B	M1	2	1	13.259	8.117	0.735	0.082	12	0.0068
HFINB112A	B	M1	2	1	13.092	7.672	0.674	0.088	12	0.0073
HFINB113A	B	M1	2	1	13.405	7.776	0.680	0.088	12	0.0073
HFINB211A*	B	M2	2	2		7.600	0.669	0.088	12	0.0074
HFINB212A*	B	M2	2	2		7.943	0.713	0.084	12	0.0070
HFINB213A	B	M2	2	2	13.197	7.686	0.678	0.088	12	0.0073
HFINC111A**	C	M1	3	1						
HFINC112A	C	M1	3	1	13.407	7.977	0.684	0.088	12	0.0073
HFINC113A**	C	M1	3	1						
HFINC211A	C	M2	3	2	13.609	7.755	0.669	0.089	12	0.0074
HFINC212A	C	M2	3	2	13.200	7.741	0.681	0.088	12	0.0073
HFINC213A*	C	M2	3	2		8.279	0.698	0.087	12	0.0072
HFINC214A	C	M2	3	2	13.387	7.591	0.660	0.087	12	0.0073

*specimens failed to reach 50,000 micro strain

** data was omitted due to Biaxial Extensometer slippage

Average	13.225	7.756	0.677	Average	0.0073
Standard Dev.	0.211	0.218	0.022	Standard Dev.	
Coeff. of Var. [%]	1.595	2.808	3.272	Coeff. of Var. [%]	
Min.	12.855	7.481	0.652	Min.	0.0068
Max.	13.609	8.279	0.735	Max.	0.0075
Number of Spec.	12	16	16	Number of Spec.	16



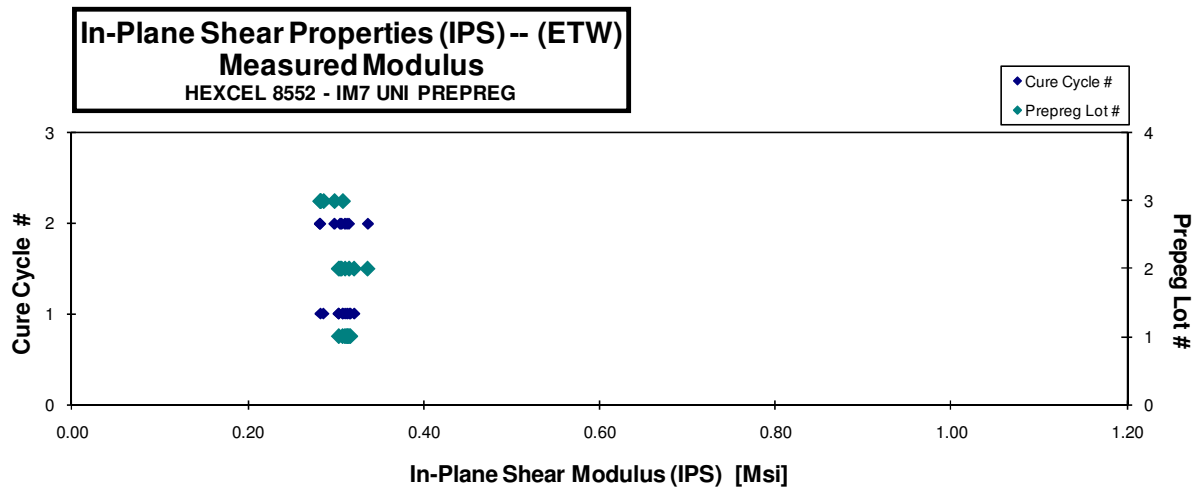
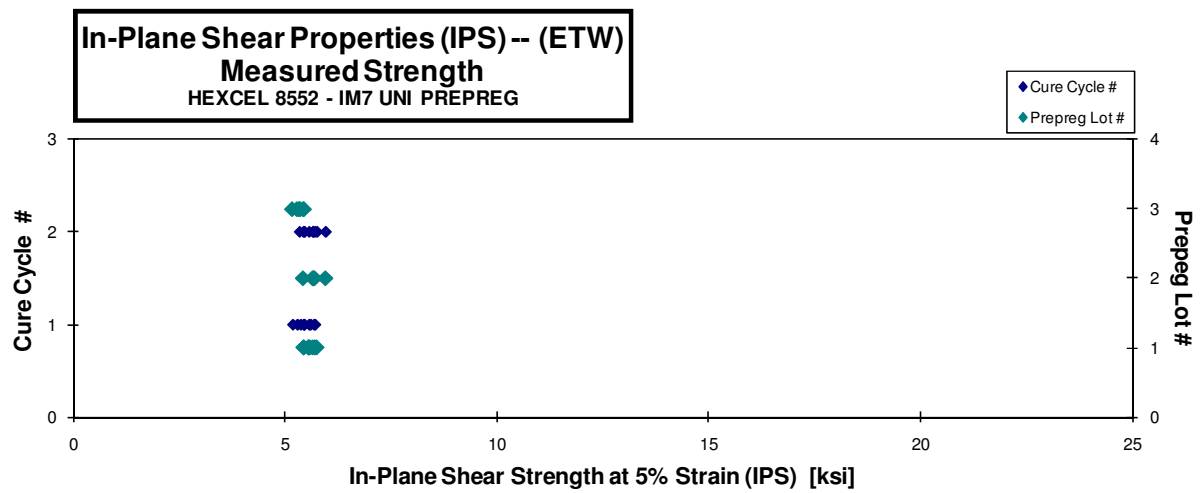
In-Plane Shear Properties (IPS) -- (ETW) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
HFINA11BD	A	M1	1	1	5.451	3.4082	0.308	0.081	12	0.0067
HFINA11CD	A	M1	1	1	5.563	3.3495	0.317	0.089	12	0.0075
HFINA11DD	A	M1	1	1	5.597	3.2809	0.304	0.089	12	0.0075
HFINA11ED	A	M1	1	1	5.447	3.3080	0.313	0.088	12	0.0073
HFINA21BD	A	M2	1	2	5.706	3.262	0.311	0.089	12	0.0074
HFINA21CD	A	M2	1	2	5.657	3.373	0.315	0.088	12	0.0073
HFINA21DD	A	M2	1	2	5.563	3.292	0.313	0.088	12	0.0073
HFINB11BD	B	M1	2	1	5.751	3.627	0.321	0.082	12	0.0068
HFINB11CD	B	M1	2	1	5.678	3.462	0.311	0.087	12	0.0073
HFINB11DD*	B	M1	2	1		3.432	0.315	0.087	12	0.0072
HFINB11ED	B	M1	2	1	5.434	3.090	0.303	0.086	12	0.0072
HFINB21BD	B	M2	2	2	5.954	3.539	0.336	0.083	12	0.0069
HFINB21CD	B	M2	2	2	5.657	3.350	0.305	0.088	12	0.0073
HFINB21DD	B	M2	2	2	5.700	3.349	0.307	0.087	12	0.0073
HFINC11BD	C	M1	3	1	5.289	3.304	0.308	0.082	12	0.0069
HFINC11CD	C	M1	3	1	5.366	3.088	0.283	0.087	12	0.0073
HFINC11DD	C	M1	3	1	5.178	3.050	0.286	0.086	12	0.0072
HFINC21BD	C	M2	3	2	5.431	3.248	0.282	0.089	12	0.0074
HFINC21CD	C	M2	3	2	5.456	3.265	0.283	0.088	12	0.0073
HFINC21DD	C	M2	3	2	5.338	3.060	0.299	0.087	12	0.0072

ALL SPECIMENS: SHEAR MODULUS STRAIN RANGE CUTS INTO NON-LINEAR REGION

* Unable to reach 50,000 microstrain

Average	5.54	3.31	0.31	Average	0.0072
Standard Dev.	0.19	0.15	0.01	Standard Dev.	
Coeff. of Var. [%]	3.38	4.63	4.51	Coeff. of Var. [%]	
Min.	5.18	3.05	0.28	Min.	0.0067
Max.	5.95	3.63	0.34	Max.	0.0075
Number of Spec.	19.00	20.00	20.00	Number of Spec.	20

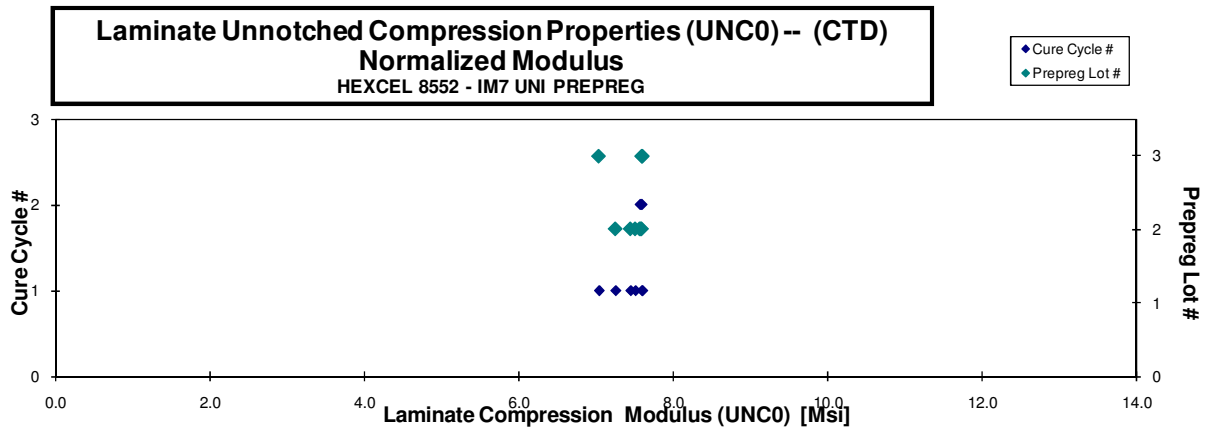
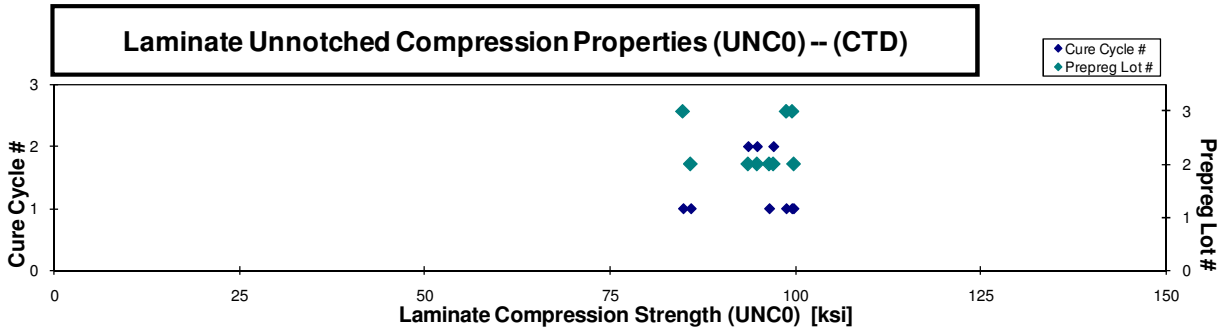


4.6 Unnotched Compression 0 Properties

Laminate Unnotched Compression Properties (UNC0) -- (CTD) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG											normalizing t_{ply} [in] 0.0072		
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIRB115B	B	M1	2	1	110.782	7.426	0.060	0.109	15	BGM	0.0073	111.944	7.504
HFIRB116B	B	M1	2	1	104.576	7.503	0.038	0.109	15	BGM	0.0073	105.464	7.567
HFIRB117B	B	M1	2	1	114.578	7.466	0.030	0.108	15	BGM	0.0072	114.578	7.466
HFIRB215B	B	M2	2	2	111.952	7.849	0.045	0.109	15	BGM	0.0073	112.799	7.908
HFIRB216B	B	M2	2	2	108.713	7.436	0.033	0.109	15	BGM	0.0073	109.954	7.521
HFIRB217B	B	M2	2	2	115.841	7.723	0.041	0.109	15	BGM/BAB	0.0072	116.431	7.762
HFIRC115B	C	M1	3	1	112.448	7.704	0.047	0.112	15	BGM	0.0075	116.578	7.987
HFIRC116B	C	M1	3	1	118.903	7.839	0.033	0.111	15	HAT	0.0074	121.747	8.027
HFIRC117B	C	M1	3	1	106.963	7.809	0.044	0.111	15	BAT	0.0074	109.819	8.017

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

Average	111.640	7.639	0.041	Average _{norm}	0.0073	113.257	7.751
Standard Dev.	4.484	0.180	0.009	Standard Dev. _{norm}		4.748	0.239
Coeff. of Var. [%]	4.017	2.357	22.360	Coeff. of Var. [%] _{norm}		4.192	3.083
Min.	104.576	7.426	0.030	Min.	0.0072	105.464	7.466
Max.	118.903	7.849	0.060	Max.	0.0075	121.747	8.027
Number of Spec.	9	9	9	Number of Spec.		9	9



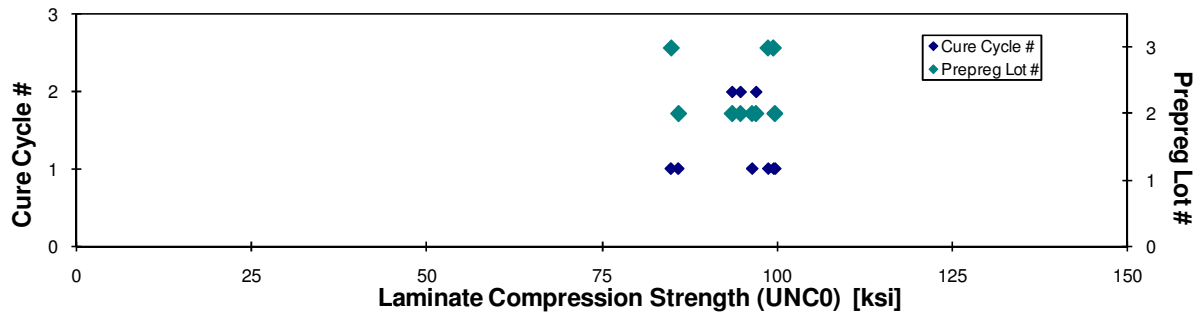
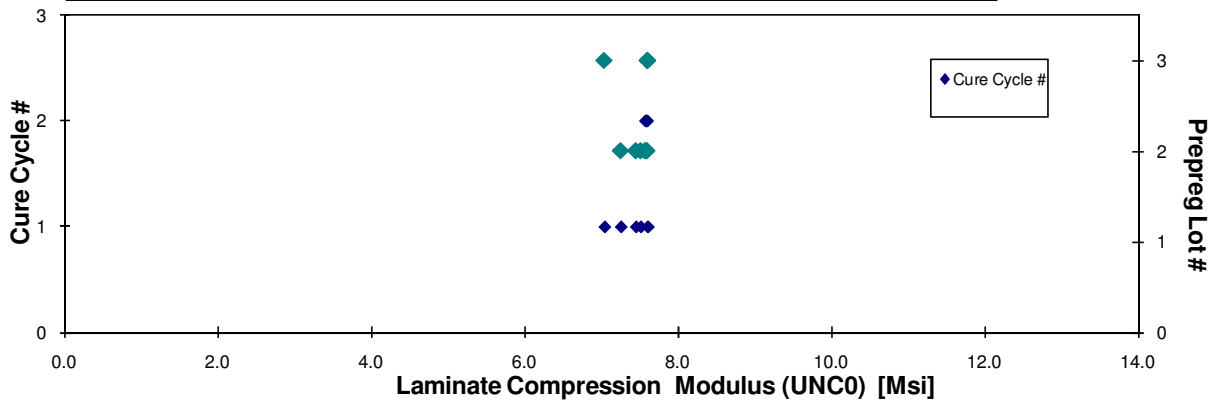
Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

 normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIRB111A	B	M1	2	1	91.558	7.732	0.035	0.101	15	BGM	0.0068	85.878	7.253
HFIRB112A	B	M1	2	1	97.669	7.541	0.037	0.107	15	BGM	0.0071	96.449	7.447
HFIRB113A	B	M1	2	1	98.542	7.419	0.035	0.109	15	BGM	0.0073	99.743	7.509
HFIRB211A	B	M2	2	2	96.791	7.564	0.036	0.108	15	BAT	0.0072	97.015	7.582
HFIRB212A	B	M2	2	2	93.387	7.550	0.037	0.108	15	BGM	0.0072	93.603	7.567
HFIRB213A	B	M2	2	2	94.371	7.559	0.034	0.108	15	BGM	0.0072	94.794	7.592
HFIRC111A	C	M1	3	1	89.785	7.451	0.032	0.102	15	BGM	0.0068	84.825	7.039
HFIRC112A	C	M1	3	1	98.082	7.544	0.033	0.109	15	BAT	0.0072	98.747	7.595
HFIRC113A	C	M1	3	1	95.814	7.319	0.039	0.112	15	BGM	0.0075	99.525	7.602

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

Average	95.111	7.520	0.035	Average _{norm}	0.0071	94.509	7.465
Standard Dev.	3.061	0.115	0.002	Standard Dev. _{norm}		5.587	0.195
Coeff. of Var. [%]	3.218	1.530	6.397	Coeff. of Var. [%] _{norm}		5.912	2.615
Min.	89.785	7.319	0.032	Min.	0.0068	84.825	7.039
Max.	98.542	7.732	0.039	Max.	0.0075	99.743	7.602
Number of Spec.	9	9	9	Number of Spec.		9	9

Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Normalized Strength

Laminate Unnotched Compression Properties (UNC0) -- (RTD)
Normalized Modulus


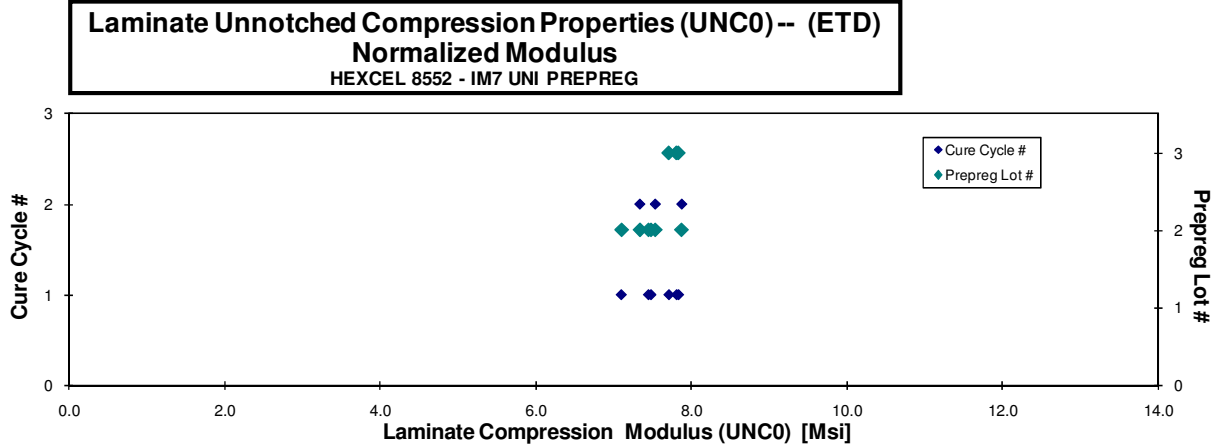
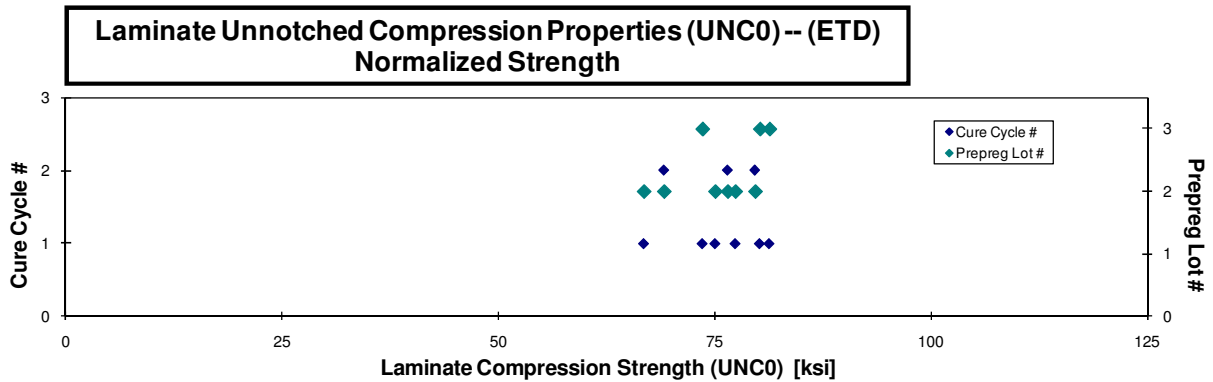
Laminate Unnotched Compression Properties (UNC0) -- (ETD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIRB11CC	B	M1	2	1	75.164	7.462	0.032	0.108	15	BAB	0.0072	75.059	7.452
HFIRB11DC	B	M1	2	1	66.566	7.458	0.031	0.108	15	HGM	0.0072	66.781	7.483
HFIRB118C	B	M1	2	1	77.437	7.109	0.032	0.108	15	HAB	0.0072	77.401	7.105
HFIRB219C	B	M2	2	2	78.236	7.400	0.025	0.110	15	BAB	0.0073	79.697	7.538
HFIRB21DC	B	M2	2	2	81.637	7.834	0.025	0.101	15	BAT	0.0067	76.509	7.342
HFIRB218C	B	M2	2	2	68.787	7.838	0.031	0.109	15	BGM	0.0072	69.127	7.876
HFIRC11DC	C	M1	3	1	71.555	7.594	0.034	0.111	15	BGM	0.0074	73.587	7.810
HFIRC1RMC	C	M1	3	1	79.904	7.697	0.033	0.110	15	BGM	0.0073	81.341	7.835
HFIRC1RNC	C	M1	3	1	76.899	7.390	0.022	0.113	15	BGM	0.0075	80.246	7.712

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

Average	75.132	7.531	0.030	Average _{norm}	0.0072	75.528	7.573
Standard Dev.	5.118	0.235	0.004	Standard Dev. _{norm}		4.992	0.258
Coeff. of Var. [%]	6.813	3.123	14.554	Coeff. of Var. [%] _{norm}		6.610	3.407
Min.	66.566	7.109	0.022	Min.	0.0067	66.781	7.105
Max.	81.637	7.838	0.034	Max.	0.0075	81.341	7.876
Number of Spec.	9	9	9	Number of Spec.	9	9	9



Laminate Unnotched Compression Properties (UNC0) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus* [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIRB11ED	B	M1	2	1	64.567			0.110	15	BGM	0.0073	65.543	
HFIRB11FD	B	M1	2	1	61.927			0.110	15	BGM	0.0073	62.978	
HFIRB11GD	B	M1	2	1	64.966			0.107	15	BGM	0.0072	64.645	
HFIRB11HD	B	M1	2	1	74.964			0.102	15	BGM	0.0068	70.950	
HFIRB21ED	B	M2	2	2	52.845			0.110	15	HAT	0.0073	53.938	
HFIRB21FD	B	M2	2	2	57.458			0.109	15	BGM	0.0073	58.229	
HFIRB21GD	B	M2	2	2	62.622			0.108	15	BGM	0.0072	62.786	
HFIRC11ED	C	M1	3	1	52.059			0.113	15	BAT	0.0075	54.357	
HFIRC11FD	C	M1	3	1	60.193			0.113	15	BGM	0.0075	63.045	
HFIRC11GD	C	M1	3	1	59.456			0.110	15	BGM	0.0073	60.649	
HFIRB11ID*	B	M1	2	1				0.099	15	BAT			
HFIRB114D	B	M1	2	1	69.360	7.748	0.019	0.110	15	BAB	0.0073	70.795	7.908
HFIRB11RMD	B	M1	2	1	69.098	7.898	0.020	0.107	15	BAT	0.0071	68.245	7.801
HFIRB21HD	B	M2	2	2		7.963	0.015	0.103	15	HIT	0.0069		7.614
HFIRB21ID	B	M2	2	2	70.790	8.216	0.019	0.103	15	HAB	0.0068	67.185	7.797
HFIRB214D	B	M2	2	2	67.719	8.128	0.013	0.108	15	BGM	0.0072	67.635	8.118
HFIRC11HD	C	M1	3	1	65.131	7.745	0.011	0.103	15	BAB	0.0069	62.327	7.412
HFIRC114D	C	M1	3	1	67.033	7.531	0.021	0.112	15	BAT	0.0075	69.588	7.818
HFIRC118D	C	M1	3	1	68.351	7.298	0.021	0.110	15	BAB	0.0074	69.827	7.456

Compressive strength for HFIRA21ID and HFIRB21HD is not reported as unacceptable failure mode was

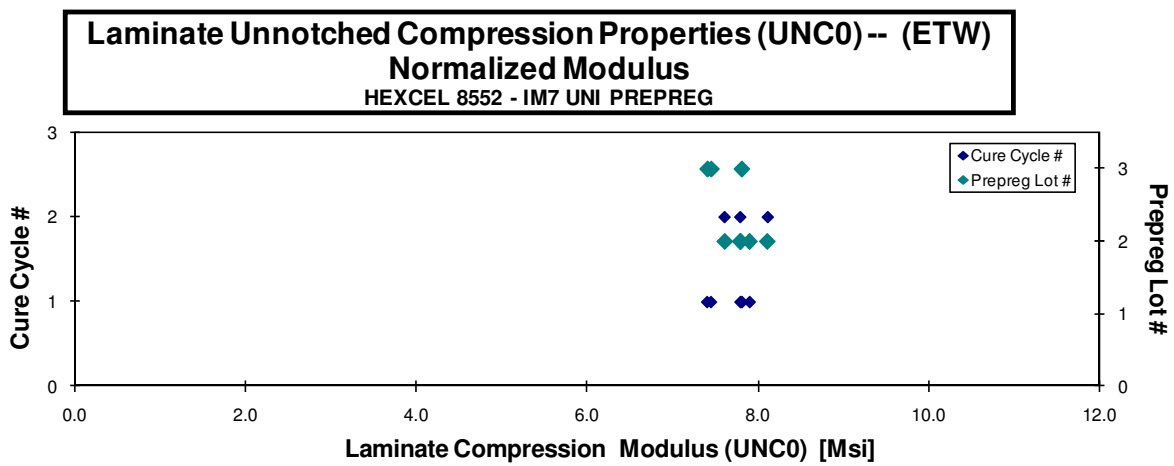
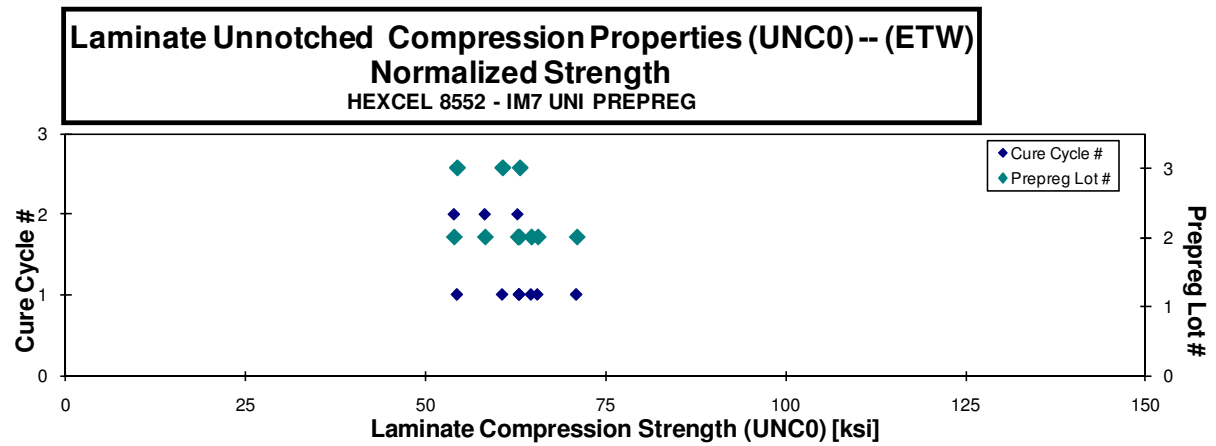
Modulus not reported due to improper strain gage adhesive used

Batch A Cure Cycle 1 and 2 and Batch C Cure Cycle 2 has improper layup so data was removed

COMPRESSIVE STRENGTH WAS NOT REPORTED FOR SPECIMEN # HFIRC21FD DUE TO UNACCEPTABLE FAILURE MODE.

* Specimens have uneven grip marks so data is not reported

Average	64.032	7.816	0.017	Average _{norm}	0.0072	64.278	7.740
Standard Dev.	6.208	0.303	0.004	Standard Dev. _{norm}		5.289	0.236
Coeff. of Var. [%]	9.696	3.882	22.032	Coeff. of Var. [%] _{norm}		8.228	3.043
Min.	52.059	7.298	0.011	Min.	0.0068	53.938	7.412
Max.	74.964	8.216	0.021	Max.	0.0075	70.950	8.118
Number of Spec.	17	8	8	Number of Spec.		17	8



4.7 Unnotched Tension 0 Properties

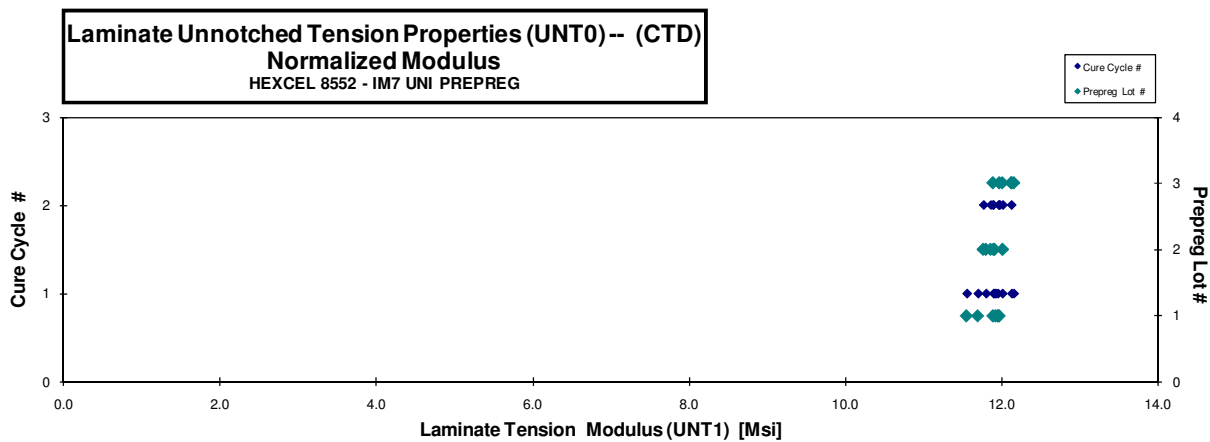
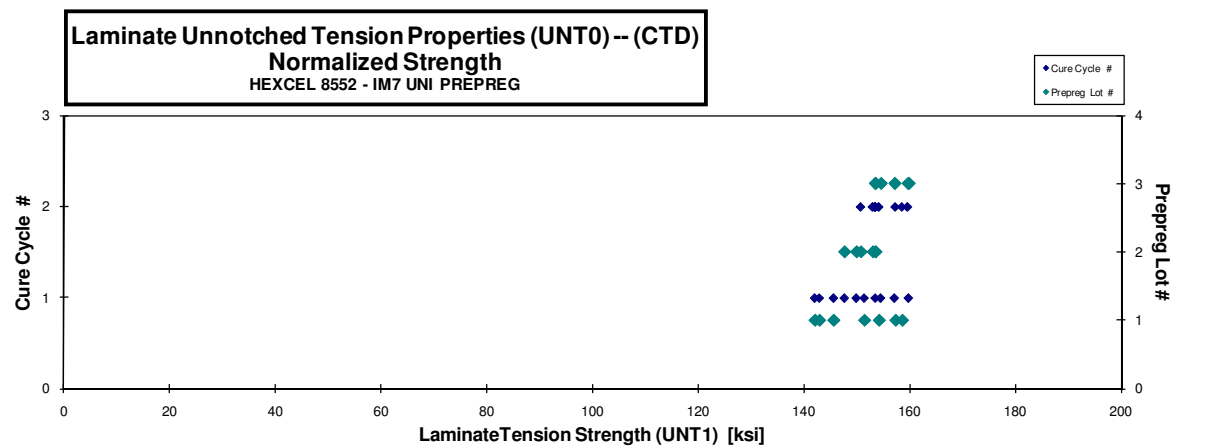
Laminate Unnotched Tension Properties (UNT0)-- (CTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIPA116B	A	M1	1	1	140.452	11.491	0.059	8	LGM	0.0073	142.931	11.694
HFIPA117B	A	M1	1	1	138.380	11.251	0.059	8	LGM	0.0074	142.064	11.551
HFIPA118B	A	M1	1	1	149.109	11.735	0.059	8	LGM	0.0073	151.439	11.919
HFIPA119B	A	M1	1	1	138.826	11.390	0.060	8	LGM	0.0076	145.615	11.947
HFIPA216B	A	M2	1	2	153.285	11.488	0.060	8	LGM	0.0075	158.607	11.887
HFIPA217B	A	M2	1	2	148.863	11.543	0.060	8	LGM	0.0075	154.204	11.958
HFIPA218B	A	M2	1	2	153.556	11.680	0.059	8	LGM	0.0074	157.333	11.968
HFIPB116B	B	M1	2	1	149.540	11.876	0.058	8	LGM	0.0072	149.929	11.907
HFIPB117B	B	M1	2	1	154.720	11.886	0.057	8	LGM	0.0071	153.556	11.797
HFIPB118B	B	M1	2	1	146.994	11.837	0.058	8	LWB	0.0072	147.675	11.892
HFIPB216B	B	M2	2	2	150.463	11.832	0.058	8	LWB	0.0072	150.767	11.856
HFIPB217B	B	M2	2	2	152.509	11.686	0.058	8	LGM	0.0072	153.523	11.763
HFIPB218B	B	M2	2	2	150.815	11.835	0.058	8	LAB	0.0073	153.040	12.010
HFIPC116B	C	M1	3	1	154.979	11.838	0.058	8	LGM	0.0073	157.176	12.006
HFIPC117B	C	M1	3	1	156.681	11.909	0.059	8	LGM	0.0073	159.854	12.151
HFIPC118B	C	M1	3	1	148.810	11.670	0.060	8	LGM	0.0075	154.579	12.122
HFIPC216B	C	M2	3	2	151.797	11.830	0.058	8	LGM	0.0073	153.554	11.967
HFIPC217B	C	M2	3	2	152.579	11.818	0.058	8	LGM	0.0072	153.462	11.886
HFIPC218B	C	M2	3	2	155.700	11.820	0.059	8	LGM	0.0074	159.664	12.121

Average 149.898 11.706
 Standard Dev. 5.417 0.189
 Coeff. of Var. [%] 3.614 1.612
 Min. 138.380 11.251
 Max. 156.681 11.909
 Number of Spec. 19 19

Average_{norm} 0.0073 152.578 11.916
 Standard Dev._{norm} 5.172 0.147
 Coeff. of Var. [%]_{norm} 3.389 1.236
 Min. 0.0071 142.064 11.551
 Max. 0.0076 159.854 12.151
 Number of Spec. 19 19



Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

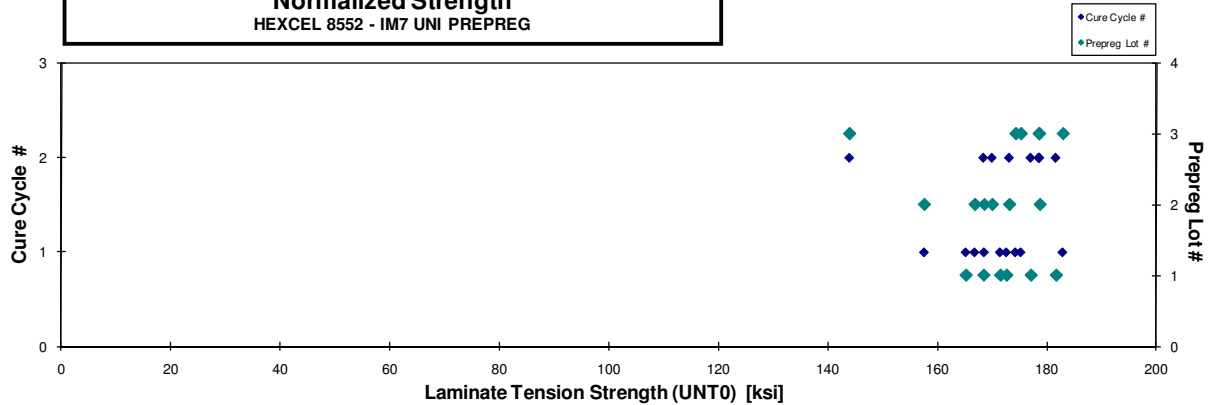
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIPA111A*	A	M1	1	1								
HFIPA112A	A	M1	1	1	160.028	11.338	0.059	8	LWT/LWB	0.0074	165.214	11.706
HFIPA113A	A	M1	1	1	165.993	11.753	0.060	8	LGM	0.0075	172.621	12.222
HFIPA114A	A	M1	1	1	170.162	12.003	0.058	8	LWT/LAB	0.0073	171.491	12.097
HFIPA211A	A	M2	1	2	170.274	11.629	0.057	8	LAT/LAB	0.0071	168.451	11.504
HFIPA212A	A	M2	1	2	166.740	11.334	0.061	8	LGM	0.0076	177.065	12.036
HFIPA213A	A	M2	1	2	177.388	11.745	0.059	8	LWB/LWT	0.0074	181.648	12.027
HFIPB111A	B	M1	2	1	167.506	12.347	0.054	8	LGM	0.0068	157.619	11.618
HFIPB112A	B	M1	2	1	164.698	11.723	0.058	8	LWT/LAB	0.0073	166.842	11.875
HFIPB113A	B	M1	2	1	169.650	12.020	0.057	8	LWT/LWB	0.0072	168.570	11.943
HFIPB211A	B	M2	2	2	165.886	11.892	0.059	8	LGM	0.0074	170.014	12.188
HFIPB212A	B	M2	2	2	169.856	11.745	0.059	8	LGM	0.0073	173.149	11.973
HFIPB213A	B	M2	2	2	177.983	12.004	0.058	8	LWB	0.0072	178.704	12.052
HFIPC111A	C	M1	3	1	168.776	11.646	0.059	8	LWT	0.0074	174.295	12.027
HFIPC112A	C	M1	3	1	169.224	11.688	0.060	8	LWT	0.0075	175.247	12.104
HFIPC113A	C	M1	3	1	182.062	12.029	0.058	8	LGM	0.0072	182.904	12.084
HFIPC211A	C	M2	3	2	150.387	12.455	0.055	8	LGM	0.0069	143.990	11.926
HFIPC212A	C	M2	3	2	173.159	11.766	0.059	8	LGM	0.0074	178.570	12.134
HFIPC213A	C	M2	3	2	175.088	12.104	0.059	8	LGM	0.0073	178.533	12.342

*Data from was removed due to thickness taper due to pinching on edge of panel during bagging.

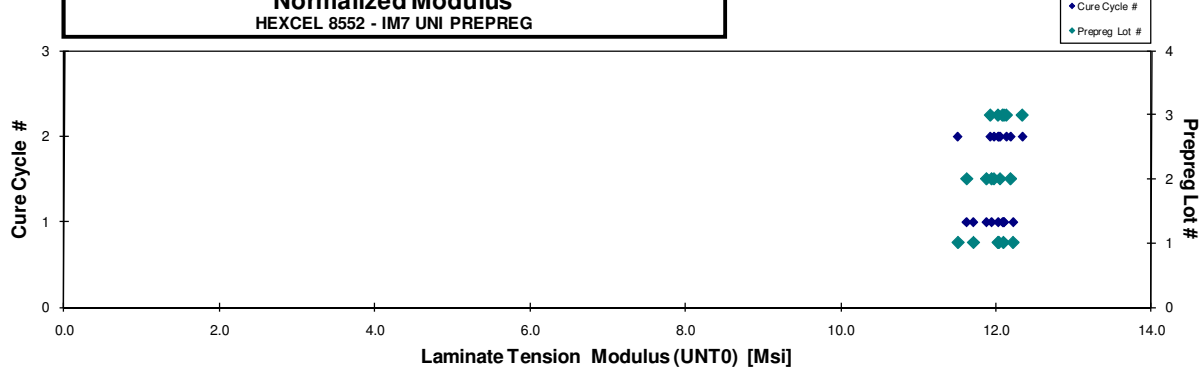
Average 169.159 11.846
 Standard Dev. 7.077 0.296
 Coeff. of Var. [%] 4.183 2.496
 Min. 150.387 11.334
 Max. 182.062 12.455
 Number of Spec. 18 18

Average_{norm} 0.0073 171.385 11.992
 Standard Dev._{norm} 9.304 0.211
 Coeff. of Var. [%]_{norm} 5.429 1.757
 Min. 0.0068 143.990 11.504
 Max. 0.0076 182.904 12.342
 Number of Spec. 18 18

Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Normalized Strength
 HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT0) -- (RTD)
Normalized Modulus
 HEXCEL 8552 - IM7 UNI PREPREG



Laminate Unnotched Tension Properties (UNT0) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

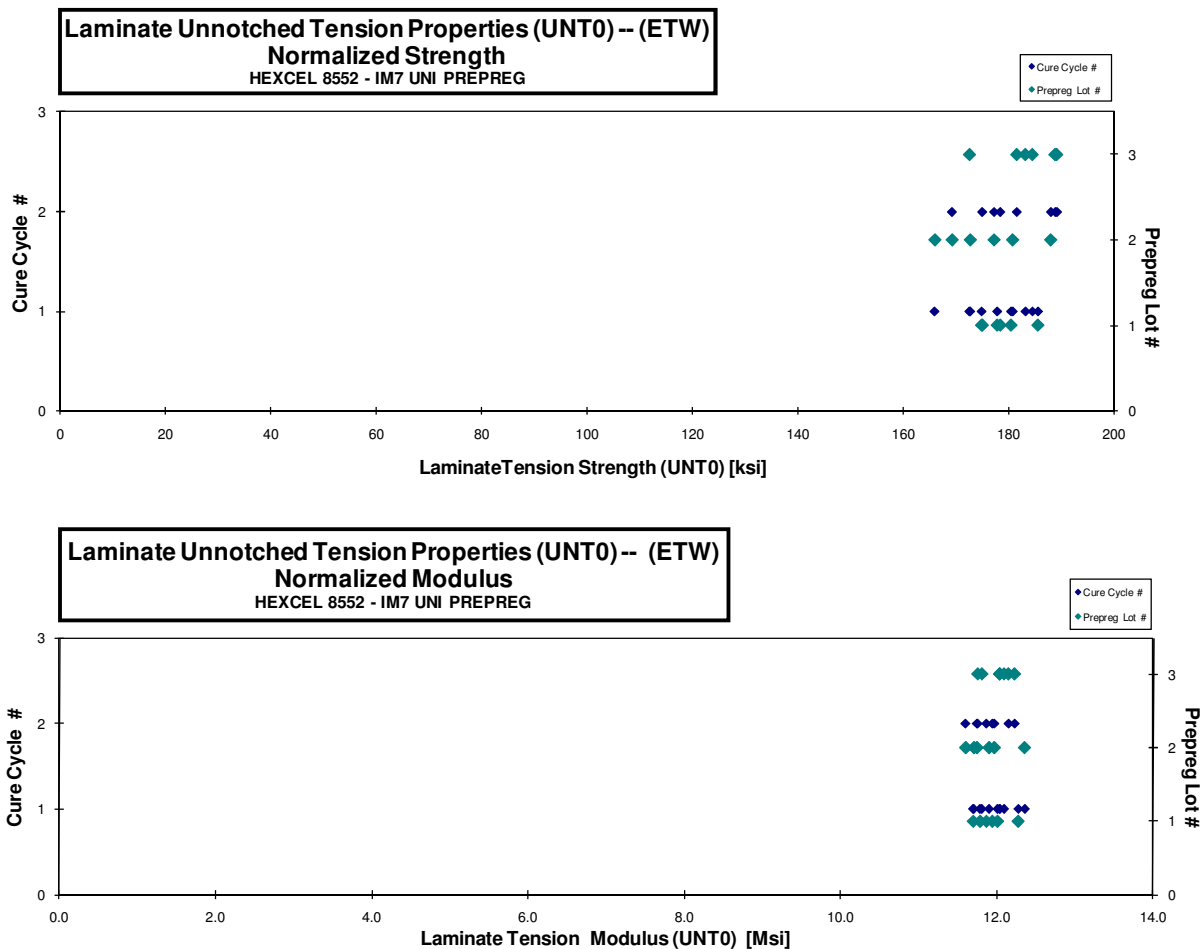
normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIPA11BD	A	M1	1	1	176.795	11.690	0.060	8	LAT / LGM / LAB	0.0076	185.594	12.272
HFIPA11CD	A	M1	1	1	174.123	11.286	0.060	8	LAT / LAB	0.0075	180.471	11.697
HFIPA11DD	A	M1	1	1	175.012	11.816	0.059	8	LWT / LGM	0.0073	177.848	12.008
HFIPA11ED	A	M1	1	1	170.114	11.463	0.059	8	LAT / LAB	0.0074	174.889	11.785
HFIPA21BD*	A	M2	1	2								
HFIPA21CD	A	M2	1	2	169.361	11.335	0.061	8	LAT / LWB	0.0076	178.427	11.942
HFIPA21DD	A	M2	1	2	170.950	11.590	0.059	8	LAT / LAB	0.0074	175.007	11.865
HFIPB11BD	B	M1	2	1	178.511	12.198	0.058	8	LAT / LWB	0.0073	180.784	12.353
HFIPB11CD	B	M1	2	1	164.549	11.798	0.058	8	LAT / LGM	0.0073	165.977	11.900
HFIPB11ED	B	M1	2	1	172.023	11.659	0.058	8	LAT / LGM	0.0072	172.720	11.706
HFIPB21BD	B	M2	2	2	186.089	11.843	0.058	8	LAT / LGM / LAB	0.0073	188.028	11.966
HFIPB21CD	B	M2	2	2	169.321	11.605	0.058	8	LGM	0.0072	169.272	11.601
HFIPB21DD	B	M2	2	2	175.679	11.641	0.058	8	LAT / LGM	0.0073	177.254	11.745
HFIPC11BD	C	M1	3	1	172.929	11.832	0.057	8	LGM / LWB	0.0072	172.579	11.808
HFIPC11CD	C	M1	3	1	177.552	11.718	0.059	8	LAT / LWB	0.0074	183.203	12.091
HFIPC11DD*	C	M1	3	1	11.947		0.058	8	LIT / LWB	0.0073		12.034
HFIPC11ED	C	M1	3	1	179.743	11.724	0.059	8	LAT / LAB	0.0074	184.528	12.036
HFIPC21BD	C	M2	3	2	189.339	12.258	0.055	8	LAT / LAB	0.0069	181.560	11.755
HFIPC21CD	C	M2	3	2	181.866	11.677	0.060	8	LWT / LGM / LAB	0.0075	189.181	12.147
HFIPC21DD	C	M2	3	2	183.749	11.894	0.059	8	LAT / LAB	0.0074	188.853	12.224

*Data from was removed due to thickness variation due to pinching on edge of panel during bagging.

Average 175.984 11.735
 Standard Dev. 6.450 0.245
 Coeff. of Var. [%] 3.665 2.091
 Min. 164.549 11.286
 Max. 189.339 12.258
 Number of Spec. 18 19

Average_{norm} 0.0073 179.232 11.944
 Standard Dev._{norm} 6.718 0.211
 Coeff. of Var. [%]_{norm} 3.748 1.764
 Min. 0.0069 165.977 11.601
 Max. 0.0076 189.181 12.353
 Number of Spec. 18 19



4.8 Unnotched Tension 1 Properties

Laminate Unnotched Tension Properties (UNT1) -- (CTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

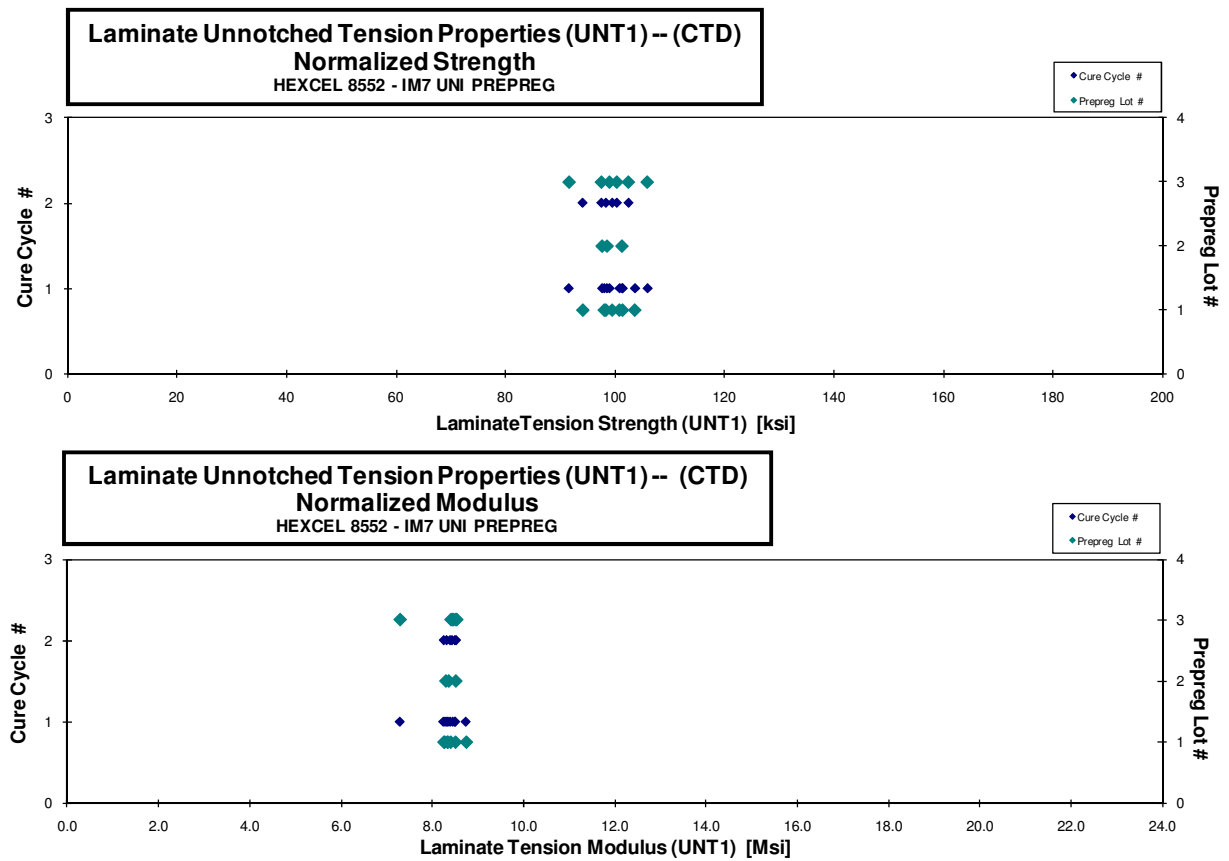
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Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIAA116B	A	M1	1	1	98.622	8.511	0.118	16	LGM / AGM	0.0074	101.333	8.745
HFIAA117B	A	M1	1	1	99.922	8.181	0.116	16	AGM	0.0073	100.789	8.252
HFIAA118B	A	M1	1	1	102.825	8.274	0.116	16	AWT	0.0073	103.584	8.335
HFIAA119B	A	M1	1	1	95.738	8.311	0.118	16	AGM	0.0074	98.009	8.508
HFIAA215B	A	M2	1	2	98.424	8.242	0.116	16	LGM	0.0073	99.449	8.328
HFIAA216B	A	M2	1	2	97.607	8.342	0.116	16	LGM	0.0073	98.313	8.402
HFIAA217B	A	M2	1	2	93.700	8.231	0.116	16	LWB	0.0072	94.093	8.265
HFIAB115B	B	M1	2	1	97.175	8.253	0.116	16	AGM	0.007	97.639	8.293
HFIAB116B	B	M1	2	1	97.723	8.290	0.116	16	AWT	0.0073	98.514	8.357
HFIAB117B	B	M1	2	1	101.304	8.519	0.115	16	AGM	0.0072	101.245	8.514
HFAC115B	C	M1	3	1	96.981	8.237	0.118	16	AGM / DGM	0.0073	98.974	8.406
HFAC116B	C	M1	3	1	104.197	8.331	0.117	16	AGM	0.0073	105.840	8.462
HFAC111B	C	M1	3	1	99.363	7.913	0.106	16	AGM	0.0066	91.601	7.295
HFAC215B	C	M2	3	2	95.780	8.362	0.117	16	AGM	0.0073	97.485	8.511
HFAC216B	C	M2	3	2	100.348	8.450	0.115	16	AWT	0.0072	100.290	8.446
HFAC217B	C	M2	3	2	100.956	8.414	0.117	16	AWB	0.0073	102.402	8.535

Data for HFIAB 21XB was removed due to unbalanced lay up.

Average 98.792 8.304
 Standard Dev. 2.750 0.145
 Coeff. of Var. [%] 2.784 1.742
 Min. 93.700 7.913
 Max. 104.197 8.519
 Number of Spec. 16 16

Average_{norm} 0.0072 99.348 8.353
 Standard Dev._{norm} 3.442 0.309
 Coeff. of Var. [%]_{norm} 3.464 3.696
 Min. 0.0066 91.601 7.295
 Max. 0.0074 105.840 8.745
 Number of Spec. 16 16 16



Laminate Unnotched Tension Properties (UNT1)-- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}

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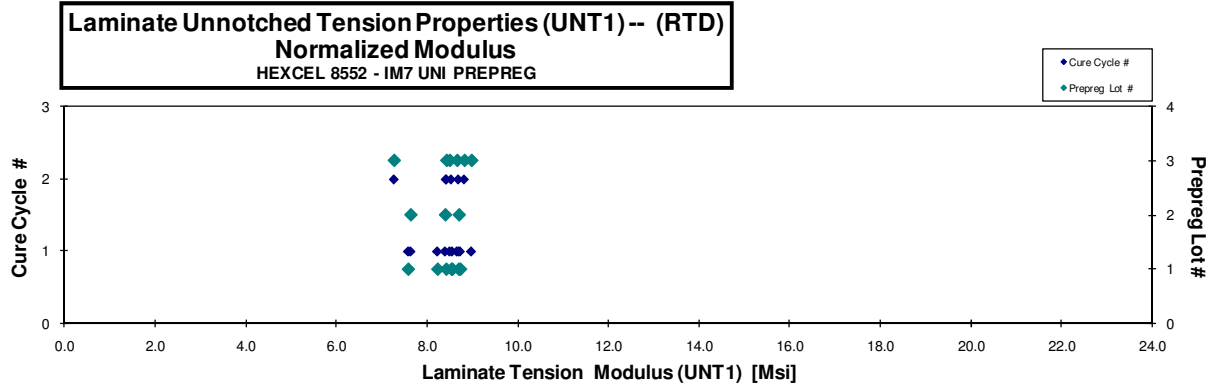
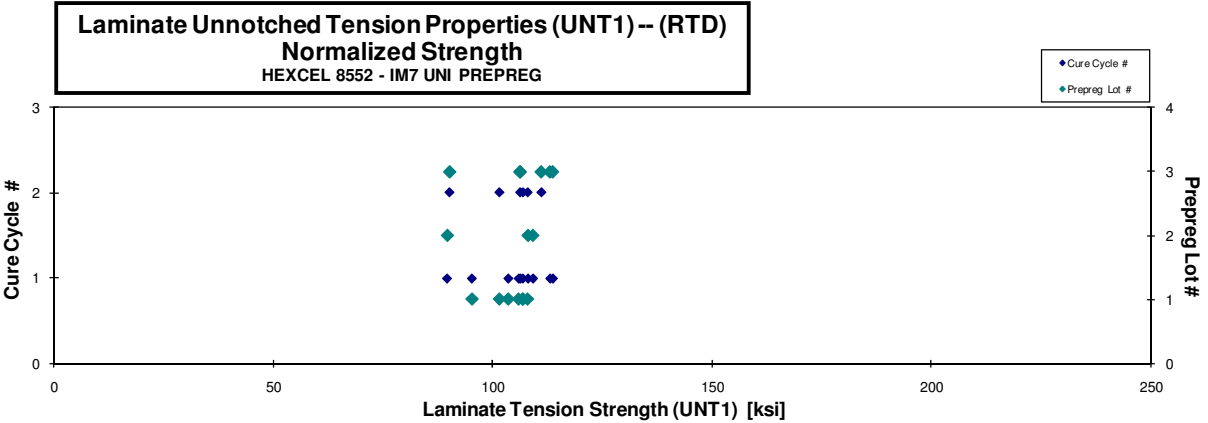
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Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIAA111A	A	M1	1	1	102.024	8.116	0.117	16	AWT	0.0073	103.515	8.235
HFIAA112A	A	M1	1	1	101.477	8.093	0.108	16	AGM	0.0068	95.194	7.592
HFIAA113A	A	M1	1	1	103.733	8.310	0.119	16	AGM	0.0074	106.855	8.560
HFIAA114A	A	M1	1	1	103.511	8.543	0.118	16	AWB	0.0074	105.892	8.739
HFIAA212A	A	M2	1	2	105.753	8.366	0.118	16	AWT	0.0074	107.956	8.541
HFIAA213A	A	M2	1	2	104.779	8.528	0.118	16	AGM	0.0073	106.871	8.698
HFIAA214A	A	M2	1	2	101.098	8.393	0.116	16	AGM	0.0072	101.493	8.426
HFIB111A	B	M1	2	1	96.381	8.227	0.107	16	AGM	0.0067	89.563	7.645
HFIB112A	B	M1	2	1	107.280	8.554	0.117	16	AGM	0.0073	109.174	8.705
HFIB113A	B	M1	2	1	106.160	8.257	0.117	16	AWT	0.0073	108.049	8.404
HFAC112A	C	M1	3	1	110.004	8.691	0.119	16	AWB	0.0074	113.712	8.984
HFAC113A	C	M1	3	1	102.238	8.186	0.120	16	AWT	0.0075	106.246	8.507
HFAC114A	C	M1	3	1	111.125	8.519	0.117	16	AWB	0.0073	113.070	8.668
HFAC211A	C	M2	3	2	97.791	7.900	0.106	16	AWB	0.0066	90.080	7.277
HFAC212A	C	M2	3	2	108.416	8.618	0.118	16	AGM	0.0074	111.066	8.828
HFAC213A	C	M2	3	2	102.436	8.133	0.119	16	AGM	0.0075	106.230	8.435

Data for HFIB 21XA was removed due to unbalanced lay up.

Average 104.013 8.340
 Standard Dev. 4.054 0.224
 Coeff. of Var. [%] 3.898 2.682
 Min. 96.381 7.900
 Max. 111.125 8.691
 Number of Spec. 16 16

Average_{norm} 0.0072 104.685 8.390
 Standard Dev._{norm} 7.276 0.480
 Coeff. of Var. [%]_{norm} 6.950 5.727
 Min. 0.0066 89.563 7.277
 Max. 0.0075 113.712 8.984
 Number of Spec. 16 16



Laminate Unnotched Tension Properties (UNT1) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

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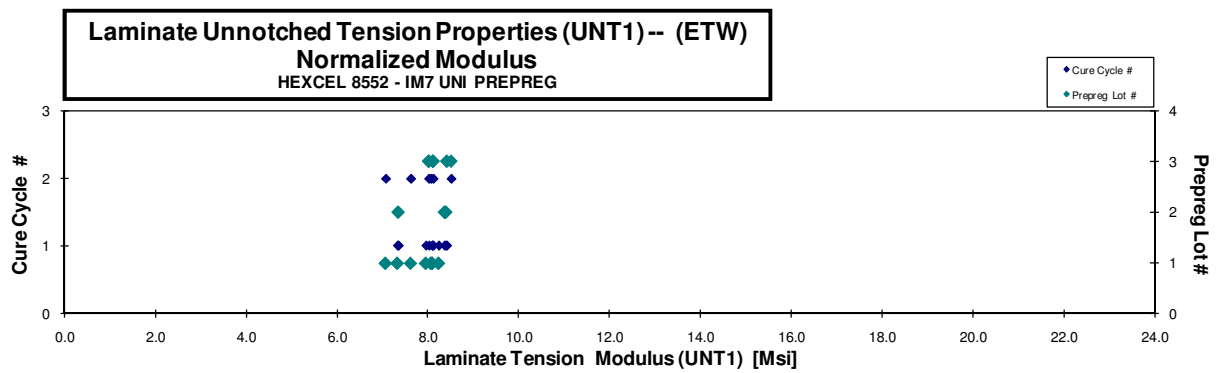
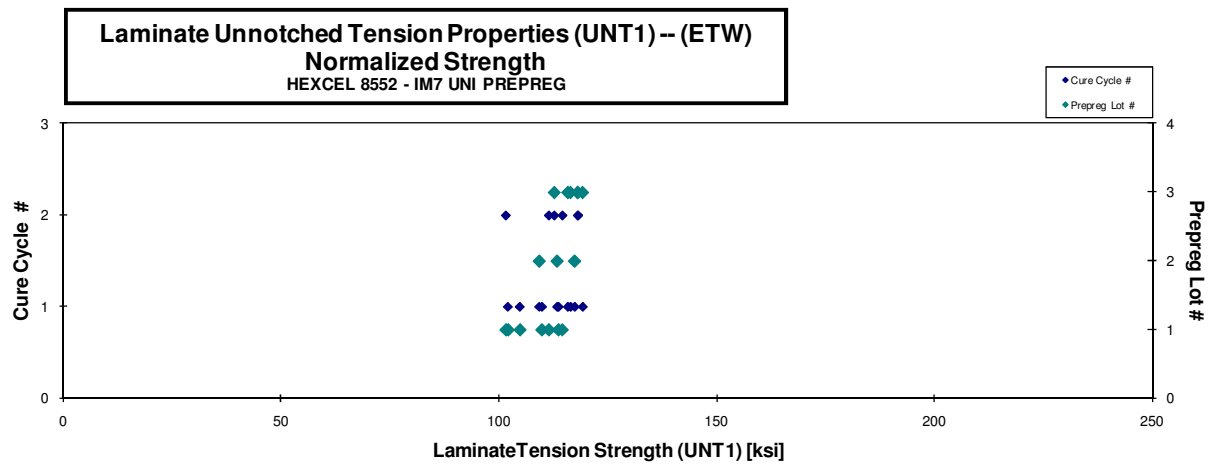
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIAA11AD**	A	M1	1	1		7.968	0.117	16	*	0.0073		8.098
HFIAA11BD	A	M1	1	1	109.007	7.825	0.108	16	AGM/AWB	0.0067	102.115	7.330
HFIAA11CD	A	M1	1	1	111.481	7.933	0.118	16	AGM	0.0073	113.739	8.094
HFIAA11DD	A	M1	1	1	107.732	8.074	0.118	16	AGM	0.0073	109.929	8.238
HFIAA11FD	A	M1	1	1	104.093	7.898	0.116	16	AGM	0.0073	104.861	7.956
HFIAA218D	A	M2	1	2	112.321	7.906	0.118	16	DGM	0.0073	114.612	8.067
HFIAA219D	A	M2	1	2	109.153	7.460	0.118	16	DGM	0.0074	111.521	7.622
HFIAA21AD	A	M2	1	2	108.151	7.522	0.108	16	DGM/AWT/AWB	0.0068	101.642	7.069
HFIAB118D	B	M1	2	1	111.994	8.292	0.117	16	DGM/AGM	0.0073	113.420	8.398
HFIAB119D	B	M1	2	1	115.193	8.207	0.117	16	DGM	0.0073	117.443	8.367
HFIAB11AD	B	M1	2	1	106.398	7.155	0.118	16	DGM/AWB	0.0074	109.292	7.350
HFIA118D	C	M1	3	1	111.908	8.128	0.119	16	DGM	0.0075	115.875	8.416
HFIA119D	C	M1	3	1	119.118	8.105	0.115	16	DGM	0.0072	119.290	8.117
HFIA11AD	C	M1	3	1	112.566	7.754	0.119	16	DGM	0.0075	116.491	8.024
HFIA218D	C	M2	3	2	115.435	7.926	0.118	16	DGM	0.0074	118.224	8.117
HFIA219D	C	M2	3	2	114.366	8.241	0.119	16	DGM	0.0074	118.155	8.514
HFIA21AD	C	M2	3	2	115.103	8.187	0.113	16	LWT/DGM	0.0071	112.772	8.021

**SPECIMEN SLIPPED DURING TESTING, STRENGTH NOT REPORTED

Data for HFIA21AD was removed due to unbalanced lay up.

Average 111.501 7.916
 Standard Dev. 3.904 0.305
 Coeff. of Var. [%] 3.501 3.857
 Min. 104.093 7.155
 Max. 119.118 8.292
 Number of Spec. 16 17

Average_{norm} 0.0073 112.461 7.988
 Standard Dev._{norm} 5.606 0.412
 Coeff. of Var. [%]_{norm} 4.985 5.162
 Min. 0.0067 101.642 7.069
 Max. 0.0075 119.290 8.514
 Number of Spec. 17 16 17



4.9 Unnotched Tension 2 Properties

Laminate Unnotched Tension Properties (UNT2) -- (CTD)**Strength & Modulus**
HEXCEL 8552 - IM7 UNI PREPREGnormalizing t_{ply}

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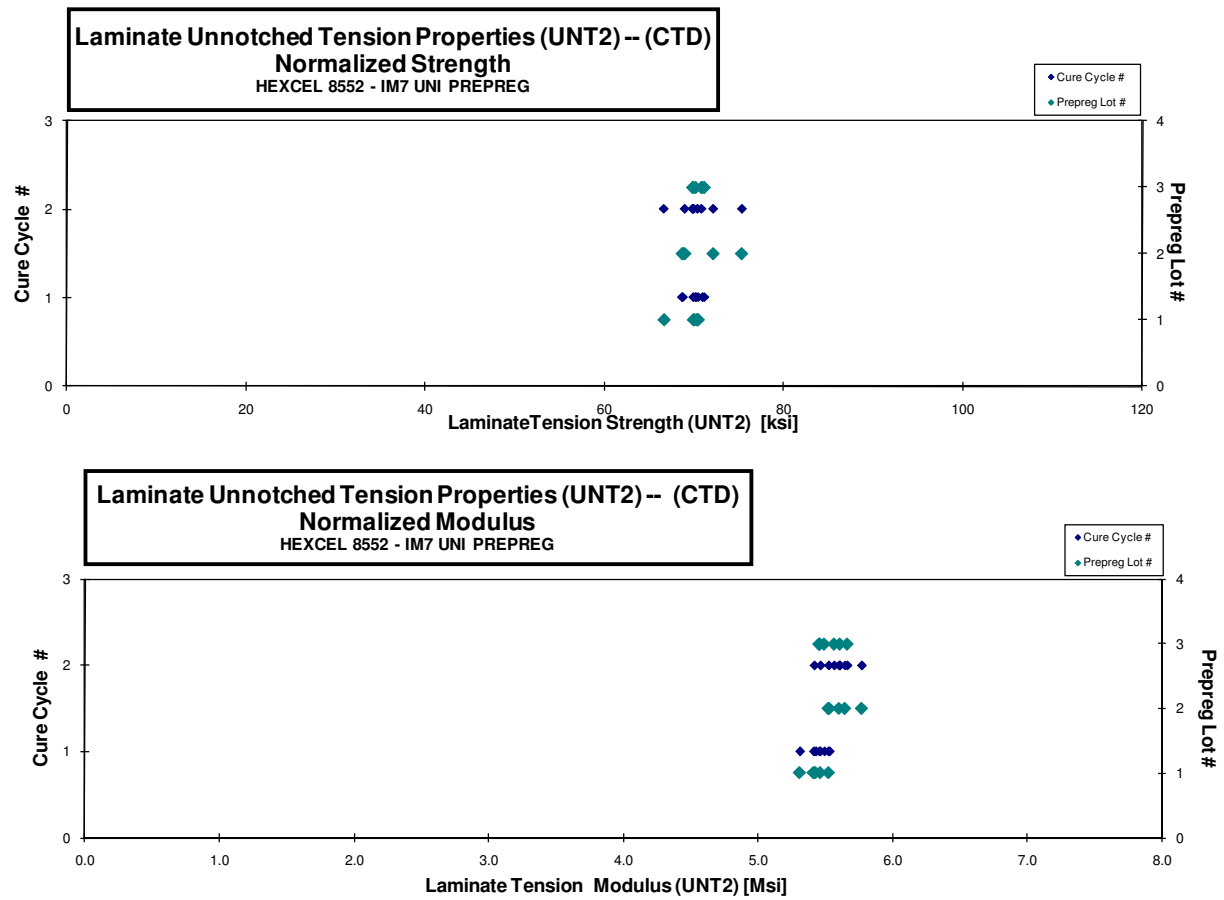
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Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIBA117B	A	M1	1	1	68.999	5.320	0.147	20	AGM	0.0073	70.196	5.412
HFIBA118B	A	M1	1	1	67.700	5.143	0.149	20	AGM	0.0074	69.902	5.310
HFIBA119B	A	M1	1	1	68.762	5.300	0.148	20	AGM	0.0074	70.433	5.429
HFIBA11AB*	A	M1	1	1								
HFIBA216B	A	M2	1	2	65.977	5.366	0.145	20	AWB	0.0073	66.603	5.417
HFIBA217B	A	M2	1	2	69.702	5.413	0.145	20	AWB	0.0073	70.340	5.463
HFIBA218B	A	M2	1	2	68.153	5.384	0.148	20	AGM	0.0074	69.927	5.524
HFIBB1X3B	B	M1	2	1	69.069	5.565	0.143	20	AGM	0.0072	68.637	5.530
HFIBB1X4B	B	M1	2	1	69.980	5.623	0.141	20	AWB	0.0071	68.733	5.523
HFIBB217B	B	M2	2	2	70.872	5.548	0.147	20	AGM	0.0073	72.102	5.645
HFIBB218B	B	M2	2	2	66.597	5.412	0.149	20	AWT	0.0075	68.933	5.602
HFIBB219B	B	M2	2	2	72.926	5.588	0.149	20	AWT	0.0074	75.289	5.769
HFIBC116B	C	M1	3	1	68.989	5.402	0.146	20	AWB	0.0073	70.139	5.492
HFIBC117B	C	M1	3	1	69.926	5.385	0.146	20	AWB	0.0073	70.914	5.461
HFIBC118B	C	M1	3	1	69.297	5.315	0.148	20	AGM	0.0074	71.118	5.454
HFIBC216B	C	M2	3	2	68.195	5.431	0.148	20	AWB	0.0074	69.884	5.565
HFIBC217B	C	M2	3	2	69.646	5.518	0.146	20	AGM	0.0073	70.790	5.608
HFIBC218B	C	M2	3	2	67.780	5.499	0.148	20	AGM	0.0074	69.796	5.662

*Data was removed due to thickness taper due to pinching on edge of panel during bagging.

Average 68.975 5.424
 Standard Dev. 1.605 0.123
 Coeff. of Var. [%] 2.328 2.263
 Min. 65.977 5.143
 Max. 72.926 5.623
 Number of Spec. 17 17

Average_{norm} 0.0073 70.220 5.522
 Standard Dev._{norm} 1.783 0.112
 Coeff. of Var. [%]_{norm} 2.539 2.030
 Min. 0.0071 66.603 5.310
 Max. 0.0075 75.289 5.769
 Number of Spec. 17 17



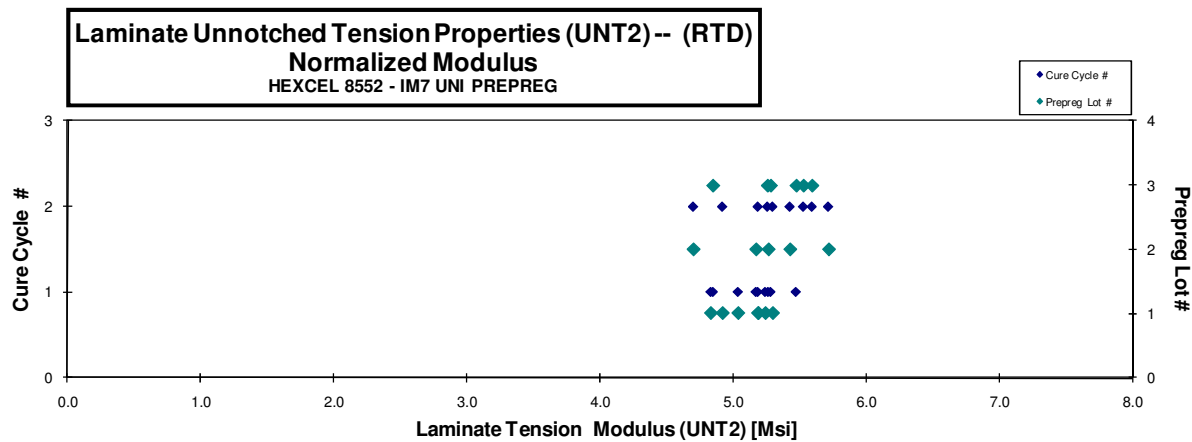
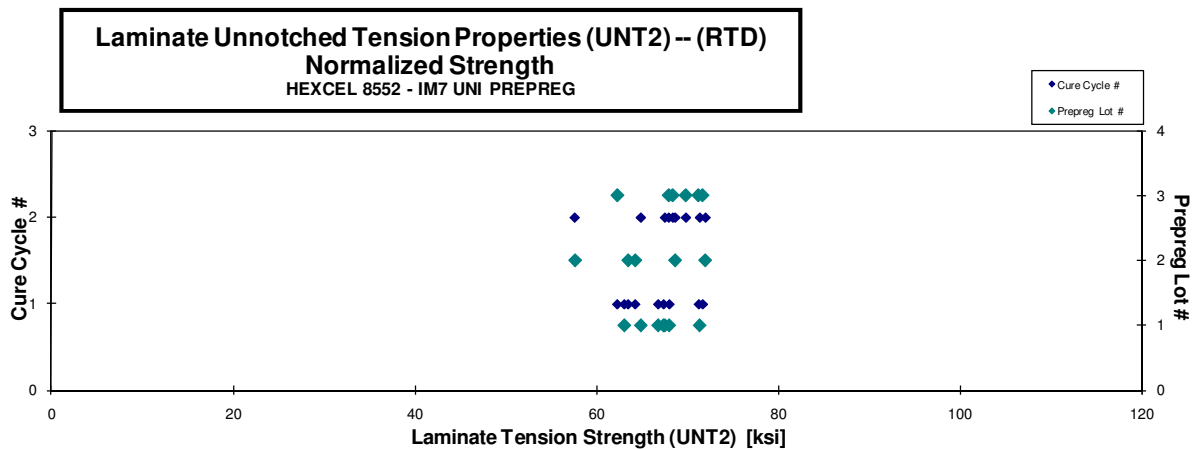
Laminate Unnotched Tension Properties (UNT2) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

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Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIBA111A	A	M1	1	1	65.315	5.006	0.139	20	DGM	0.0070	63.055	4.832
HFIBA113A	A	M1	1	1	66.335	5.060	0.148	20	DGM	0.0074	67.993	5.186
HFIBA114A	A	M1	1	1	66.255	5.156	0.146	20	DGM	0.0073	67.359	5.242
HFIBA115A	A	M1	1	1	65.636	4.951	0.147	20	DGM	0.0073	66.776	5.037
HFIBA211A	A	M2	1	2	67.895	5.150	0.138	20	DWT	0.0069	64.870	4.920
HFIBA212A	A	M2	1	2	69.978	5.196	0.147	20	DGM	0.0073	71.339	5.297
HFIBA213A	A	M2	1	2	66.443	5.106	0.146	20	DWB	0.0073	67.512	5.188
HFIBB1X1A	B	M1	2	1	67.953	5.536	0.135	20	DGM	0.0067	63.486	5.172
HFIBB1X2A	B	M1	2	1	63.968	5.241	0.145	20	DGM	0.0072	64.264	5.265
HFIBB211A	B	M2	2	2	62.419	5.092	0.133	20	DGM	0.0066	57.637	4.701
HFIBB212A	B	M2	2	2	69.711	5.539	0.149	20	DGM	0.0074	71.954	5.718
HFIBB213A	B	M2	2	2	66.311	5.243	0.149	20	DGM	0.0075	68.644	5.427
HFIBC111A	C	M1	3	1	66.102	5.146	0.136	20	DGM	0.0068	62.285	4.849
HFIBC112A	C	M1	3	1	69.586	5.316	0.148	20	DGM	0.0074	71.656	5.474
HFIBC113A	C	M1	3	1	69.367	5.146	0.148	20	DGM	0.0074	71.205	5.282
HFIBC211A	C	M2	3	2	69.692	5.394	0.140	20	DWB/DGM	0.0070	67.934	5.258
HFIBC212A	C	M2	3	2	66.268	5.421	0.149	20	DGM	0.0074	68.369	5.593
HFIBC213A	C	M2	3	2	68.155	5.398	0.147	20	DGM	0.0074	69.804	5.529

Average 67.077 5.228
 Standard Dev. 2.124 0.173
 Coeff. of Var. [%] 3.167 3.305
 Min. 62.419 4.951
 Max. 69.978 5.539
 Number of Spec. 18 18

Average_{norm} 0.0072 67.008 5.221
 Standard Dev._{norm} 3.814 0.275
 Coeff. of Var. [%]_{norm} 5.692 5.271
 Min. 0.0066 57.637 4.701
 Max. 0.0075 71.954 5.718
 Number of Spec. 18 18



Laminate Unnotched Tension Properties (UNT2) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

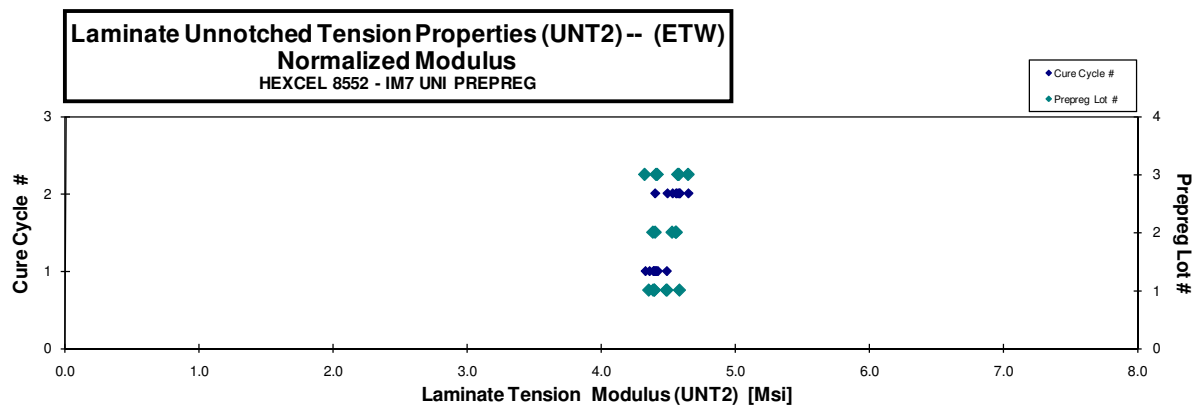
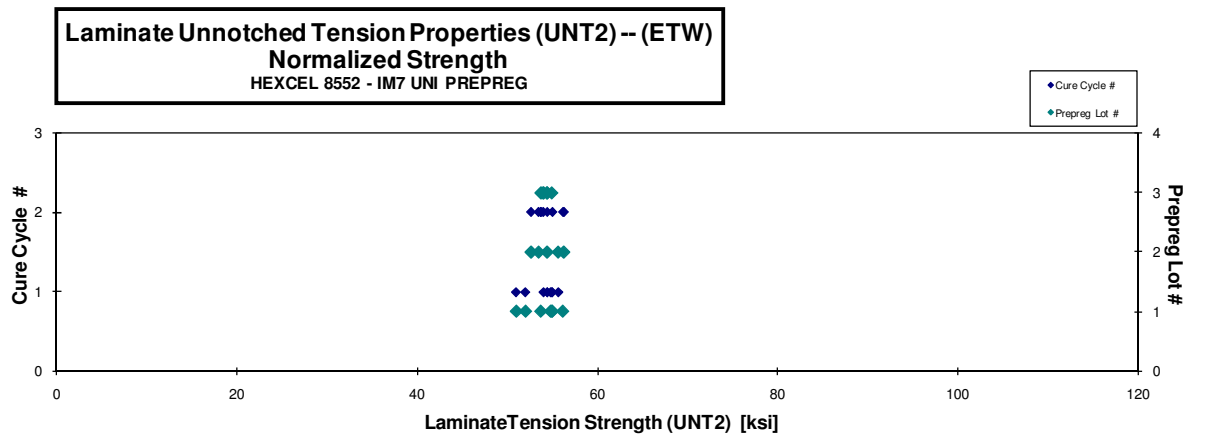
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Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIBA11DD	A	M1	1	1	53.540	4.284	0.148	20	DGM	0.0074	54.928	4.395
HFIBA11ED	A	M1	1	1	54.012	4.422	0.146	20	DGM	0.0073	54.775	4.484
HFIBA11FD	A	M1	1	1	50.226	4.323	0.146	20	DGM	0.0073	50.965	4.387
HFIBA11GD	A	M1	1	1	51.145	4.285	0.146	20	DGM	0.0073	51.985	4.356
HFIBA21BD	A	M2	1	2	54.794	4.473	0.148	20	DGM	0.0074	56.126	4.582
HFIBA21CD	A	M2	1	2	52.714	4.318	0.147	20	DGM	0.0073	53.685	4.398
HFIBA21DD	A	M2	1	2	54.527	4.454	0.145	20	DGM	0.0073	54.963	4.489
HFIBB1X5D*	B	M1	2	1	56.418	4.466	0.142	20	DGM	0.0071	55.615	4.402
HFIBB1X6D*	B	M1	2	1	54.904	4.427	0.143	20	DGM	0.0071	54.390	4.385
HFIBB21ED	B	M2	2	2	52.034	4.479	0.146	20	DGM	0.0073	52.606	4.528
HFIBB21FD	B	M2	2	2	55.349	4.482	0.146	20	DGM	0.0073	56.233	4.553
HFIBB21GD	B	M2	2	2	52.600	4.487	0.146	20	DGM	0.0073	53.440	4.559
HFIBC11CD	C	M1	3	1	52.726	4.307	0.147	20	DGM	0.0074	53.983	4.409
HFIBC11DD	C	M1	3	1	54.608	4.394	0.145	20	DGM	0.0072	54.905	4.418
HFIBC11ED	C	M1	3	1	53.866	4.284	0.145	20	DGM	0.0073	54.390	4.325
HFIBC21BD	C	M2	3	2	52.347	4.509	0.148	20	DGM	0.0074	53.940	4.646
HFIBC21CD	C	M2	3	2	52.559	4.473	0.147	20	DGM	0.0074	53.703	4.570
HFIBC21DD	C	M2	3	2	53.588	4.510	0.146	20	DGM	0.0073	54.394	4.577

*PANEL WAS NOT REPLACED BECAUSE OF INSUFICIENT MATERIAL. SPECIMENS WERE TAKEN FROM UNC2 PANEL.

Average 53.442 4.410
 Standard Dev. 1.550 0.085
 Coeff. of Var. [%] 2.901 1.930
 Min. 50.226 4.284
 Max. 56.418 4.510
 Number of Spec. 18 18

Average_{norm} 0.0073 54.168 4.470
 Standard Dev._{norm} 1.350 0.095
 Coeff. of Var. [%]_{norm} 2.492 2.127
 Min. 0.0071 50.965 4.325
 Max. 0.0074 56.233 4.646
 Number of Spec. 18 18



4.10 Unnotched Tension 3 Properties

Laminate Unnotched Tension Properties (UNT3) -- (CTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}

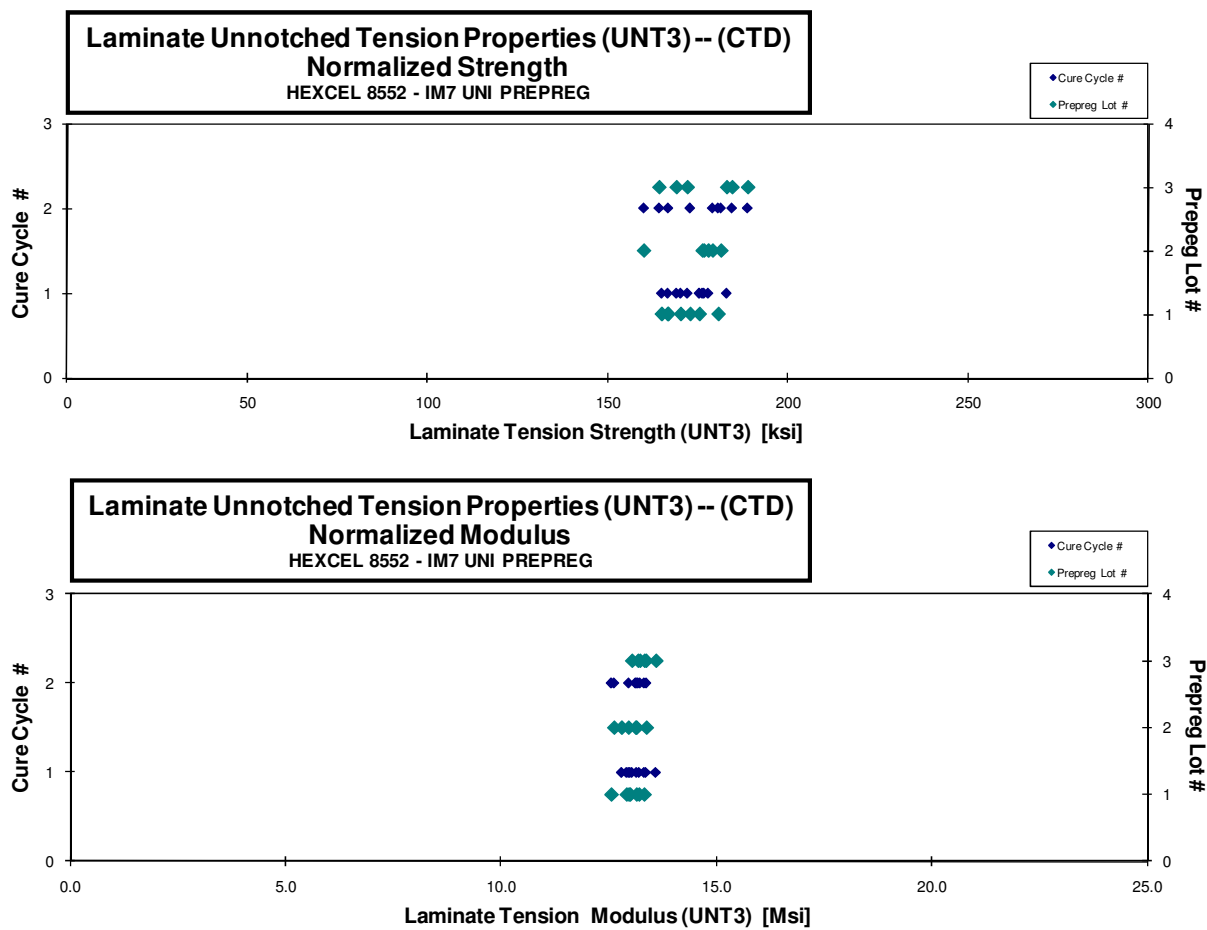
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0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFICA116B	A	M1	1	1	173.739	12.884	0.145	20	AWT	0.0073	175.368	13.005
HFICA117B	A	M1	1	1	165.963	13.282	0.145	20	DWT / LWT / LAB	0.0072	166.559	13.329
HFICA118B	A	M1	1	1	166.866	12.669	0.147	20	LAB / DAB	0.0073	170.188	12.921
HFICA119B	A	M1	1	1	161.608	12.952	0.147	20	LWB	0.0073	164.863	13.213
HFICA215B	A	M2	1	2	163.835	12.356	0.146	20	DGM / LAT / AWT	0.0073	166.660	12.569
HFICA216B	A	M2	1	2	170.370	12.971	0.146	20	DGM / AWB / AAT	0.0073	172.776	13.154
HFICA217B	A	M2	1	2	178.529	12.824	0.146	20	DGM / LAB / AWT	0.0073	180.595	12.972
HFICB115B	B	M1	2	1	177.874	13.058	0.143	20	LWT / DGM	0.0072	176.638	12.967
HFICB116B	B	M1	2	1	178.969	13.237	0.143	20	LAT / LAB / DGM	0.0072	177.829	13.153
HFICB117B	B	M1	2	1	176.503	12.829	0.144	20	LAT / LWB	0.0072	176.197	12.807
HFICB214B	B	M2	2	2	178.802	13.116	0.144	20	DGM / LWT / LWB	0.0072	179.029	13.132
HFICB216B	B	M2	2	2	160.819	12.705	0.143	20	LAB / LWT	0.0072	159.907	12.633
HFICB217B	B	M2	2	2	181.762	13.411	0.144	20	LAB	0.0072	181.362	13.381
HFICC115B	C	M1	3	1	169.266	12.837	0.146	20	AGM / DGM	0.0073	172.028	13.047
HFICC116B	C	M1	3	1	180.101	13.162	0.146	20	LAT / LWB	0.0073	182.957	13.370
HFICC117B	C	M1	3	1	166.222	13.379	0.146	20	LWB	0.0073	168.973	13.600
HFICC215B	C	M2	3	2	185.159	13.384	0.143	20	LWT / LWB	0.0072	184.452	13.333
HFICC216B	C	M2	3	2	164.960	13.250	0.143	20	LWT	0.0072	164.177	13.187
HFICC217B	C	M2	3	2	187.845	13.168	0.145	20	LWT / LWB	0.0072	188.802	13.235

Average 173.115 13.025
 Standard Dev. 8.207 0.282
 Coeff. of Var. [%] 4.741 2.166
 Min. 160.819 12.356
 Max. 187.845 13.411
 Number of Spec. 19 19

Average_{norm} 0.0072 174.177 13.106
 Standard Dev._{norm} 7.790 0.260
 Coeff. of Var. [%]_{norm} 4.472 1.985
 Min. 0.0072 159.907 12.569
 Max. 0.0073 188.802 13.600
 Number of Spec. 19 19



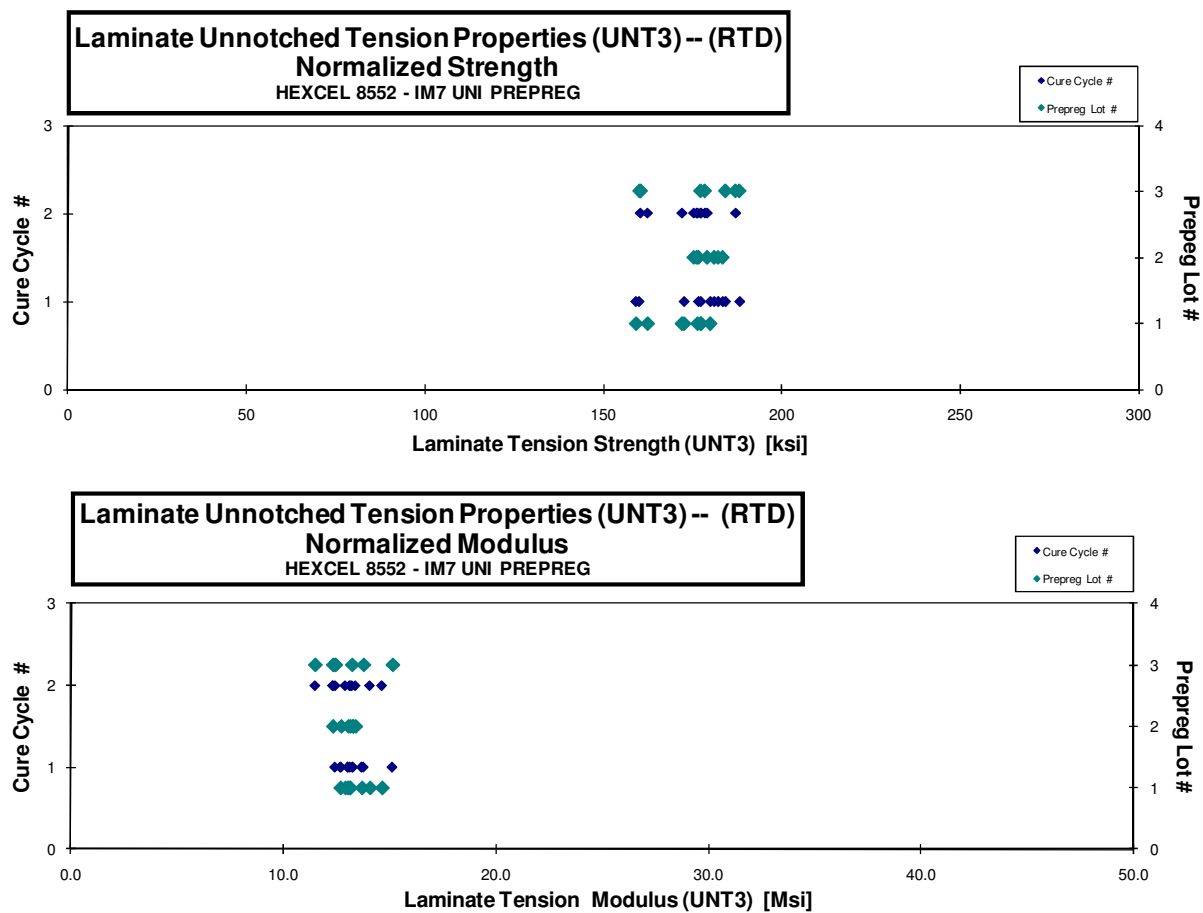
Laminate Unnotched Tension Properties (UNT3) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFICA112A	A	M1	1	1	170.864	13.556	0.145	20	DGM / LGM	0.0073	172.525	13.688
HFICA113A	A	M1	1	1	172.992	12.827	0.147	20	DGM / LGM	0.0074	177.157	13.136
HFICA114A	A	M1	1	1	178.974	12.978	0.145	20	DGM / LWT	0.0072	179.844	13.041
HFICA115A	A	M1	1	1	158.489	12.642	0.145	20	LAB	0.0072	159.040	12.686
HFICA211A	A	M2	1	2	170.462	14.775	0.137	20	LAT / LWB	0.0069	162.294	14.067
HFICA212A	A	M2	1	2	172.953	14.363	0.147	20	DGM / LAT	0.0073	176.276	14.639
HFICA213A	A	M2	1	2	167.997	12.824	0.147	20	LGM	0.0074	171.905	13.122
HFICA214A	A	M2	1	2	175.427	12.782	0.146	20	DGM / LWT	0.0073	177.274	12.916
HFICB111A	B	M1	2	1	190.858	13.423	0.137	20	DGM / LAT	0.0068	180.917	12.724
HFICB112A	B	M1	2	1	181.054	12.986	0.145	20	DGM / LAT	0.0072	182.018	13.055
HFICB113A	B	M1	2	1	175.890	13.232	0.145	20	DGM / LAT/ LAB	0.0072	176.521	13.279
HFICB114A	B	M1	2	1	183.397	13.273	0.144	20	AGM / AWB	0.0072	183.269	13.264
HFICB211A	B	M2	2	2	185.538	13.003	0.137	20	DGM /LWT / LWB	0.0068	176.025	12.336
HFICB212A	B	M2	2	2	174.416	13.331	0.145	20	DGM / AGM	0.0072	175.183	13.390
HFICB213A	B	M2	2	2	177.385	13.042	0.145	20	DGM / AGM	0.0073	178.946	13.157
HFICC111A	C	M1	3	1	166.230	12.920	0.139	20	LWT / LAB / DGM	0.0069	159.977	12.434
HFICC112A	C	M1	3	1	182.653	13.380	0.148	20	AGM / DGM	0.0074	188.001	13.772
HFICC113A	C	M1	3	1	180.532	14.836	0.147	20	AGM / DGM	0.0073	184.064	15.127
HFICC211A	C	M2	3	2	170.513	13.121	0.135	20	LWB/AWB/LAT	0.0068	160.330	12.337
HFICC212A	C	M2	3	2	176.813	13.211	0.144	20	DGM /LWT /LWB	0.0072	177.079	13.231
HFICC213A	C	M2	3	2	176.746	11.400	0.145	20	DGM / LGM	0.0073	178.280	11.499
HFICC214A	C	M2	3	2	186.723	12.437	0.144	20	DGM / LGM	0.0072	186.852	12.446

Average 176.223 13.197
 Standard Dev. 7.423 0.743
 Coeff. of Var. [%] 4.212 5.626
 Min. 158.489 11.400
 Max. 190.858 14.836
 Number of Spec. 22 22

Average_{norm} 0.0072 175.626 13.152
 Standard Dev._{norm} 8.388 0.795
 Coeff. of Var. [%]_{norm} 4.776 6.043
 Min. 0.0068 159.040 11.499
 Max. 0.0074 188.001 15.127
 Number of Spec. 22 22



Laminate Unnotched Tension Properties (UNT3) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

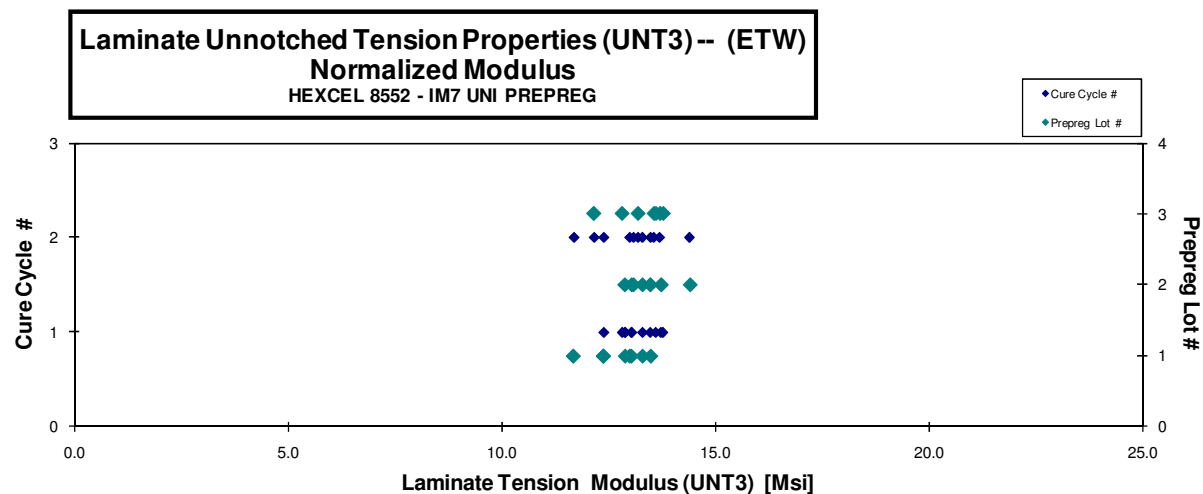
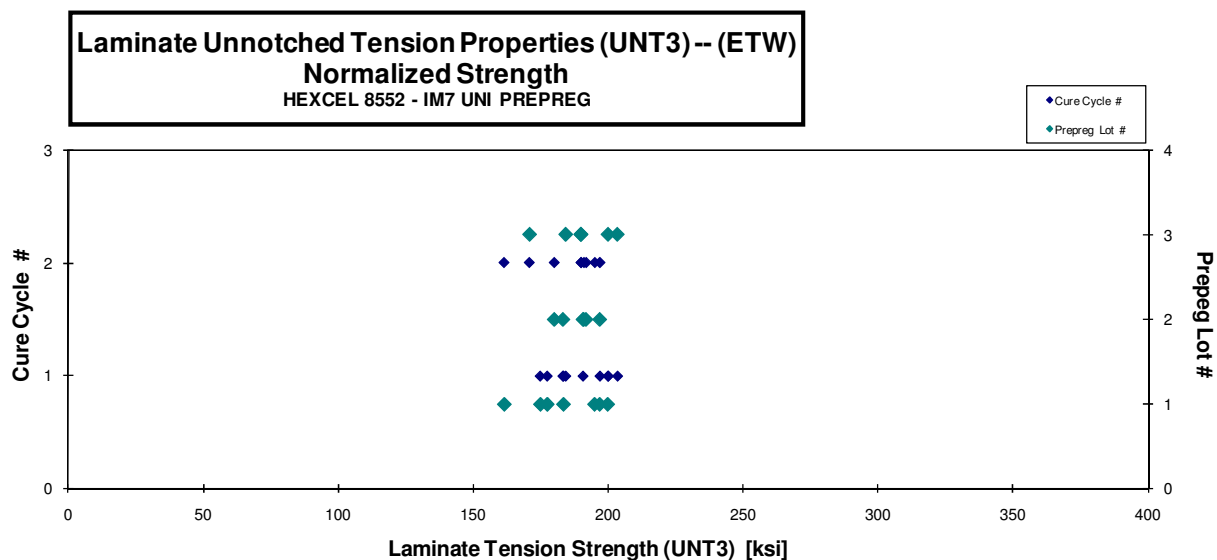
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 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFICA11AD	A	M1	1	1	195.340	13.192	0.135	20	LWB/LWT	0.0068	183.448	12.389
HFICA11CD	A	M1	1	1	172.304	13.105	0.146	20	LGM/AGM	0.0073	174.896	13.302
HFICA11DD	A	M1	1	1	195.017	12.585	0.148	20	DGM/AGM	0.0074	199.847	12.897
HFICA11ED	A	M1	1	1	175.968	12.931	0.145	20	DGM/LWB/LWT	0.0073	177.476	13.042
HFICA21AD	A	M1	1	2		12.979	0.137	20	LIT	0.0069		12.388
HFICA219D	A	M2	1	2	189.435	13.106	0.148	20	LGM	0.0074	194.982	13.490
HFICA21BD	A	M2	1	2	172.460	12.478	0.135	20	LWT / LWB	0.0067	161.561	11.690
HFICA21CD	A	M2	1	2	193.503	12.780	0.146	20	DGM/LWT / LWB	0.0073	196.840	13.000
HFICB118D*	B	M0	2	1		13.473	0.144	20	*	0.0072		13.482
HFICB119D	B	M1	2	1	182.419	13.673	0.145	20	LAT/LAB/DGM	0.0072	183.242	13.735
HFICB11AD	B	M1	2	1	190.108	13.006	0.144	20	AGM	0.0072	190.680	13.045
HFICB11BD	B	M1	2	1	196.122	12.837	0.145	20	AGM	0.0072	196.893	12.887
HFICB218D	B	M2	2	2	185.097	13.903	0.149	20	DGM/AGM	0.0075	191.824	14.409
HFICB219D	B	M2	2	2	189.991	13.228	0.145	20	DGM/LAT	0.0072	191.002	13.299
HFICB21AD	B	M2	2	2	180.302	13.108	0.144	20	AGM/DGM	0.0072	180.051	13.090
HFICC118D	C	M1	3	1	199.333	13.508	0.147	20	LWB/LGM	0.0073	203.394	13.783
HFICC119D	C	M1	3	1	191.362	13.319	0.139	20	LWB/DGM	0.0069	184.252	12.824
HFICC11AD	C	M1	3	1	195.315	13.294	0.147	20	DGM/LWT	0.0074	199.995	13.612
HFICC218D*	C	M1	3	2		13.544	0.144	20	*	0.0072		13.568
HFICC219D	C	M2	3	2	187.265	13.008	0.146	20	DGM/AGM	0.0073	189.953	13.195
HFICC21BD	C	M2	3	2	180.648	12.859	0.136	20	LAT/LAB	0.0068	170.905	12.165
HFICC21CD	C	M2	3	2	186.654	13.470	0.147	20	DGM/LWB	0.0073	189.916	13.706

* Specimen had a bad failure so strength was excluded

Average 187.297 13.154
 Standard Dev. 8.102 0.352
 Coeff. of Var. [%] 4.326 2.676
 Min. 172.304 12.478
 Max. 199.333 13.903
 Number of Spec. 19 22

Average_{norm} 0.0072 187.429 13.136
 Standard Dev._{norm} 10.938 0.611
 Coeff. of Var. [%]_{norm} 5.836 4.652
 Min. 0.0067 161.561 11.690
 Max. 0.0075 203.394 14.409
 Number of Spec. 19 22



4.11 Unnotched Compression 1 Properties

Laminate Unnotched Compression Properties (UNC1)-- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

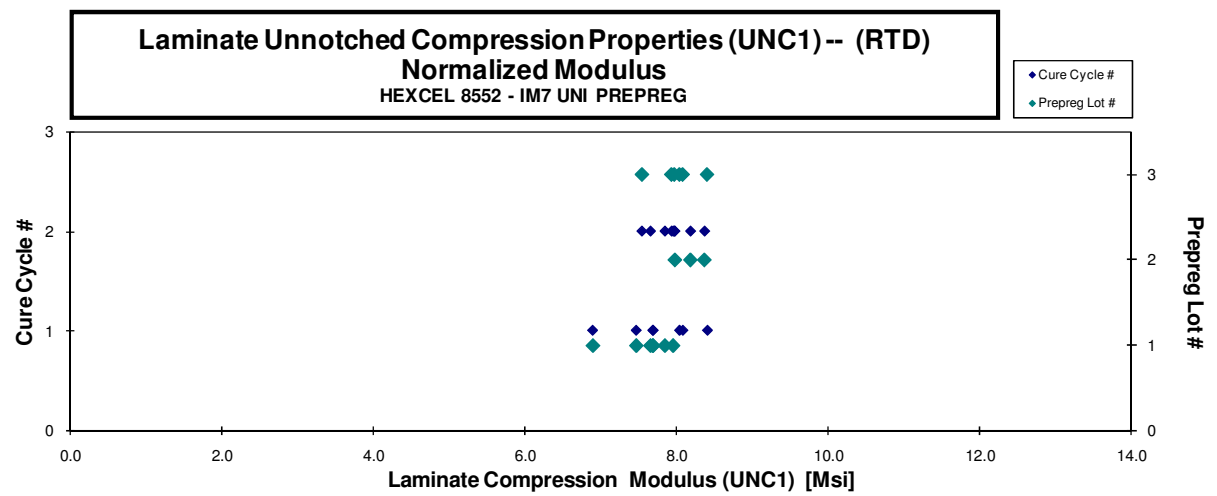
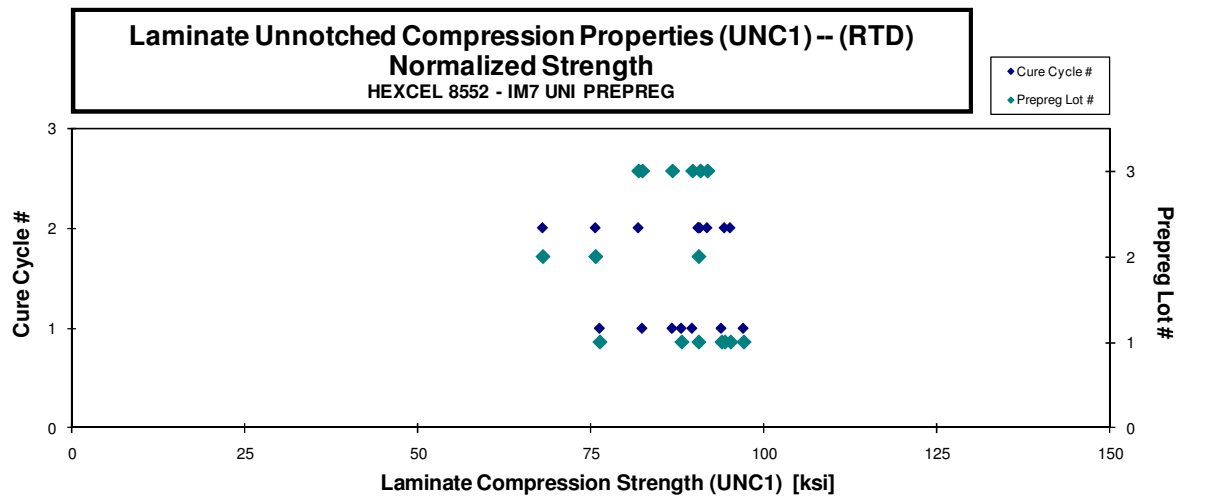
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 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIWA111A	A	M1	1	1	82.117	7.418	0.290	0.107	16	BGM	0.0067	76.272	6.890
HFIWA112A	A	M1	1	1	96.785	7.671	0.320	0.116	16	BGM	0.0072	97.037	7.690
HFIWA113A	A	M1	1	1	90.832	7.440	0.310	0.119	16	BGM	0.0074	93.855	7.688
HFIWA114A	A	M1	1	1	84.912	7.199	0.304	0.120	16	BGM	0.0075	88.081	7.467
HFIWA211A	A	M2	1	2	91.192	7.711	0.338	0.114	16	BGM	0.0071	90.532	7.655
HFIWA212A	A	M2	1	2	92.530	7.739	0.367	0.118	16	BGM	0.0074	95.127	7.957
HFIWA213A	A	M2	1	2	91.329	7.602	0.354	0.119	16	BGM	0.0074	94.289	7.848
HFIWB111A	B	M1	2	1									
HFIWB112A	B	M1	2	1									
HFIWB113A	B	M1	2	1									
HFIWB211A	B	M2	2	2	73.465	8.612	0.314	0.107	16	BGM	0.0067	68.065	7.979
HFIWB212A	B	M2	2	2	91.759	8.485	0.348	0.114	16	BGM	0.0071	90.538	8.372
HFIWB213A	B	M2	2	2	74.784	8.092	0.336	0.117	16	BGM	0.0073	75.660	8.187
HFIWC111A	C	M1	3	1	88.972	8.245	0.314	0.112	16	BGM	0.0070	86.745	8.039
HFIWC112A	C	M1	3	1	86.634	8.125	0.341	0.119	16	BGM	0.0075	89.642	8.407
HFIWC113A	C	M1	3	1	79.952	7.841	0.349	0.119	16	BGM	0.0074	82.427	8.084
HFIWC211A	C	M2	3	2	85.577	7.884	0.339	0.110	16	BGM	0.0069	81.875	7.543
HFIWC212A	C	M2	3	2	91.348	7.933	0.356	0.116	16	BGM	0.0072	91.797	7.972
HFIWC213A	C	M2	3	2	89.030	7.781	0.360	0.117	16	BGM	0.0073	90.782	7.934

Batch B Cure Cycle 1 has improper layup so results were removed

Average 86.951 7.861 0.334
 Standard Dev. 6.529 0.382 0.022
 Coeff. of Var. [%] 7.508 4.861 6.705
 Min. 73.465 7.199 0.290
 Max. 96.785 8.612 0.367
 Number of Spec. 16 16 16

out check for extras
 Average_{norm} 0.0072 87.045 7.857
 Standard Dev._{norm} 8.111 0.373
 Coeff. of Var. [%]_{norm} 9.318 4.749
 Min. 0.0067 68.065 6.890
 Max. 0.0075 97.037 8.407
 Number of Spec. 16 16 16



Laminate Unnotched Compression Properties (UNC1) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}

[in]

0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIWA11DD	A	M1	1	1	54.607	7.001	0.369	0.118	16	BGM	0.0074	55.744	7.147
HFIWA11ED	A	M1	1	1	59.118	6.924	0.356	0.118	16	BGM	0.0074	60.555	7.093
HFIWA11FD	A	M1	1	1	51.227	7.240	0.356	0.116	16	BGM	0.0073	51.605	7.293
HFIWA115D	A	M1	1	1	51.738	6.987	0.362	0.118	16	BGM	0.0074	52.958	7.152
HFIWA214D	A	M2	1	2	64.777	6.971	0.334	0.118	16	BGM	0.0073	66.071	7.111
HFIWA215D	A	M2	1	2	58.623	6.817	0.367	0.117	16	BAB	0.0073	59.284	6.894
HFIWA216D	A	M2	1	2	51.583	6.791	0.375	0.116	16	BGM / DGM	0.0073	52.046	6.852
HFIWB21CD	B	M2	2	1	58.036	7.198	0.379	0.115	16	DGM / BGM	0.0072	57.726	7.159
HFIWB216D	B	M2	2	1	56.134	7.126	0.350	0.115	16	HGM	0.0072	55.874	7.093
HFIWB21RMD	B	M2	2	1	61.874	6.905	0.354	0.117	16	DGM / BGM	0.0073	62.841	7.013
HFIWC11AD	C	M1	3	1	52.051	7.024	0.359	0.117	16	DGM	0.0073	52.804	7.126
HFIWC11BD	C	M1	3	1	56.854	7.040	0.356	0.117	16	BGM	0.0073	57.520	7.122
HFIWC11CD	C	M1	3	1	50.531	7.184	0.317	0.116	16	BGM	0.0073	51.065	7.260
HFIWC21AD	C	M2	3	2	49.367	7.204	0.339	0.115	16	DGM	0.0072	49.345	7.201
HFIWC21BD	C	M2	3	2	50.270	7.375	0.361	0.115	16	BAT	0.0072	50.059	7.344
HFIWC21CD	C	M2	3	2	48.540	7.136	0.369	0.116	16	BGM	0.0072	48.716	7.161
HFIWA118D	A	M1	1	1	70.392			0.117	16	BGM	0.0073	71.543	
HFIWA119D	A	M1	1	1	70.983			0.117	16	BGM	0.0073	72.226	
HFIWA11AD*	A	M1	1	1	56.125			0.117	16	BGM	0.0073	57.075	
HFIWA11BD*	A	M1	1	1	58.329			0.118	16	BGM	0.0073	59.511	
HFIWA11CD*	A	M1	1	1				0.117	16	HIB	0.0073		
HFIWA217D*	A	M2	1	2	55.250			0.117	16	HAB	0.0073	56.130	
HFIWA218D*	A	M2	1	2	58.901			0.117	16	BGM	0.0073	60.009	
HFIWA219D*	A	M2	1	2	54.659			0.117	16	HGM	0.0073	55.735	
HFIWB217D	B	M2	2	2	54.624			0.115	16	BGM	0.0072	54.339	
HFIWB218D	B	M2	2	2	69.184			0.115	16	HGM	0.0072	69.194	
HFIWB219D	B	M2	2	2	64.638			0.115	16	BGM	0.0072	64.563	
HFIWB21AD	B	M2	2	2	62.823			0.115	16	HAT	0.0072	62.569	
HFIWB21BD	B	M2	2	2				0.115	16	HIT			
HFIWC117D*	C	M1	3	1				0.117	16	BGM			
HFIWC118D*	C	M1	3	1	55.329			0.117	16	BAB	0.0073	56.065	
HFIWC119D	C	M1	3	1	55.844			0.117	16	HAB	0.0073	56.636	
HFIWC217D*	C	M2	3	2	50.176			0.116	16	HAT	0.0072	50.452	
HFIWC218D*	C	M2	3	2				0.117	16	HAB			
HFIWC219D*	C	M2	3	2				0.117	16	HAT			

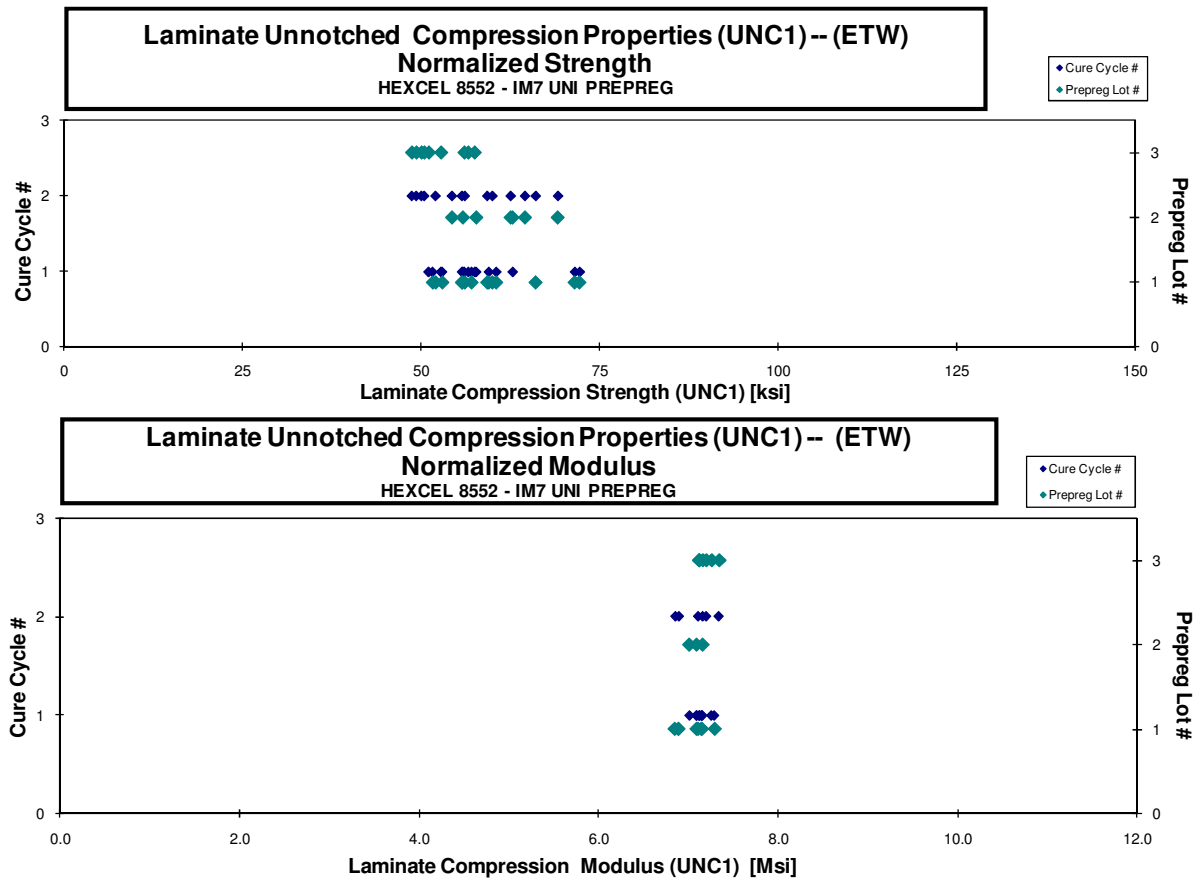
Compressive Strength is not reported for HFIWB 116D as unacceptable failure mode was observed
 STRENGTH WAS NOT REPORTED FOR SPECIMENS HFIWA11CD and HFIWB21BD DUE TO AN UNACCEPTABLE FAILURE MODE.

Shaded specimens had modulus removed due to improper strain gage adhesive used

Batch B Cure Cycle 1 has improper layup so results were removed

* Specimens have uneven grip marks due to thickness variation

Average	57.086	7.058	0.356	Average _{norm}	0.0073	57.675	7.126
Standard Dev.	6.207	0.161	0.016	Standard Dev. _{norm}		6.355	0.128
Coeff. of Var. [%]	10.872	2.282	4.424	Coeff. of Var. [%] _{norm}		11.019	1.801
Min.	48.540	6.791	0.317	Min.	0.0072	48.716	6.852
Max.	70.983	7.375	0.379	Max.	0.0074	72.226	7.344
Number of Spec.	30	16	16	Number of Spec.	31	30	16



4.12 Unnotched Compression 2 Properties

Laminate Unnotched Compression Properties (UNC2) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}

[in]

0.0072

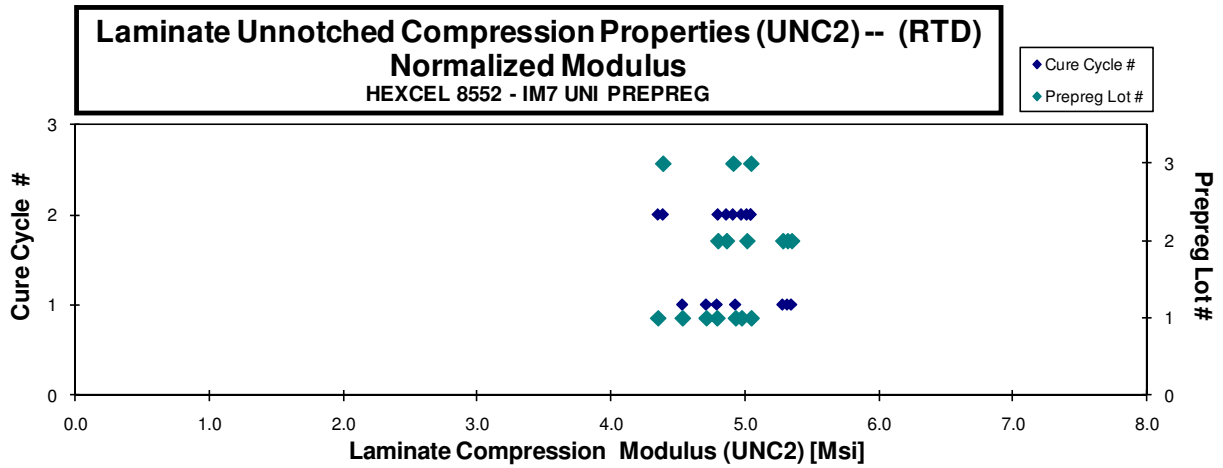
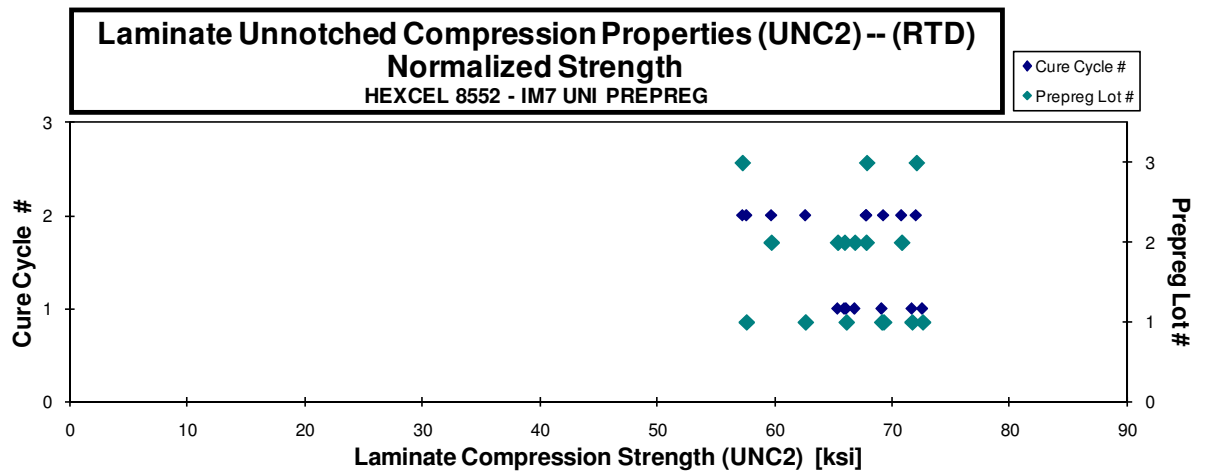
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIXA111A	A	M1	1	1	73.013	4.789	0.535	0.136	20	BGM	0.0068	69.151	4.536
HFIXA112A	A	M1	1	1	71.811	4.938	0.566	0.144	20	BGM	0.0072	71.720	4.932
HFIXA113A	A	M1	1	1	64.461	4.672	0.562	0.148	20	BGM	0.0074	66.125	4.793
HFIXA114A	A	M1	1	1	70.533	4.578	0.581	0.148	20	BGM	0.0074	72.615	4.713
HFIXA211A	A	M2	1	2	60.868	4.598	0.563	0.136	20	BGM	0.0068	57.627	4.353
HFIXA212A	A	M2	1	2	63.297	5.027	0.608	0.143	20	BGM	0.0071	62.652	4.976
HFIXA213A	A	M2	1	2	68.035	4.955	0.612	0.147	20	BGM	0.0073	69.302	5.047
HFIXB111A	B	M1	2	1	67.082	5.303	0.664	0.144	20	BGM	0.0072	66.849	5.284
HFIXB112A	B	M1	2	1	65.716	5.328	0.675	0.145	20	BGM	0.0072	65.975	5.349
HFIXB113A	B	M1	2	1	64.557	5.251	0.662	0.146	20	BGM	0.0073	65.394	5.319
HFIXB211A*	B	M2	2	2	64.745	5.202	0.546	0.133	20	BGM	0.0066	59.747	4.800
HFIXB212A	B	M2	2	2	69.508	5.141	0.587	0.141	20	BGM	0.0070	67.818	5.016
HFIXB213A	B	M2	2	2	70.542	4.844	0.563	0.145	20	BGM	0.0072	70.836	4.864
HFIXC211A*	C	M2	3	2	63.253	4.847	0.514	0.130	20	BGM	0.0065	57.294	4.390
HFIXC212A	C	M2	3	2	70.328	5.092	0.574	0.139	20	BGM	0.0069	67.862	4.914
HFIXC213A	C	M2	3	2	72.077	5.046	0.572	0.144	20	BGM	0.0072	72.085	5.046

For batch C, cure cycle 1 panel has wrong layup, has two -45 degree plies at beginning of layup.

*Specimens have thickness taper at edge of coupon

Average	67.489	4.976	0.587
Standard Dev.	3.735	0.241	0.047
Coeff. of Var. [%]	5.534	4.842	7.960
Min.	60.868	4.578	0.514
Max.	73.013	5.328	0.675
Number of Spec.	16	16	16

Average_{norm}	0.0071	66.441	4.896
Standard Dev._{norm}		4.890	0.299
Coeff. of Var. [%]_{norm}		7.360	6.100
Min.	0.0065	57.294	4.353
Max.	0.0074	72.615	5.349
Number of Spec.		16	16



Laminate Unnotched Compression Properties (UNC2) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus* [Msi]	Poisson's Ratio	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIXA11DD	A	M1	1	1	37.314	3.847	0.641	0.148	20	DGM	0.0074	38.415	3.961
HFIXA11ED	A	M1	1	1	34.936	3.910	0.642	0.149	20	DGM	0.0074	36.137	4.045
HFIXA11FD	A	M1	1	1	41.150	4.149	0.673	0.147	20	DGM	0.0074	42.008	4.235
HFIXA11SD	A	M1	1	1	40.617	3.860	0.659	0.148	20	DGM	0.0074	41.735	3.967
HFIXA21AD	A	M2	1	2	36.826	3.967	0.670	0.146	20	DGM	0.0073	37.256	4.013
HFIXA21BD	A	M2	1	2	36.576	4.173	0.698	0.146	20	BGM	0.0073	37.037	4.225
HFIXA21CD	A	M2	1	2	34.595	4.077	0.685	0.146	20	DGM	0.0073	35.156	4.143
HFIXB119D	B	M1	2	1	41.295	4.131	0.690	0.143	20	DGM	0.0072	41.094	4.111
HFIXB11AD	B	M1	2	1	41.878	4.145	0.671	0.143	20	DGM	0.0072	41.723	4.130
HFIXB114D	B	M1	2	1	42.303	4.182	0.695	0.146	20	DGM	0.0073	42.949	4.246
HFIXB21BD	B	M2	2	2	35.933	4.115	0.654	0.143	20	BGM/DGM	0.0071	35.622	4.080
HFIXB21CD	B	M2	2	2	34.825	4.005	0.646	0.143	20	DGM	0.0072	34.692	3.990
HFIXB214D	B	M2	2	2	38.605	4.038	0.669	0.145	20	DGM	0.0073	38.941	4.073
HFIXC21AD	C	M2	3	2	31.309	4.077	0.655	0.143	20	DGM	0.0072	31.189	4.062
HFIXC21BD	C	M2	3	2	35.807	4.158	0.661	0.143	20	DGM	0.0072	35.608	4.135
HFIXC214D	C	M2	3	2	42.616	4.108	0.631	0.145	20	DGM	0.0072	42.828	4.129
HFIXA118D	A	M1	1	1	49.443			0.147	20	BGM	0.0073	50.336	
HFIXA119D	A	M1	1	1	44.763			0.146	20	BGM	0.0073	45.530	
HFIXA11AD	A	M1	1	1	46.375			0.146	20	BGM	0.0073	47.131	
HFIXA11BD	A	M1	1	1	42.111			0.146	20	BGM	0.0073	42.794	
HFIXA217D	A	M2	1	2	37.693			0.145	20	BGM	0.0072	37.855	
HFIXA218D	A	M2	1	2	42.187			0.145	20	BGM	0.0073	42.480	
HFIXA219D	A	M2	1	2	42.274			0.146	20	BGM	0.0073	42.910	
HFIXB116D	B	M1	2	1	37.228			0.137	20	BAB	0.0069	35.444	
HFIXB117D	B	M1	2	1	40.263			0.142	20	BGM	0.0071	39.597	
HFIXB118D	B	M1	2	1	40.542			0.142	20	BGM	0.0071	40.068	
HFIXB217D	B	M2	2	2	47.639			0.143	20	BGM	0.0071	47.303	
HFIXB218D	B	M2	2	2	45.032			0.143	20	BGM	0.0071	44.657	
HFIXB219D	B	M2	2	2	46.851			0.143	20	BGM	0.0072	46.575	
HFIXC217D	C	M2	3	2	40.333			0.143	20	BGM	0.0071	40.007	
HFIXC218D	C	M2	3	2				0.142	20	BGM / CIB	0.0071		
HFIXC219D	C	M2	3	2	43.987			0.144	20	BGM	0.0072	43.921	

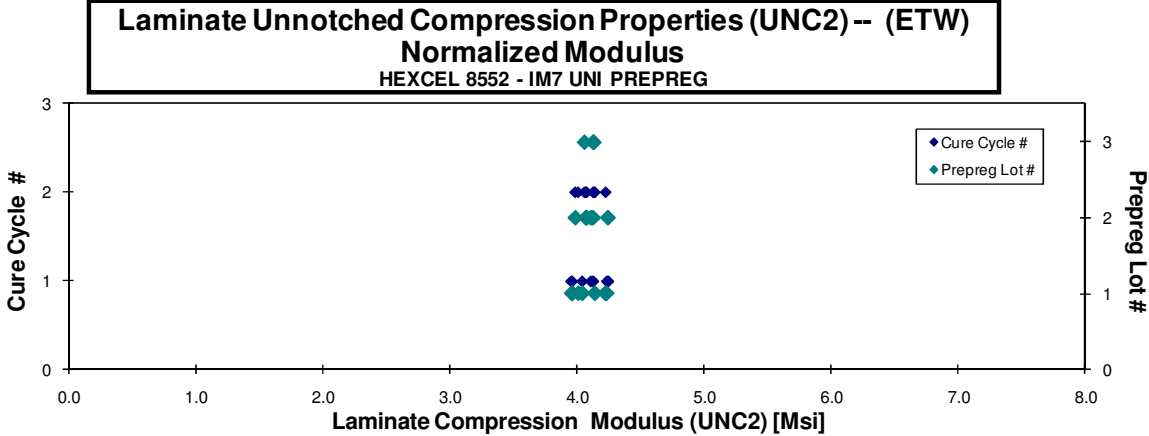
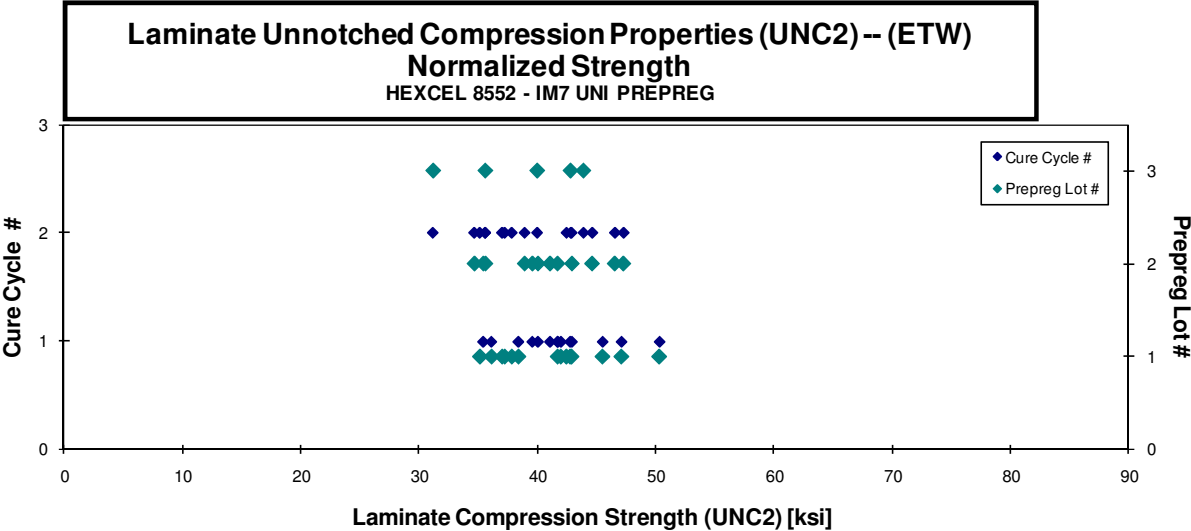
HFIXC218D: STRENGTH REMOVED DUE TO A BAD FAILURE MODE

For batch C, cure cycle 1 panel has wrong layup, has two -45 degree plies at beginning of layu

* Modulus removed due to improper strain gage adhesvie used

Average	40.429	4.059	0.665
Standard Dev.	4.330	0.111	0.020
Coeff. of Var. [%]	10.710	2.723	3.029
Min.	31.309	3.847	0.631
Max.	49.443	4.182	0.698
Number of Spec.	31	16	16

Average _{norm}	0.0072	40.613	4.096
Standard Dev _{norm}		4.430	0.090
Coeff. of Var. [%] _{norm}		10.907	2.206
Min.	0.0069	31.189	3.961
Max.	0.0074	50.336	4.246
Number of Spec.	32	31	16



4.13 Unnotched Compression 3 Properties

Laminate Unnotched Compression Properties (UNC3) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

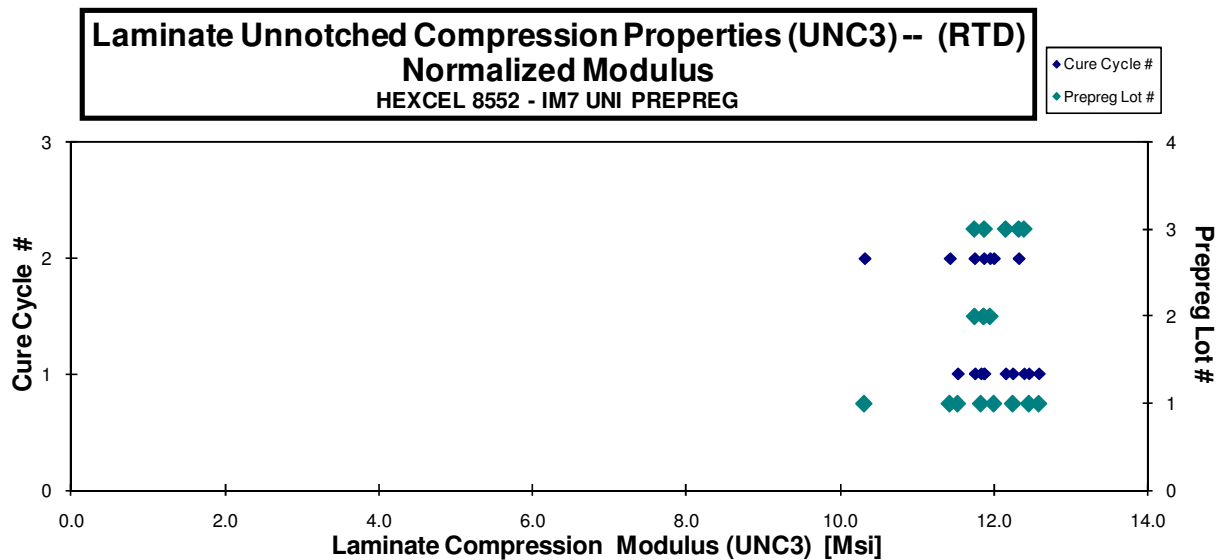
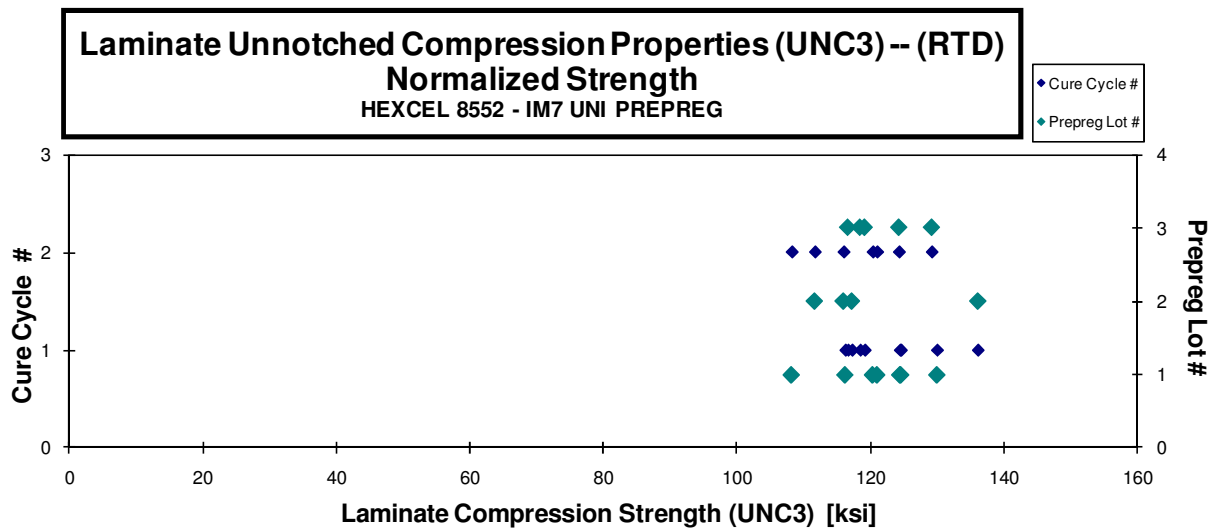
normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIYA112A	A	M1	1	1		12.739	0.452	0.141	20	END CRUSH	0.0070		12.451
HFIYA113A	A	M1	1	1	128.027	11.653	0.394	0.146	20	BGM	0.0073	129.969	11.830
HFIYA114A	A	M1	1	1	121.763	11.980	0.382	0.147	20	BGM	0.0074	124.426	12.242
HFIYA115A	A	M1	1	1	122.888	11.373	0.404	0.146	20	BGM	0.0073	124.566	11.528
HFIYA116A	A	M1	1	1	115.332	12.483	0.433	0.145	20	BGM	0.0073	116.227	12.579
HFIYA211A	A	M2	1	2	117.385	11.196	0.384	0.133	20	BGM	0.0066	108.201	10.320
HFIYA212A	A	M2	1	2	123.466	11.659	0.443	0.141	20	BGM	0.0071	120.994	11.426
HFIYA213A	A	M2	1	2	118.442	11.807	0.453	0.146	20	BGM	0.0073	120.348	11.997
HFIYB111A*	B	M1	2	1									
HFIYB112A	B	M1	2	1	122.753	12.304	0.430	0.138	20	BGM	0.0069	117.226	11.750
HFIYB113A	B	M1	2	1	137.699	12.005	0.412	0.142	20	BGM	0.0071	136.089	11.865
HFIYB2C1A*	B	M2	2	2									
HFIYB2C2A	B	M2	2	2	116.554	11.926	0.439	0.143	20	BGM	0.0072	115.974	11.866
HFIYB2C3A	B	M2	2	2	112.003	11.984	0.450	0.144	20	BGM	0.0072	111.666	11.947
HFIYC111A	C	M1	3	1	118.911	12.436	0.438	0.143	20	BGM	0.0072	118.456	12.389
HFIYC112A	C	M1	3	1	111.743	11.642	0.412	0.150	20	BGM	0.0075	116.631	12.151
HFIYC113A	C	M1	3	1	116.408	11.601	0.422	0.147	20	BGM	0.0074	119.143	11.873
HFIYC211A*	C	M2	3	2									
HFIYC212A	C	M2	3	2	126.639	11.970	0.399	0.141	20	BGM	0.0071	124.279	11.747
HFIYC213A	C	M2	3	2	127.022	12.114	0.436	0.146	20	BGM	0.0073	129.183	12.320

*Specimens have thickness taper at end of specimen

Average 121.065 11.934 0.423
 Standard Dev. 6.699 0.404 0.024
 Coeff. of Var. [%] 5.533 3.383 5.596
 Min. 111.743 11.196 0.382
 Max. 137.699 12.739 0.453
 Number of Spec. 16 17 17

Average_{norm} 0.0072 120.836 11.899
 Standard Dev._{norm} 7.083 0.518
 Coeff. of Var. [%]_{norm} 5.862 4.350
 Min. 0.0066 108.201 10.320
 Max. 0.0075 136.089 12.579
 Number of Spec. 17 16 17



Laminate Unnotched Compression Properties (UNC3) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}

[in]

0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
HFIYA111D*	A	M1	1	1				0.132	20	BAT			
HFIYA117D	A	M1	1	1		11.218	0.420	0.144	20	BAT/HIT	0.0072		11.243
HFIYA21BD	A	M2	1	2		11.351	0.414	0.146	20	HAT / HIT	0.0073		11.498
HFIYA21CD	A	M2	1	2		11.407	0.434	0.146	20	ENDCRUSH	0.0073		11.584
HFIYA214D	A	M2	1	2		11.597	0.450	0.148	20	ENDCRUSH	0.0074		11.905
HFIYB118D	B	M1	2	1	78.090	11.699	0.415	0.142	20	DGM / BGM	0.0071	77.077	11.547
HFIYB11CD	B	M1	2	1	88.909	11.821	0.399	0.144	20	BGM	0.0072	88.899	11.820
HFIYB114D	B	M1	2	1		11.946	0.427	0.144	20	HAB / HIB	0.0072		11.974
HFIYB2CBD	B	M2	2	2	75.171	11.835	0.403	0.140	20	BAT	0.0070	73.266	11.535
HFIYB2CCD*	B	M2	2	2				0.130	20	BAT			
HFIYB2C4D	B	M2	2	2		11.555	0.426	0.144	20	ENDCRUSH	0.0072		11.537
HFIYC11BD	C	M1	3	1	90.400	11.493	0.423	0.148	20	BAT	0.0074	92.744	11.791
HFIYC11CD	C	M1	3	1		11.639	0.417	0.147	20	HIT	0.0074		11.899
HFIYC114D	C	M1	3	1		11.479	0.408	0.148	20	HIT	0.0074		11.797
HFIYC21CD	C	M2	3	2	88.788	11.949	0.402	0.146	20	BAB	0.0073	89.877	12.095
HFIYC214D	C	M2	3	2	94.499	11.953	0.416	0.147	20	BAB	0.0074	96.632	12.223
HFIYC215D	C	M2	3	2	93.549	11.958	0.389	0.146	20	BAB	0.0073	94.978	12.140
HFIYA119D	A	M1	1	1	70.041			0.145	20	HAB	0.0072	70.479	
HFIYA11AD	A	M1	1	1	67.563			0.145	20	HAT	0.0073	68.048	
HFIYA11BD	A	M1	1	1	76.395			0.146	20	HAT	0.0073	77.314	
HFIYA11CD	A	M1	1	1	74.707			0.146	20	HAB	0.0073	75.883	
HFIYA217D	A	M2	1	2	83.165			0.146	20	HGM	0.0073	84.272	
HFIYA218D	A	M2	1	2				0.146	20	HIB	0.0073		
HFIYA219D	A	M2	1	2	68.257			0.145	20	HAT	0.0073	68.881	
HFIYA21AD	A	M2	1	2	77.754			0.146	20	HAB	0.0073	78.663	
HFIYB117D	B	M1	2	1	78.394			0.142	20	BAB	0.0071	77.314	
HFIYB119D	B	M1	2	1	74.240			0.143	20	BAB	0.0071	73.647	
HFIYB11AD	B	M1	2	1	75.914			0.143	20	BAT	0.0072	75.510	
HFIYB11BD	B	M1	2	1	85.654			0.144	20	BAB	0.0072	85.515	
HFIYB2C7D	B	M2	2	2	83.154			0.144	20	BGM	0.0072	83.125	
HFIYB2C8D	B	M2	2	2	71.529			0.145	20	BGM	0.0072	71.968	
HFIYB2C9D*	B	M2	2	2				0.146	20	BAT			
HFIYB2CAD	B	M2	2	2	87.745			0.145	20	BAT	0.0073	88.629	
HFIYC117D	C	M1	3	1	78.159			0.150	20	HAB	0.0075	81.162	
HFIYC118D	C	M1	3	1	68.776			0.148	20	HAT	0.0074	70.639	
HFIYC11AD	C	M1	3	1	72.324			0.148	20	HAB	0.0074	74.132	
HFIYC217D	C	M2	3	2	72.290			0.145	20	HAB	0.0072	72.650	
HFIYC218D	C	M2	3	2	78.362			0.145	20	HAB	0.0072	78.707	
HFIYC21BD	C	M2	3	2	73.619			0.145	20	HAT	0.0073	74.292	

COMPRESSIVE MODULUS AND POISSON'S RATIO WAS NOT REPORTED FOR SPECIMEN HFIYA21AD.

Modulus of shaded specimens removed due to improper strain gage adhesive used

SPECIMEN HFIYA118D TO HFIYA11CD WERE NOT GAUGED

SPECIMEN HFIYB117C TO HFIYB11AD WERE NOT GAUGED

HFIYB2CAD HAD A BAD STRAIN GAGE

Compressive strengths for HFIYA21XD, HFIYA 117D not reported as unacceptable failure modes were observed

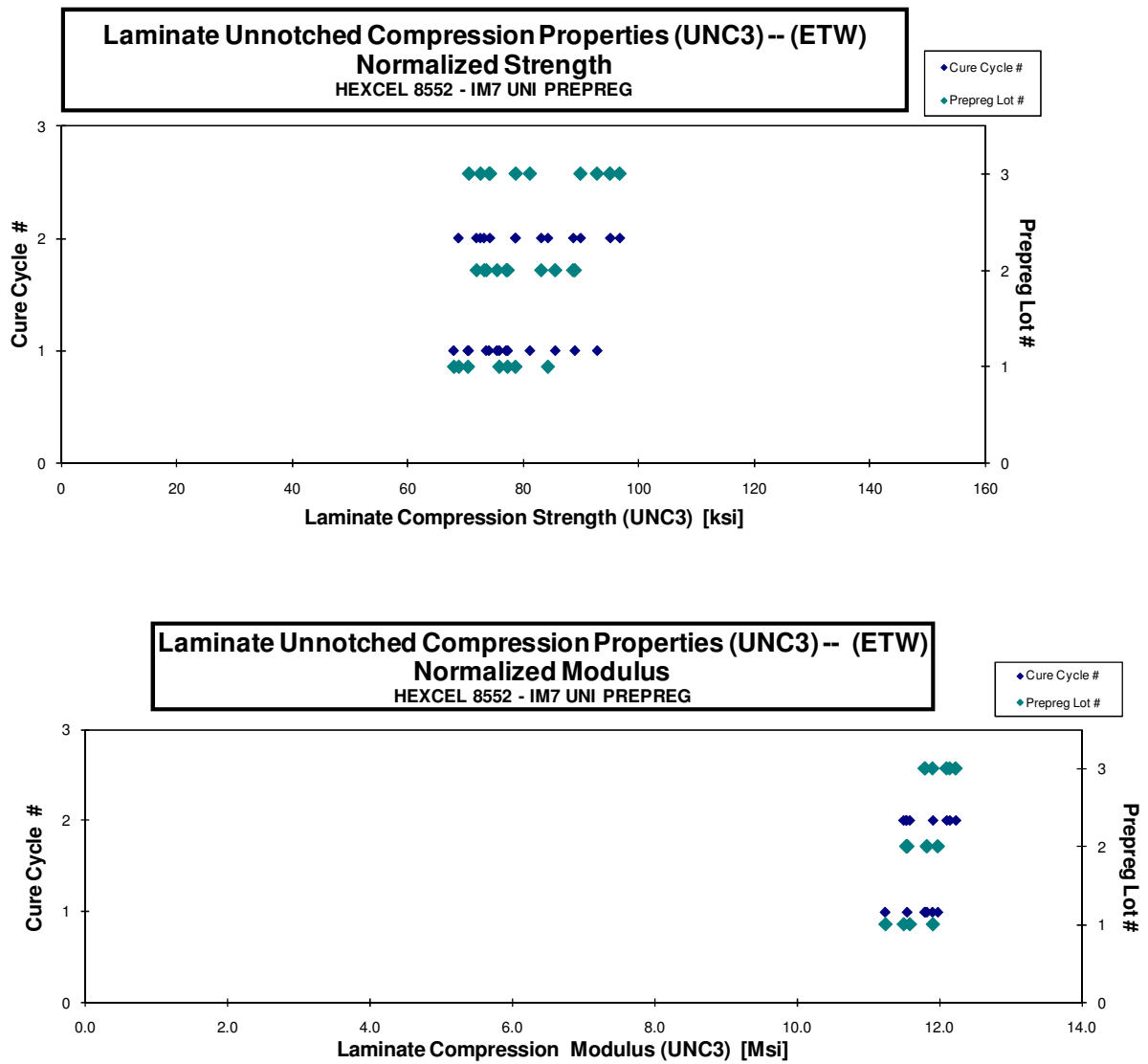
Compressive strengths not reported for HFIYB 114D, HFIYB 2C4D as unacceptable failure modes were observed.

Compressive strength for HFIYC 11CD, HFIYC 114D is not reported as unacceptable failure mode was observed.

*Specimens have thickness taper on edge of specimen

Average	78.794	11.660	0.416
Standard Dev.	7.872	0.243	0.015
Coeff. of Var. [%]	9.991	2.087	3.623
Min.	67.563	11.218	0.389
Max.	94.499	11.958	0.450
Number of Spec.	27	15	15

Average _{norm}	0.0073	79.419	11.772
Standard Dev. _{norm}		8.192	0.277
Coeff. of Var. [%] _{norm}		10.315	2.352
Min.	0.0070	68.048	11.243
Max.	0.0075	96.632	12.223
Number of Spec.	36	27	15

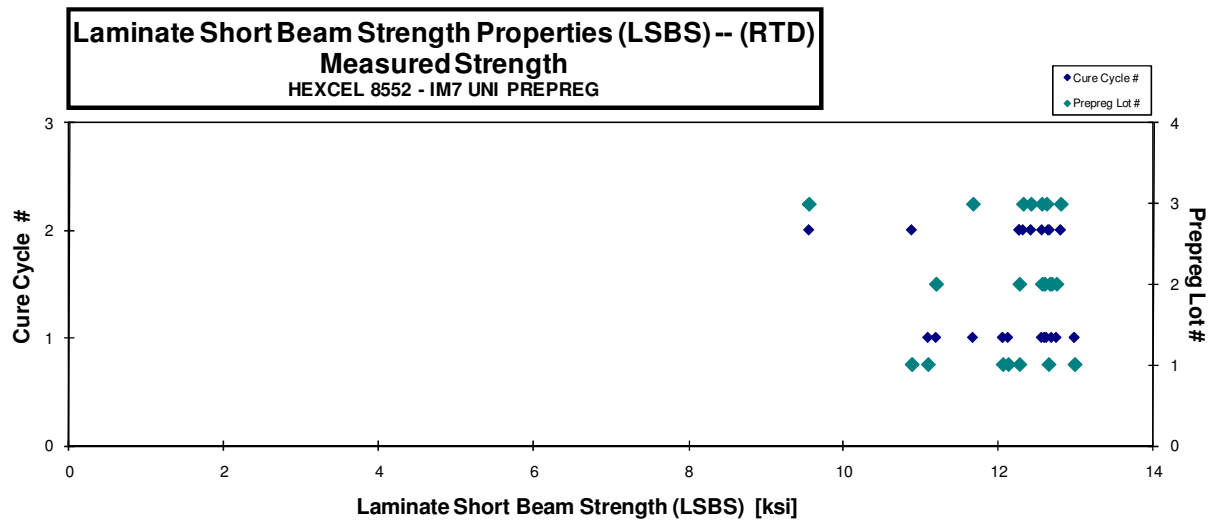


4.14 Laminate Short Beam Strength Properties

Laminate Short Beam Strength Properties (LSBS)-- (RTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFlqA171A	A	M1	1	1	11.089	0.161	24	0.0067	INTERLAMINAR SHEAR
HFlqA172A	A	M1	1	1	12.055	0.174	24	0.0073	INTERLAMINAR SHEAR
HFlqA173A	A	M1	1	1	12.983	0.179	24	0.0075	INTERLAMINAR SHEAR
HFlqA174A	A	M1	1	1	12.125	0.178	24	0.0074	INTERLAMINAR SHEAR
HFlqA27X1A	A	M2	1	2	12.646	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqA27X2A	A	M2	1	2	10.879	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqA27X3A	A	M2	1	2	12.271	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqB171A	B	M1	2	1	12.748	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqB172A	B	M1	2	1	12.594	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB173A	B	M1	2	1	11.193	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB174A	B	M1	2	1	12.687	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB271A	B	M2	2	2	12.562	0.174	24	0.0072	INTERLAMINAR SHEAR
HFlqB272A	B	M2	2	2	12.662	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB273A	B	M2	2	2	12.269	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC17X1A	C	M1	3	1	11.670	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC17X2A	C	M1	3	1	12.620	0.174	24	0.0073	INTERLAMINAR SHEAR
HFlqC17X3A	C	M1	3	1	12.560	0.174	24	0.0073	INTERLAMINAR SHEAR
HFlqC271A	C	M2	3	2	12.420	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC272A	C	M2	3	2	9.550	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC273A	C	M2	3	2	12.318	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC274A	C	M2	3	2	12.804	0.172	24	0.0072	INTERLAMINAR SHEAR

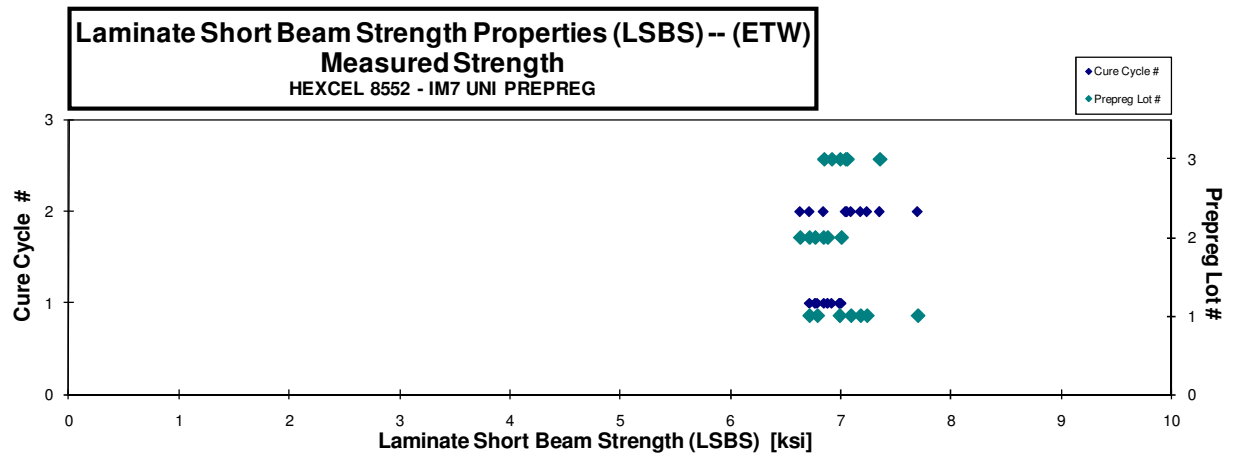
Average	12.129	Average	0.0072
Standard Dev.	0.831	Standard Dev.	
Coeff. of Var. [%]	6.851	Coeff. of Var. [%]	
Min.	9.550	Min.	0.0067
Max.	12.983	Max.	0.0075
Number of Spec.	21	Number of Spec.	21



Laminate Short Beam Strength Properties (LSBS) -- (ETW)
Measured Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFlqA177D	A	M1	1	1	6.721	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqA178D	A	M1	1	1	6.792	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqA17AD	A	M1	1	1	6.993	0.175	24	0.0073	INTERLAMINAR SHEAR
HFlqA27X6D	A	M2	1	2	7.699	0.174	24	0.0072	INTERLAMINAR SHEAR
HFlqA27X7D	A	M2	1	2	7.182	0.174	24	0.0073	INTERLAMINAR SHEAR
HFlqA27X8D	A	M2	1	2	7.240	0.175	24	0.0073	INTERLAMINAR SHEAR
HFlqA27X9D	A	M2	1	2	7.095	0.176	24	0.0073	INTERLAMINAR SHEAR
HFlqB178D	B	M1	2	1	7.008	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB179D	B	M1	2	1	6.885	0.174	24	0.0072	INTERLAMINAR SHEAR
HFlqB17AD	B	M1	2	1	6.772	0.175	24	0.0073	INTERLAMINAR SHEAR
HFlqB276D	B	M2	2	2	6.635	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqB277D	B	M2	2	2	6.846	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqB278D	B	M2	2	2	6.719	0.172	24	0.0072	INTERLAMINAR SHEAR
HFlqC17X6D	C	M1	3	1	6.996	0.174	24	0.0072	INTERLAMINAR SHEAR
HFlqC17X7D	C	M1	3	1	6.922	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC17X8D	C	M1	3	1	6.853	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC276D	C	M2	3	2	7.355	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC277D	C	M2	3	2	7.060	0.173	24	0.0072	INTERLAMINAR SHEAR
HFlqC278D	C	M2	3	2	7.047	0.173	24	0.0072	INTERLAMINAR SHEAR

Average	6.991	Average	0.0072
Standard Dev.	0.255	Standard Dev.	
Coeff. of Var. [%]	3.646	Coeff. of Var. [%]	
Min.	6.635	Min.	0.0072
Max.	7.699	Max.	0.0073
Number of Spec.	19	Number of Spec.	19

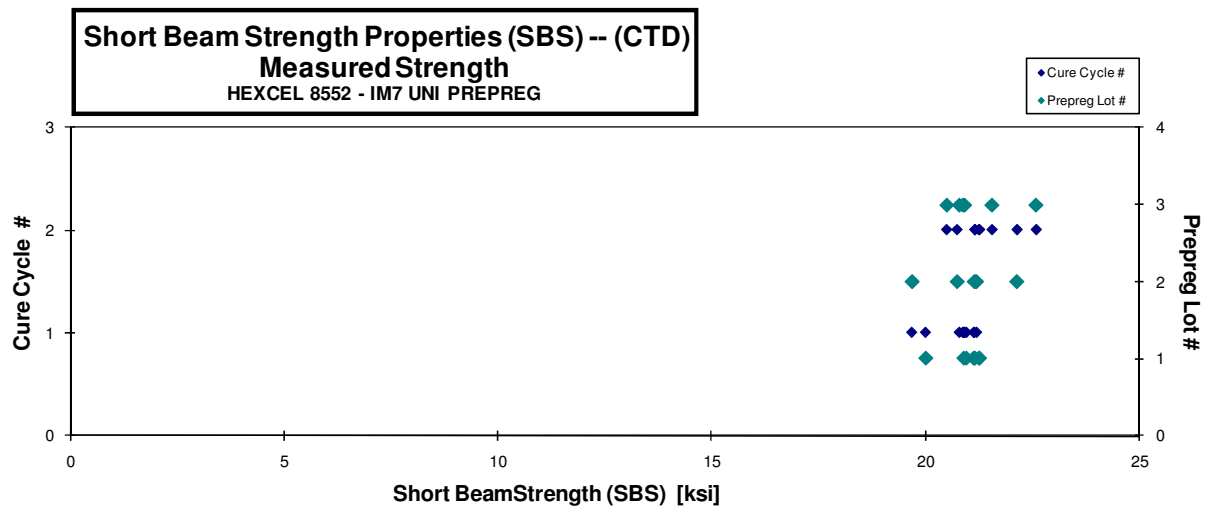


4.15 Lamina Short Beam Strength Properties

Short Beam Strength Properties (SBS) -- (CTD) Strength HEXCEL 8552 - IM7 UNI PREPREG
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Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFIQA113B	A	M1	1	1	20.889	0.238	34	0.0070	INTERLAMINAR SHEAR
HFIQA118B	A	M1	1	1	20.948	0.237	34	0.0070	INTERLAMINAR SHEAR
HFIQA11CB	A	M1	1	1	20.000	0.239	34	0.0070	INTERLAMINAR SHEAR
HFIQA11HB	A	M1	1	1	21.120	0.241	34	0.0071	INTERLAMINAR SHEAR
HFIQA214B	A	M2	1	2	21.244	0.255	34	0.0075	INTERLAMINAR SHEAR
HFIQA215B	A	M2	1	2	21.257	0.258	34	0.0076	INTERLAMINAR SHEAR
HFIQA216B	A	M2	1	2	21.148	0.257	34	0.0075	INTERLAMINAR SHEAR
HFIQB11DB	B	M1	2	1	19.680	0.253	34	0.0074	INTERLAMINAR SHEAR
HFIQB11EB	B	M1	2	1	21.135	0.257	34	0.0075	INTERLAMINAR SHEAR
HFIQB11FB	B	M1	2	1	21.188	0.255	34	0.0075	INTERLAMINAR SHEAR
HFIQB217B	B	M2	2	2	20.735	0.247	34	0.0073	INTERLAMINAR SHEAR
HFIQB21DB	B	M2	2	2	21.155	0.248	34	0.0073	INTERLAMINAR SHEAR
HFIQB21GB	B	M2	2	2	22.130	0.244	34	0.0072	INTERLAMINAR SHEAR
HFIQC114B	C	M1	3	1	20.907	0.253	34	0.0074	INTERLAMINAR SHEAR
HFIQC115B	C	M1	3	1	20.787	0.259	34	0.0076	INTERLAMINAR SHEAR
HFIQC116B	C	M1	3	1	20.868	0.259	34	0.0076	INTERLAMINAR SHEAR
HFIQC215B	C	M2	3	2	20.492	0.251	34	0.0074	INTERLAMINAR SHEAR
HFIQC216B	C	M2	3	2	21.548	0.250	34	0.0074	INTERLAMINAR SHEAR
HFIQC21DB	C	M2	3	2	22.577	0.256	34	0.0075	INTERLAMINAR SHEAR

Average	21.043	Average	0.0074
Standard Dev.	0.642	Standard Dev.	
Coeff. of Var. [%]	3.053	Coeff. of Var. [%]	
Min.	19.680	Min.	0.0070
Max.	22.577	Max.	0.0076
Number of Spec.	19	Number of Spec.	19



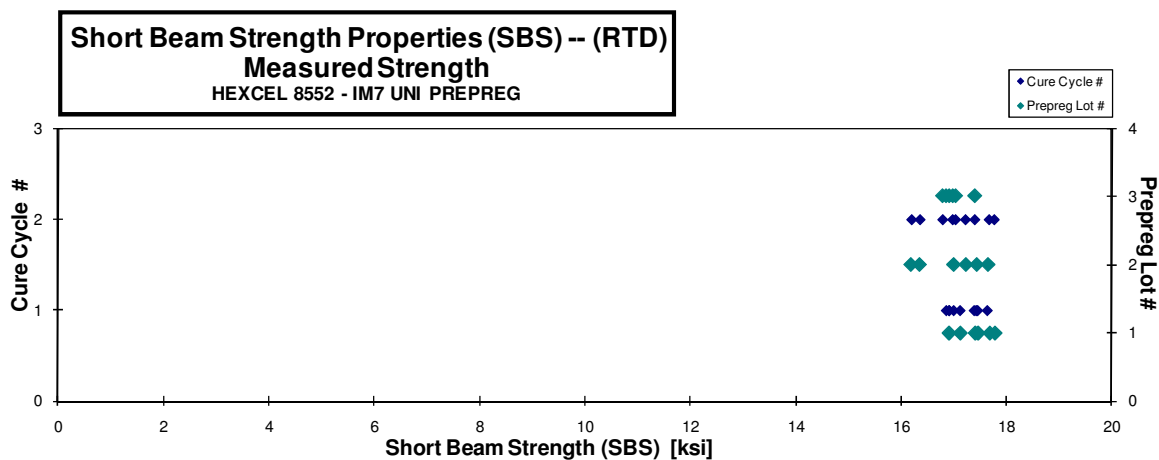
Short Beam Strength Properties (SBS) -- (RTD) Strength

HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFIQA112A	A	M1	1	1	17.128	0.224	34	0.0066	INTERLAMINAR SHEAR
HFIQA119A	A	M1	1	1	17.463	0.228	34	0.0067	INTERLAMINAR SHEAR
HFIQA11BA	A	M1	1	1	16.916	0.223	34	0.0066	INTERLAMINAR SHEAR
HFIQA211A	A	M2	1	2	17.780	0.225	34	0.0066	INTERLAMINAR SHEAR
HFIQA21BA	A	M2	1	2	17.682	0.227	34	0.0067	INTERLAMINAR SHEAR
HFIQA21HA	A	M2	1	2	17.409	0.229	34	0.0067	INTERLAMINAR SHEAR
HFIQB113A	B	M1	2	1	17.649	0.231	34	0.0068	INTERLAMINAR SHEAR
HFIQB117A	B	M1	2	1	17.436	0.234	34	0.0069	INTERLAMINAR SHEAR
HFIQB11BA	B	M1	2	1	17.002	0.230	34	0.0068	INTERLAMINAR SHEAR
HFIQB213A	B	M2	2	2	17.233	0.243	34	0.0071	INTERLAMINAR SHEAR
HFIQB218A	B	M2	2	2	16.360	0.237	34	0.0070	INTERLAMINAR SHEAR
HFIQB21CA	B	M2	2	2	16.198	0.240	34	0.0071	INTERLAMINAR SHEAR
HFIQC112A	C	M1	3	1	16.861	0.225	34	0.0066	INTERLAMINAR SHEAR
HFIQC119A	C	M1	3	1	16.919	0.223	34	0.0066	INTERLAMINAR SHEAR
HFIQC11HA	C	M1	3	1	17.398	0.227	34	0.0067	INTERLAMINAR SHEAR
HFIQC21EA	C	M2	3	2	16.984	0.261	34	0.0077	INTERLAMINAR SHEAR
HFIQC21FA	C	M2	3	2	17.039	0.262	34	0.0077	INTERLAMINAR SHEAR
HFIQC21GA	C	M2	3	2	16.794	0.258	34	0.0076	INTERLAMINAR SHEAR

Average 17.125
 Standard Dev. 0.430
 Coeff. of Var. [%] 2.511
 Min. 16.198
 Max. 17.780
 Number of Spec. 18

Average 0.0069
 Standard Dev. 0.0006
 Coeff. of Var. [%] 0.0066
 Min. 0.0066
 Max. 0.0077
 Number of Spec. 18

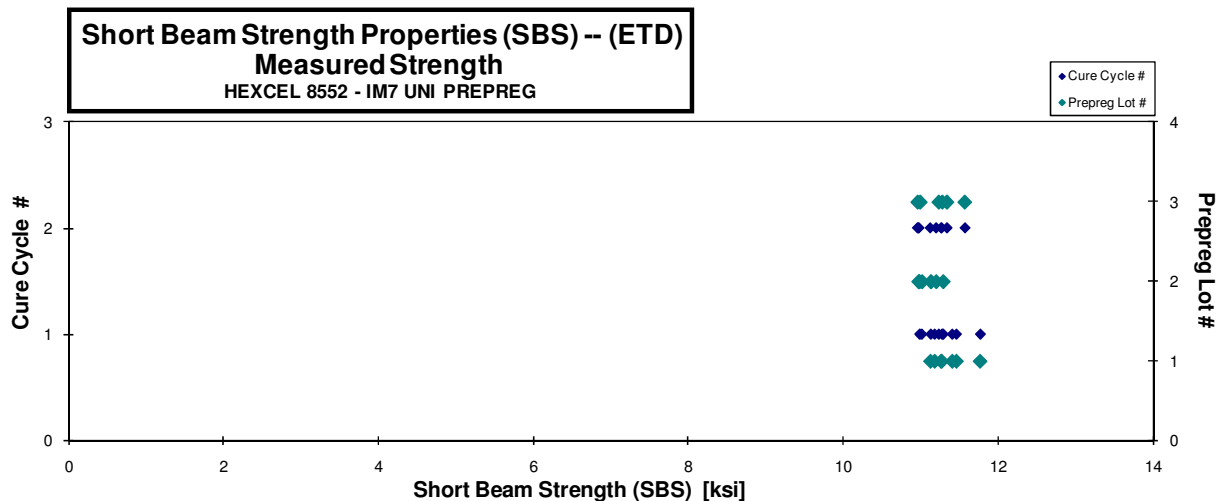


Short Beam Strength Properties (SBS) -- (ETD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFIQA114C	A	M1	1	1	11.181	0.247	34	0.0073	INTERLAMINAR SHEAR
HFIQA117C	A	M1	1	1	11.775	0.245	34	0.0072	INTERLAMINAR SHEAR
HFIQA11DC	A	M1	1	1	11.465	0.248	34	0.0073	INTERLAMINAR SHEAR
HFIQA11GC	A	M1	1	1	11.411	0.248	34	0.0073	INTERLAMINAR SHEAR
HFIQA212C	A	M2	1	2	11.125	0.237	34	0.0070	INTERLAMINAR SHEAR
HFIQA21CC	A	M2	1	2	11.264	0.237	34	0.0070	INTERLAMINAR SHEAR
HFIQA21GC	A	M2	1	2	11.273	0.238	34	0.0070	INTERLAMINAR SHEAR
HFIQB112C	B	M1	2	1	11.293	0.220	34	0.0065	INTERLAMINAR SHEAR
HFIQB118C	B	M1	2	1	11.015	0.224	34	0.0066	INTERLAMINAR SHEAR
HFIQB111C	B	M1	2	1	11.132	0.222	34	0.0065	INTERLAMINAR SHEAR
HFIQB219C	B	M2	2	2	11.201	0.224	34	0.0066	INTERLAMINAR SHEAR
HFIQB21BC	B	M2	2	2	10.980	0.228	34	0.0067	INTERLAMINAR SHEAR
HFIQB211C	B	M2	2	2	10.970	0.222	34	0.0065	INTERLAMINAR SHEAR
HFIQC117C	C	M1	3	1	10.989	0.252	34	0.0074	INTERLAMINAR SHEAR
HFIQC11EC	C	M1	3	1	11.235	0.248	34	0.0073	INTERLAMINAR SHEAR
HFIQC11FC	C	M1	3	1	11.279	0.247	34	0.0073	INTERLAMINAR SHEAR
HFIQC214C	C	M2	3	2	11.576	0.245	34	0.0072	INTERLAMINAR SHEAR
HFIQC217C	C	M2	3	2	11.341	0.245	34	0.0072	INTERLAMINAR SHEAR
HFIQC21CC	C	M2	3	2	10.958	0.247	34	0.0073	INTERLAMINAR SHEAR

Average 11.235
 Standard Dev. 0.218
 Coeff. of Var. [%] 1.944
 Min. 10.958
 Max. 11.775
 Number of Spec. 19

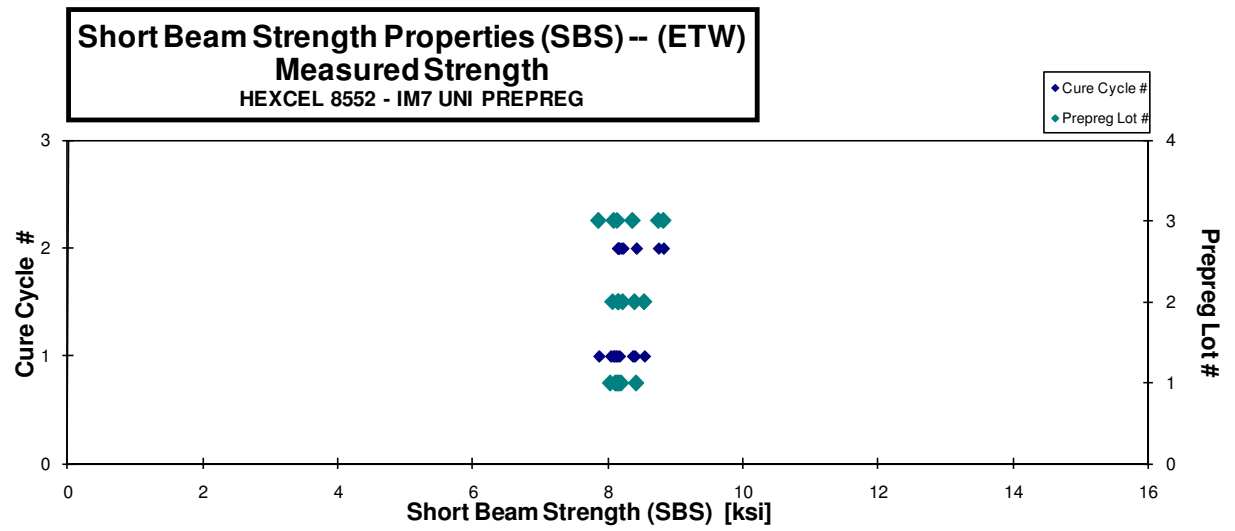
Average 0.0070
 Standard Dev. 0.0065
 Coeff. of Var. [%] 0.0074
 Min. 0.0065
 Max. 0.0074
 Number of Spec. 19



Short Beam Shear Properties (SBS) -- (ETW)
Measured Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HFIQA115D	A	M1	1	1	8.113	0.251	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQA116D	A	M1	1	1	8.038	0.249	34	0.0073	COMPRESSION / INTERLAMINAR SHEAR
HFIQA11ED	A	M1	1	1	8.169	0.253	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQA11FD	A	M1	1	1	8.137	0.252	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQA21DD	A	M2	1	2	8.419	0.244	34	0.0072	COMPRESSION / INTERLAMINAR SHEAR
HFIQA21ED	A	M2	1	2	8.151	0.247	34	0.0073	COMPRESSION / INTERLAMINAR SHEAR
HFIQA21FD	A	M2	1	2	8.198	0.246	34	0.0072	COMPRESSION / INTERLAMINAR SHEAR
HFIQB115D	B	M1	2	1	8.538	0.244	34	0.0072	COMPRESSION / INTERLAMINAR SHEAR
HFIQB116D	B	M1	2	1	8.395	0.241	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFIQB11CD	B	M1	2	1	8.074	0.244	34	0.0072	COMPRESSION / INTERLAMINAR SHEAR
HFIQB214D	B	M2	2	2	8.161	0.251	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQB21ED	B	M2	2	2	8.151	0.251	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQB21FD	B	M2	2	2	8.222	0.250	34	0.0074	COMPRESSION / INTERLAMINAR SHEAR
HFIQC113D	C	M1	3	1	8.091	0.241	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFIQC118D	C	M1	3	1	7.863	0.240	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFIQC11DD	C	M1	3	1	8.364	0.242	34	0.0071	COMPRESSION / INTERLAMINAR SHEAR
HFIQC213D	C	M2	3	2	8.820	0.236	34	0.0069	COMPRESSION / INTERLAMINAR SHEAR
HFIQC218D	C	M2	3	2	8.748	0.237	34	0.0070	COMPRESSION / INTERLAMINAR SHEAR
HFIQC21BD	C	M2	3	2	8.140	0.236	34	0.0069	COMPRESSION / INTERLAMINAR SHEAR

Average	8.252	Average	0.0072
Standard Dev.	0.242	Standard Dev.	
Coeff. of Var. [%]	2.927	Coeff. of Var. [%]	
Min.	7.863	Min.	0.0069
Max.	8.820	Max.	0.0074
Number of Spec.	19	Number of Spec.	19



4.16 Open Hole Tension 1 Properties

Laminate Open Hole Tension Properties (OHT1) -- (CTD) Strength HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
[in]
0.0072

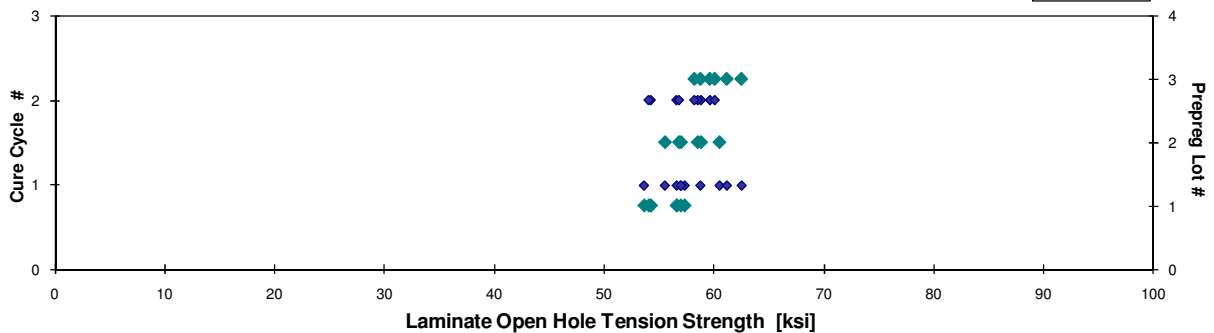
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Modes
HFIDA116B	A	M1	1	1	56.265	0.117	16	MGM
HFIDA117B	A	M1	1	1	55.416	0.118	16	MGM
HFIDA118B	A	M1	1	1	57.519	0.115	16	MGM
HFIDA119B	A	M1	1	1	54.997	0.112	16	MGM
HFIDA216B	A	M2	1	2	53.305	0.117	16	MGM
HFIDA217B	A	M2	1	2	55.545	0.117	16	MGM
HFIDA218B	A	M2	1	2	53.271	0.117	16	MGM
HFIDB115B	B	M1	2	1	56.508	0.116	16	MGM
HFIDB116B	B	M1	2	1	55.718	0.115	16	MGM
HFIDB117B	B	M1	2	1	58.780	0.119	16	MGM
HFIDB216B	B	M2	2	2	59.065	0.115	16	MGM
HFIDB217B	B	M2	2	2	58.040	0.116	16	MGM
HFIDB218B	B	M2	2	2	57.482	0.114	16	MGM
HFIDC116B	C	M1	3	1	60.750	0.116	16	MGM
HFIDC117B	C	M1	3	1	61.668	0.117	16	MGM
HFIDC118B	C	M1	3	1	58.242	0.116	16	MGM
HFIDC216B	C	M2	3	2	58.836	0.117	16	MGM
HFIDC217B	C	M2	3	2	59.173	0.117	16	MGM
HFIDC218B	C	M2	3	2	57.662	0.116	16	MGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0073	57.006
0.0074	56.635
0.0072	57.344
0.0070	53.645
0.0073	54.269
0.0073	56.598
0.0073	54.073
0.0073	57.015
0.0072	55.549
0.0074	60.531
0.0072	58.843
0.0073	58.544
0.0071	56.825
0.0073	61.190
0.0073	62.524
0.0073	58.781
0.0073	59.645
0.0073	60.089
0.0073	58.229

Average 57.276
Standard Dev. 2.262
Coeff. of Var. [%] 3.950
Min. 53.271
Max. 61.668
Number of Spec. 19

Average_{norm} 0.0073 57.754
Standard Dev_{norm} 2.433
Coeff. of Var. [%]_{norm} 4.213
Min. 0.0070 53.645
Max. 0.0074 62.524
Number of Spec. 19 19

Laminate Open Hole Tension Properties (OHT1) -- (CTD) Normalized Strength HEXCEL 8552 - IM7 UNI PREPREG



Laminate Open Hole Tension Properties (OHT1) -- (RTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

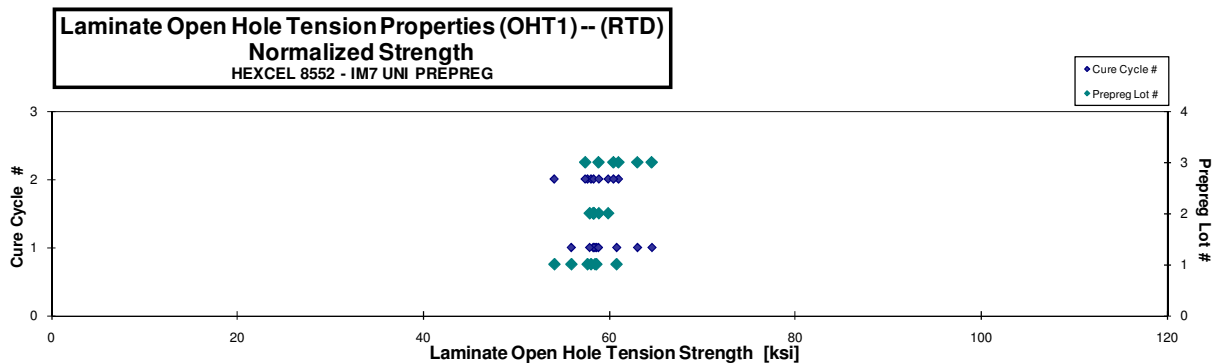
normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Modes
HFIDA111A	A	M1	1	1	57.333	0.112	16	MGM
HFIDA112A	A	M1	1	1	57.225	0.118	16	MGM
HFIDA113A	A	M1	1	1	57.430	0.117	16	MGM
HFIDA114A	A	M1	1	1	59.787	0.117	16	MGM
HFIDA211A	A	M2	1	2	53.318	0.117	16	MGM
HFIDA212A	A	M2	1	2	56.126	0.118	16	MGM
HFIDA213A	A	M2	1	2	56.851	0.118	16	MGM
HFIDB111A	B	M1	2	1	58.569	0.115	16	MGM
HFIDB112A	B	M1	2	1	57.566	0.117	16	MGM
HFIDB113A	B	M1	2	1	57.722	0.116	16	MGM
HFIDB211A	B	M2	2	2	59.861	0.112	16	MGM
HFIDB212A	B	M2	2	2	58.439	0.116	16	MGM
HFIDB213A	B	M2	2	2	60.377	0.114	16	MGM
HFIDC111A	C	M1	3	1	59.887	0.113	16	MGM
HFIDC112A	C	M1	3	1	62.217	0.117	16	MGM
HFIDC113A	C	M1	3	1	64.442	0.116	16	MGM
HFIDC211A	C	M2	3	2	58.071	0.114	16	MGM
HFIDC212A	C	M2	3	2	59.987	0.117	16	MGM
HFIDC213A	C	M2	3	2	60.004	0.116	16	MGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0070	55.956
0.0074	58.649
0.0073	58.502
0.0073	60.825
0.0073	54.120
0.0074	57.693
0.0074	58.068
0.0072	58.298
0.0073	58.382
0.0072	57.922
0.0070	58.345
0.0073	58.912
0.0071	59.915
0.0071	58.865
0.0073	63.063
0.0072	64.610
0.0071	57.440
0.0073	61.020
0.0073	60.481

Average 58.695
 Standard Dev. 2.390
 Coeff. of Var. [%] 4.072
 Min. 53.318
 Max. 64.442
 Number of Spec. 19

Average_{norm} 0.00724 59.003
 Standard Dev._{norm} 2.350
 Coeff. of Var. [%]_{norm} 3.982
 Min. 0.0070 54.120
 Max. 0.0074 64.610
 Number of Spec. 19 19



Laminate Open Hole Tension Properties (OHT1)-- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

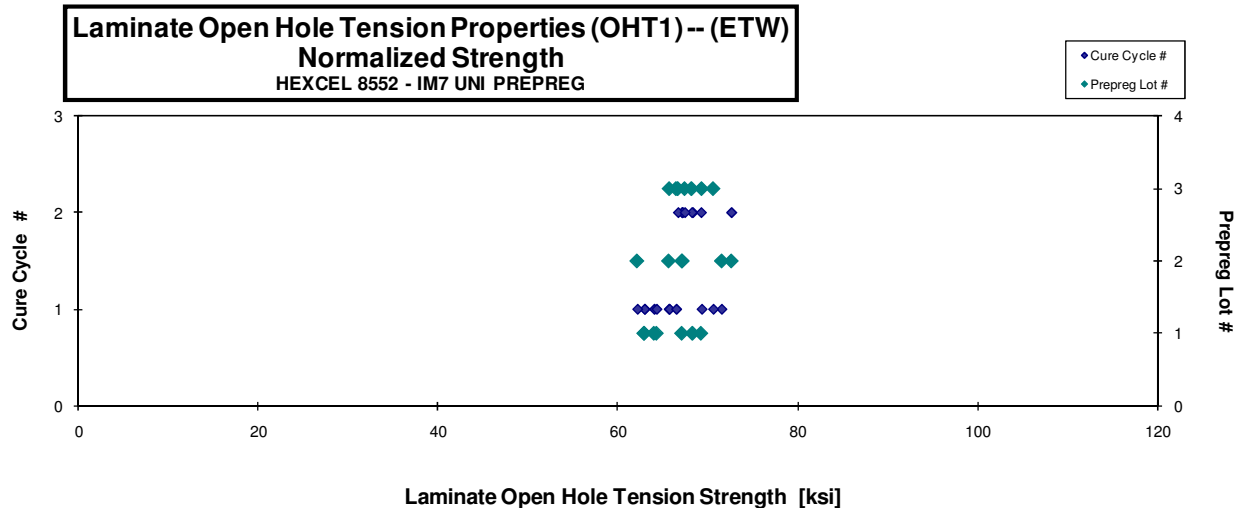
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Modes
HFIDA11BD	A	M1	1	1	63.475	0.116	16	AGM
HFIDA11CD	A	M1	1	1	62.272	0.116	16	AGM
HFIDA11DD	A	M1	1	1	62.206	0.117	16	AGM
HFIDA11ED	A	M1	1	1	63.863	0.116	16	AGM
HFIDA21BD	A	M2	1	2	66.003	0.117	16	AGM
HFIDA21CD	A	M2	1	2	67.056	0.117	16	MGM
HFIDA21DD	A	M2	1	2	67.795	0.118	16	AGM
HFIDB119D	B	M1	2	1	63.402	0.113	16	AGM
HFIDB11AD	B	M1	2	1	65.212	0.116	16	AGM
HFIDB11BD	B	M1	2	1	71.042	0.116	16	MGM
HFIDB21BD	B	M2	2	2	73.233	0.114	16	AGM
HFIDB21CD	B	M2	2	2	67.200	0.115	16	AGM
HFIDB21DD	B	M2	2	2	67.239	0.115	16	AGM
HFIDC11BD	C	M1	3	1	65.357	0.116	16	AGM
HFIDC11CD	C	M1	3	1	69.942	0.116	16	AGM
HFIDC11DD	C	M1	3	1	68.968	0.116	16	AGM
HFIDC11FD	C	M1	3	1	65.533	0.117	16	MGM
HFIDC21BD	C	M2	3	2	67.346	0.117	16	AGM
HFIDC21CD	C	M2	3	2	65.625	0.117	16	AGM
HFIDC21DD	C	M2	3	2	66.795	0.116	16	AGM

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0073	64.017
0.0073	62.966
0.0073	62.926
0.0072	64.297
0.0073	67.092
0.0073	68.288
0.0074	69.218
0.0071	62.154
0.0072	65.656
0.0072	71.515
0.0071	72.587
0.0072	67.152
0.0072	67.141
0.0072	65.716
0.0073	70.579
0.0072	69.297
0.0073	66.472
0.0073	68.184
0.0073	66.660
0.0073	67.413

Average 66.478
 Standard Dev. 2.853
 Coeff. of Var. [%] 4.292
 Min. 62.206
 Max. 73.233
 Number of Spec. 20

Average_{norm} 0.0073 66.966
 Standard Dev._{norm} 2.850
 Coeff. of Var. [%]_{norm} 4.255
 Min. 0.0071 62.154
 Max. 0.0074 72.587
 Number of Spec. 20



4.17 Open Hole Tension 2 Properties

Laminate Open Hole Tension Properties (OHT2) -- (CTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure
HFIEA115B	A	M1	1	1	44.404	0.145	20	AGM
HFIEA116B	A	M1	1	1	45.649	0.146	20	AGM
HFIEA117B	A	M1	1	1	44.586	0.146	20	AGM
HFIEA118B	A	M1	1	1	45.233	0.146	20	AGM
HFIEA215B	A	M2	1	2	43.883	0.147	20	AGM
HFIEA216B	A	M2	1	2	44.158	0.146	20	AGM
HFIEA217B	A	M2	1	2	44.366	0.149	20	AGM
HFIEB115B	B	M1	2	1	45.728	0.144	20	AGM
HFIEB116B	B	M1	2	1	46.353	0.144	20	AGM
HFIEB117B	B	M1	2	1	45.119	0.145	20	AGM
HFIEB215B	B	M2	2	2	46.586	0.144	20	AGM
HFIEB216B	B	M2	2	2	46.601	0.143	20	AGM
HFIEB217B	B	M2	2	2	46.631	0.144	20	AGM
HFIEC115B	C	M1	3	1	45.492	0.139	20	AGM
HFIEC116B	C	M1	3	1	46.661	0.146	20	AGM
HFIEC117B	C	M1	3	1	47.025	0.144	20	AGM
HFIEC215B	C	M2	3	2	46.563	0.145	20	AGM
HFIEC216B	C	M2	3	2	46.288	0.145	20	AGM
HFIEC217B	C	M2	3	2	45.652	0.147	20	AGM

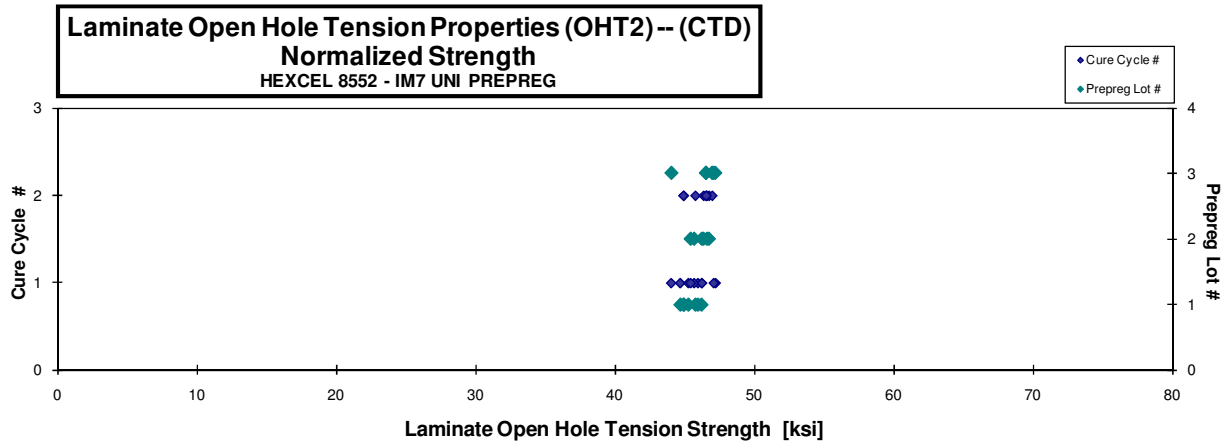
normalizing t_{ply}
 [in]

0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0072	44.686
0.0073	46.209
0.0073	45.262
0.0073	45.940
0.0074	44.940
0.0073	44.920
0.0074	45.768
0.0072	45.664
0.0072	46.224
0.0072	45.422
0.0072	46.586
0.0072	46.347
0.0072	46.734
0.0070	44.045
0.0073	47.196
0.0072	47.063
0.0073	46.962
0.0072	46.535
0.0073	46.524

Average 45.630
 Standard Dev. 0.987
 Coeff. of Var. [%] 2.164
 Min. 43.883
 Max. 47.025
 Number of Spec. 19

Average_{norm} 0.0073 45.949
 Standard Dev._{norm} 0.881
 Coeff. of Var. [%]_{norm} 1.918
 Min. 0.0070 44.045
 Max. 0.0074 47.196
 Number of Spec. 19 19



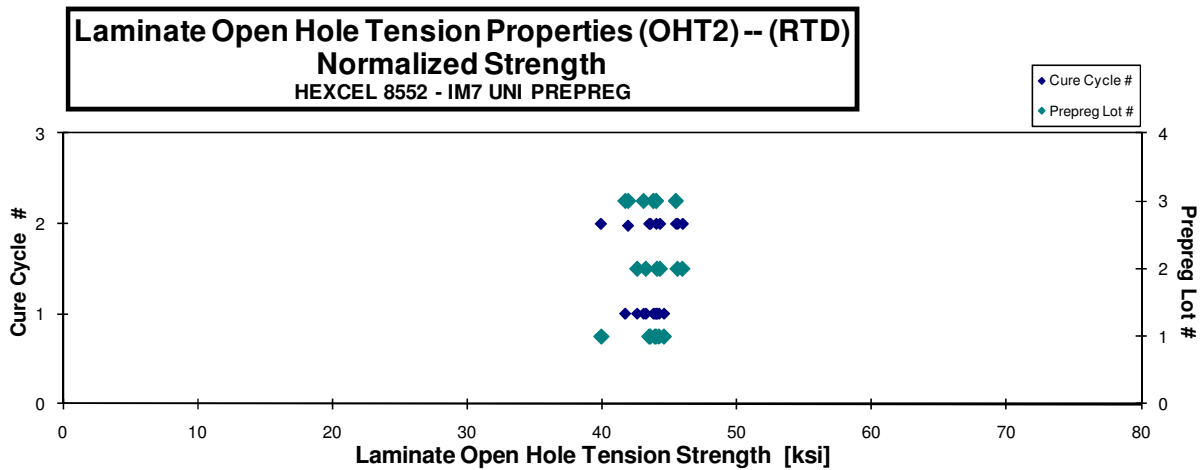
Laminate Open Hole Tension Properties (OHT2) -- (RTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	Strength _{norm} [ksi]
HFIEA111A	A	M1	1	1	44.383	0.142	20	AGM	0.0071	43.915
HFIEA112A	A	M1	1	1	43.792	0.147	20	AGM	0.0073	44.583
HFIEA113A	A	M1	1	1	43.592	0.145	20	AGM	0.0073	44.006
HFIEA114A	A	M1	1	1	43.843	0.145	20	AGM	0.0073	44.218
HFIEA211A	A	M2	1	2	41.048	0.140	20	AGM	0.0070	39.912
HFIEA212A	A	M2	1	2	42.213	0.149	20	AGM	0.0074	43.571
HFIEA213A	A	M2	1	2	42.685	0.147	20	AGM	0.0073	43.490
HFIEB111A	B	M1	2	1	42.668	0.144	20	AGM	0.0072	42.589
HFIEB112A	B	M1	2	1	43.774	0.145	20	AGM	0.0072	44.068
HFIEB113A	B	M1	2	1	43.345	0.144	20	AGM	0.0072	43.240
HFIEB211A	B	M2	2	2	45.471	0.140	20	AGM	0.0070	44.286
HFIEB212A	B	M2	2	2	45.720	0.145	20	AGM	0.0072	45.958
HFIEB213A	B	M2	2	2	45.864	0.143	20	AGM	0.0072	45.598
HFIEC111A	C	M1	3	1	42.805	0.140	20	AGM	0.0070	41.705
HFIEC112A	C	M1	3	1	42.882	0.145	20	AGM	0.0072	43.071
HFIEC113A	C	M1	3	1	43.976	0.143	20	AGM	0.0072	43.798
HFIEC211A	C	M2	3	2	43.083	0.140	20	AGM	0.0070	41.916
HFIEC212A	C	M2	3	2	44.403	0.147	20	AGM	0.0074	45.472
HFIEC213A	C	M2	3	2	43.720	0.145	20	AGM	0.0072	44.009

Average 43.646
 Standard Dev. 1.207
 Coeff. of Var. [%] 2.766
 Min. 41.048
 Max. 45.864
 Number of Spec. 19

Average_{norm} 0.0072 43.653
 Standard Dev._{norm} 1.433
 Coeff. of Var. [%]_{norm} 3.284
 Min. 0.0070 39.912
 Max. 0.0074 45.958
 Number of Spec. 19



Laminate Open Hole Tension Properties (OHT2) -- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

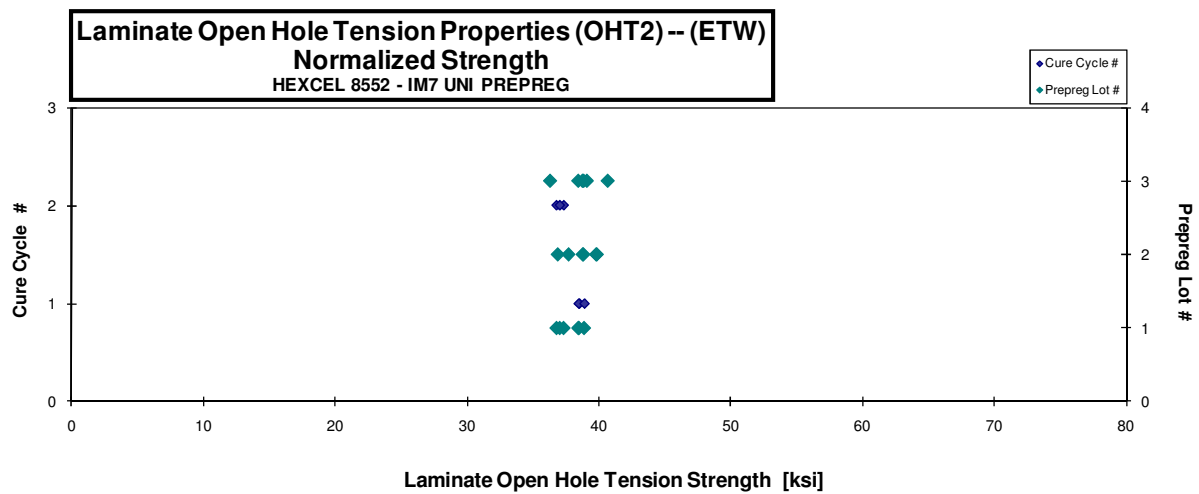
normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Modes
HFIEA11AD	A	M1	1	1	38.273	0.145	20	AGM
HFIEA11BD	A	M1	1	1	37.898	0.146	20	AGM
HFIEA11CD	A	M1	1	1	38.398	0.146	20	AGM
HFIEA219DD	A	M2	1	2	36.182	0.146	20	AGM
HFIEA21AD	A	M2	1	2	36.377	0.148	20	AGM
HFIEA21BD	A	M2	1	2	36.605	0.146	20	AGM
HFIEB119D	B	M1	2	1	38.837	0.140	20	AGM
HFIEB11AD	B	M1	2	1	39.577	0.145	20	LGM
HFIEB11BD	B	M1	2	1	39.010	0.143	20	LGM
HFIEB218D	B	M2	2	2	37.223	0.143	20	AGM
HFIEB219D	B	M2	2	2	38.589	0.145	20	AGM
HFIEB21AD	B	M2	2	2	40.019	0.143	20	AGM
HFIEC118D	C	M1	3	1	39.249	0.143	20	AGM
HFIEC119D	C	M1	3	1	38.575	0.144	20	AGM
HFIEC11AD	C	M1	3	1	38.907	0.144	20	AGM
HFIEC218D	C	M2	3	2	39.152	0.143	20	AGM
HFIEC219D	C	M2	3	2	37.182	0.140	20	AGM
HFIEC21AD	C	M2	3	2	40.037	0.146	20	AGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0072	38.499
0.0073	38.451
0.0073	38.891
0.0073	36.773
0.0074	37.316
0.0073	37.020
0.0070	37.691
0.0072	39.810
0.0072	38.789
0.0071	36.861
0.0072	38.825
0.0072	39.875
0.0072	39.095
0.0072	38.445
0.0072	38.853
0.0071	38.771
0.0070	36.270
0.0073	40.709

Average 38.338
 Standard Dev. 1.192
 Coeff. of Var. [%] 3.110
 Min. 36.182
 Max. 40.037
 Number of Spec. 18

Average_{norm} 0.0072 38.386
 Standard Dev._{norm} 1.189
 Coeff. of Var. [%]_{norm} 3.098
 Min. 0.0070 36.270
 Max. 0.0074 40.709
 Number of Spec. 18



4.18 Open Hole Tension 3 Properties

Laminate Open Hole Tension Properties (OHT3) -- (CTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

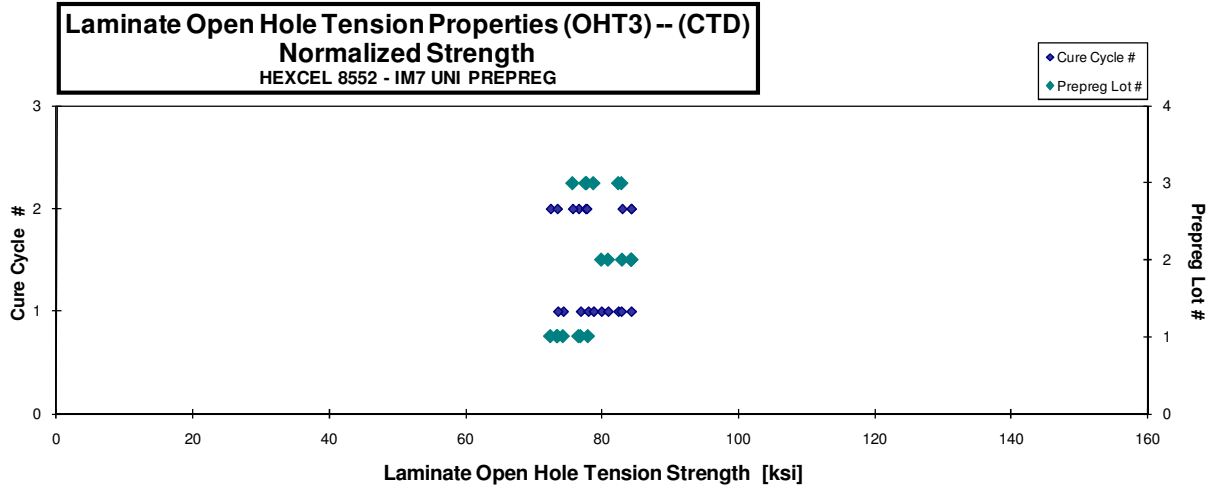
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode
HFIFA116B	A	M1	1	1	72.748	0.147	20	AGM / LGM
HFIFA117B	A	M1	1	1	71.330	0.148	20	AGM / LGM
HFIFA118B	A	M1	1	1	74.260	0.149	20	AGM / LGM
HFIFA119B	A	M1	1	1	75.999	0.148	20	AGM / LGM
HFIFA215B	A	M2	1	2	70.749	0.147	20	AGM / LGM
HFIFA216B	A	M2	1	2	74.477	0.148	20	AGM / LGM
HFIFA217B	A	M2	1	2	70.910	0.149	20	AGM / LGM
HFIFB115B	B	M1	2	1	84.181	0.144	20	LGM / AGM
HFIFB116B	B	M1	2	1	80.126	0.144	20	AGM
HFIFB117B	B	M1	2	1	80.709	0.144	20	LGM / AGM
HFIFB214B	B	M2	2	2	82.090	0.146	20	LGM / AGM
HFIFB215B	B	M2	2	2	83.543	0.145	20	LGM / AGM
HFIFB216B	B	M2	2	2	84.377	0.144	20	AGM
HFIFC115B	C	M1	3	1	82.716	0.143	20	LGM/AGM
HFIFC116B	C	M1	3	1	83.049	0.144	20	LGM
HFIFC117B	C	M1	3	1	78.341	0.145	20	AGM
HFIFC215B	C	M2	3	2	76.176	0.143	20	AGM/LGM
HFIFC216B	C	M2	3	2	77.746	0.144	20	AGM
HFIFC217B	C	M2	3	2	77.844	0.144	20	LGM

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0074	74.264
0.0074	73.476
0.0075	76.839
0.0074	77.935
0.0074	72.412
0.0074	76.537
0.0075	73.389
0.0072	84.288
0.0072	79.894
0.0072	80.868
0.0073	82.945
0.0073	84.269
0.0072	84.279
0.0072	82.362
0.0072	82.828
0.0072	78.731
0.0072	75.664
0.0072	77.566
0.0072	77.727

Average 77.967
 Standard Dev. 4.683
 Coeff. of Var. [%] 6.006
 Min. 70.749
 Max. 84.377
 Number of Spec. 19

Average_{norm} 0.0073 78.751
 Standard Dev._{norm} 3.964
 Coeff. of Var. [%]_{norm} 5.033
 Min. 0.0072 72.412
 Max. 0.0075 84.288
 Number of Spec. 19 19



Laminate Open Hole Tension Properties (OHT3) -- (RTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

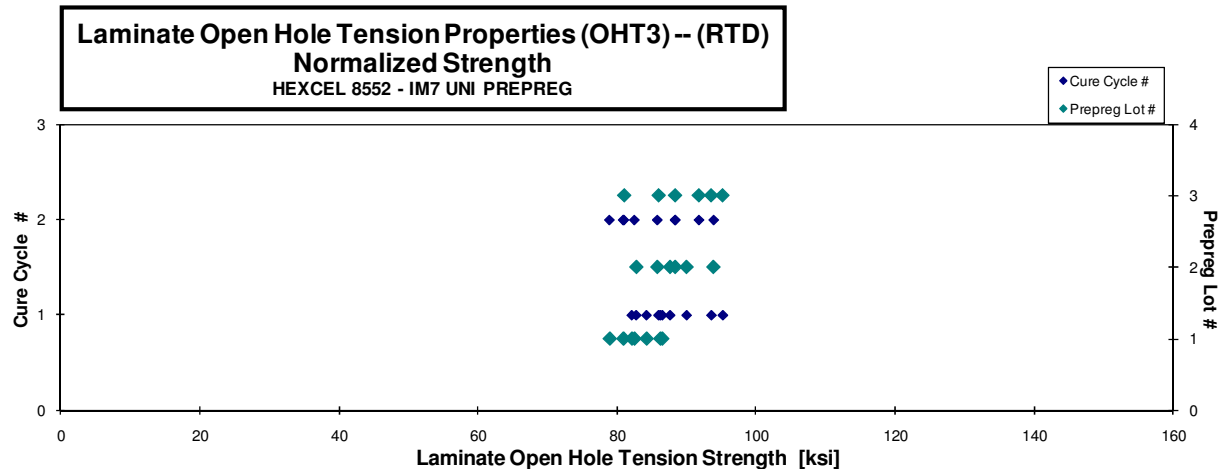
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
HFIFA111A	A	M1	1	1	81.536	0.145	20	LGM/AGM
HFIFA112A	A	M1	1	1	81.570	0.149	20	LGM
HFIFA113A	A	M1	1	1	84.147	0.148	20	LGM
HFIFA114A	A	M1	1	1	83.870	0.148	20	LGM/AGM
HFIFA211A	A	M2	1	2	80.490	0.141	20	LGM/AGM
HFIFA212A	A	M2	1	2	79.778	0.149	20	LGM
HFIFA213A	A	M2	1	2	79.068	0.147	20	LGM
HFIFB111A	B	M1	2	1	89.781	0.133	20	AGM
HFIFB112A	B	M1	2	1	88.390	0.147	20	AGM
HFIFB113A	B	M1	2	1	88.177	0.143	20	AGM / LGM
HFIFB211A	B	M2	2	2	89.962	0.141	20	AGM / LGM
HFIFB212A	B	M2	2	2	93.126	0.145	20	AGM / LGM
HFIFB213A	B	M2	2	2	85.187	0.145	20	AGM
HFIFC111A	C	M1	3	1	89.951	0.138	20	LGM / AGM
HFIFC112A	C	M1	3	1	94.489	0.145	20	LGM / AGM
HFIFC113A	C	M1	3	1	94.135	0.143	20	LGM / AGM
HFIFC211A	C	M2	3	2	83.280	0.140	20	LGM / AGM
HFIFC212A	C	M2	3	2	87.504	0.145	20	LGM / AGM
HFIFC213A	C	M2	3	2	91.470	0.144	20	LGM / AGM

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0073	82.103
0.0074	84.213
0.0074	86.484
0.0074	86.200
0.0071	78.897
0.0074	82.475
0.0074	80.880
0.0066	82.735
0.0073	89.976
0.0072	87.595
0.0071	88.328
0.0073	93.859
0.0072	85.768
0.0069	85.953
0.0073	95.167
0.0072	93.536
0.0070	80.977
0.0073	88.324
0.0072	91.746

Average 86.627
 Standard Dev. 4.958
 Coeff. of Var. [%] 5.724
 Min. 79.068
 Max. 94.489
 Number of Spec. 19

Average_{norm} 0.0072 86.590
 Standard Dev._{norm} 4.725
 Coeff. of Var. [%]_{norm} 5.457
 Min. 0.0066 78.897
 Max. 0.0074 95.167
 Number of Spec. 19



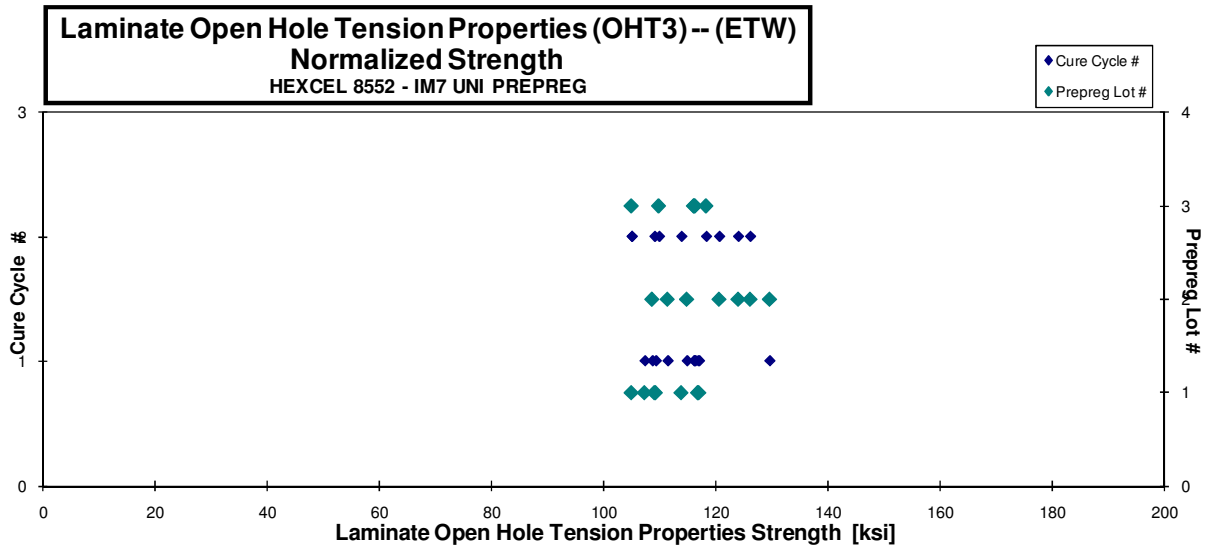
Laminate Open Hole Tension Properties (OHT3)-- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]
HFIFA11BD*	A	M1	1	1	114.518	0.147	20	LGM	0.0074	116.903
HFIFA11CD*	A	M1	1	1	107.381	0.147	20	LGM	0.0073	109.370
HFIFA11DD*	A	M1	1	1	114.736	0.147	20	LGM	0.0074	117.126
HFIFA11ED*	A	M1	1	1	103.774	0.149	20	LGM	0.0075	107.377
HFIFA219D	A	M2	1	2	102.238	0.148	20	LGM	0.0074	105.042
HFIFA21AD	A	M2	1	2	110.569	0.148	20	LGM	0.0074	113.948
HFIFA21BD	A	M2	1	2	106.810	0.147	20	LGM	0.0074	109.146
HFIFB118D	B	M1	2	1	128.781	0.145	20	AGM	0.0073	129.750
HFIFB119D*	B	M1	2	1	117.340	0.137	20	LGM/AGM	0.0068	111.486
HFIFB11AD	B	M1	2	1	106.610	0.147	20	LGM/AGM	0.0073	108.732
HFIFB11BD	B	M1	2	1	114.723	0.144	20	LGM/AGM	0.0072	114.935
HFIFB218D	B	M2	2	2	125.681	0.145	20	LGM/AGM	0.0072	126.278
HFIFB219D	B	M2	2	2	119.126	0.146	20	LGM/AGM	0.0073	120.726
HFIFB21AD	B	M2	2	2	121.801	0.147	20	LGM/AGM	0.0073	124.141
HFIFC119D	C	M1	3	1	116.543	0.144	20	AGM	0.0072	116.435
HFIFC11AD	C	M1	3	1	115.517	0.145	20	LGM	0.0072	116.266
HFIFC11BD	C	M1	3	1	117.042	0.143	20	AGM/LGM	0.0071	116.188
HFIFC219D	C	M2	3	2	119.003	0.143	20	AGM	0.0072	118.397
HFIFC21AD	C	M2	3	2	104.988	0.144	20	AGM/LGM	0.0072	105.036
HFIFC21BD	C	M2	3	2	110.152	0.144	20	AGM	0.0072	109.935

Average 113.867
 Standard Dev. 7.248
 Coeff. of Var. [%] 6.365
 Min. 102.238
 Max. 128.781
 Number of Spec. 20

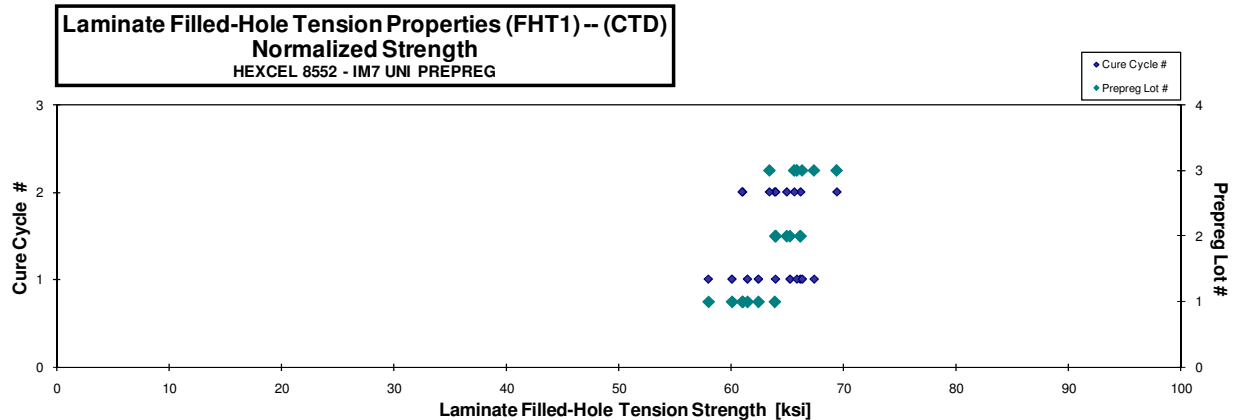
Average_{norm} 0.0073 114.861
 Standard Dev._{norm} 6.830
 Coeff. of Var. [%]_{norm} 5.946
 Min. 0.0068 105.036
 Max. 0.0075 129.750
 Number of Spec. 20 20



4.19 Filled-Hole Tension 1 Properties

Laminate Filled-Hole Tension Properties (FHT1) -- (CTD) Strength HEXCEL 8552 - IM7 UNI PREPREG									normalizing t_{ply} [in] 0.0072	
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]
HF14A117B	A	M1	1	1	59.027	0.117	16	AGM	0.0073	60.095
HF14A118B	A	M1	1	1	57.302	0.117	16	AGM	0.0073	57.998
HF14A119B	A	M1	1	1	60.172	0.118	16	AGM	0.0074	61.469
HF14A11AB	A	M1	1	1	61.327	0.117	16	AGM	0.0073	62.436
HF14A215B	A	M2	1	2	62.748	0.117	16	AGM	0.0073	63.891
HF14A216B	A	M2	1	2	60.030	0.117	16	AGM	0.0073	61.046
HF14A217B	A	M2	1	2	59.748	0.118	16	AGM	0.0074	61.002
HF14B115B	B	M1	2	1	65.873	0.114	16	AGM	0.0071	65.244
HF14B116B	B	M1	2	1	67.053	0.114	16	AGM	0.0071	66.151
HF14B117B	B	M1	2	1	64.288	0.115	16	AGM	0.0072	63.953
HF14B215B	B	M2	2	2	65.191	0.115	16	AGM	0.0072	64.955
HF14B216B	B	M2	2	2	64.500	0.114	16	AGM	0.0071	63.968
HF14B217B	B	M2	2	2	66.214	0.115	16	AGM	0.0072	66.185
HF14C115B	C	M1	3	1	65.035	0.117	16	AGM	0.0073	65.853
HF14C116B	C	M1	3	1	65.600	0.118	16	AGM	0.0074	67.384
HF14C117B	C	M1	3	1	66.666	0.115	16	AGM	0.0072	66.328
HF14C215B	C	M2	3	2	62.871	0.116	16	AGM	0.0073	63.417
HF14C216B	C	M2	3	2	65.150	0.116	16	AGM	0.0073	65.630
HF14C217B	C	M2	3	2	68.013	0.118	16	AGM	0.0073	69.401

Average	63.516	Average _{norm}	0.0073	64.021
Standard Dev.	3.085	Standard Dev. _{norm}		2.810
Coeff. of Var. [%]	4.856	Coeff. of Var. [%] _{norm}		4.390
Min.	57.302	Min.	0.0071	57.998
Max.	68.013	Max.	0.0074	69.401
Number of Spec.	19	Number of Spec.	19	19



Laminate Filled-Hole Tension Properties (FHT1) -- (RTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

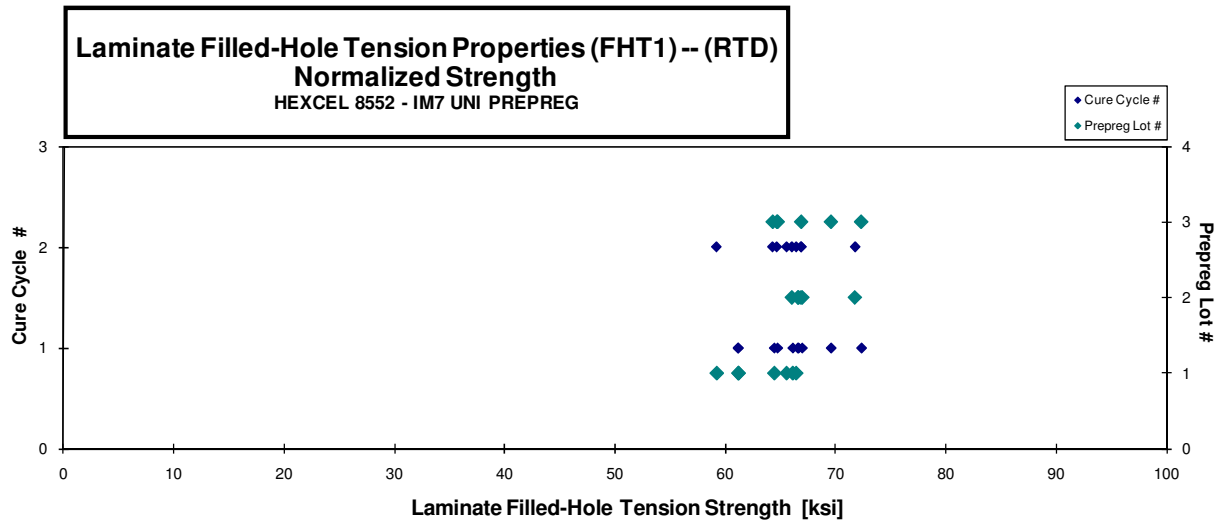
normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode
HF4A112A	A	M1	1	1	64.899	0.117	16	AGM
HF4A113A	A	M1	1	1	60.163	0.117	16	AGM
HF4A114A	A	M1	1	1	59.596	0.118	16	AGM
HF4A115A	A	M1	1	1	63.146	0.118	16	AGM
HF4A211A	A	M2	1	2	60.980	0.112	16	AGM
HF4A212A	A	M2	1	2	64.939	0.118	16	AGM
HF4A214A	A	M2	1	2	64.451	0.117	16	AGM
HF4B111A	B	M1	2	1	70.013	0.110	16	AGM
HF4B112A	B	M1	2	1	66.645	0.116	16	AGM
HF4B113A	B	M1	2	1	67.424	0.114	16	AGM
HF4B211A	B	M2	2	2	69.067	0.110	16	AGM
HF4B212A	B	M2	2	2	66.498	0.116	16	AGM
HF4B214A	B	M2	2	2	72.193	0.115	16	AGM
HF4C111A	C	M1	3	1	67.382	0.111	16	AGM
HF4C113A*	C	M1	3	1	71.250	0.117	16	AGM
HF4C114A*	C	M1	3	1	68.599	0.117	16	AGM
HF4C211A	C	M2	3	2	67.144	0.111	16	AGM
HF4C212A	C	M2	3	2	62.523	0.118	16	AGM
HF4C213A	C	M2	3	2	66.195	0.116	16	AGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0073	66.120
0.0073	61.190
0.0074	61.165
0.0073	64.444
0.0070	59.198
0.0074	66.433
0.0073	65.561
0.0068	66.579
0.0072	66.982
0.0071	66.644
0.0069	66.030
0.0072	66.863
0.0072	71.764
0.0069	64.740
0.0073	72.343
0.0073	69.591
0.0069	64.667
0.0074	64.287
0.0073	66.885

Average 65.953
 Standard Dev. 3.569
 Coeff. of Var. [%] 5.412
 Min. 59.596
 Max. 72.193
 Number of Spec. 19

Average_{norm} 0.0072 65.868
 Standard Dev._{norm} 3.259
 Coeff. of Var. [%]_{norm} 4.948
 Min. 0.0068 59.198
 Max. 0.0074 72.343
 Number of Spec. 19 19



Laminate Filled-Hole Tension Properties (FHT1) -- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

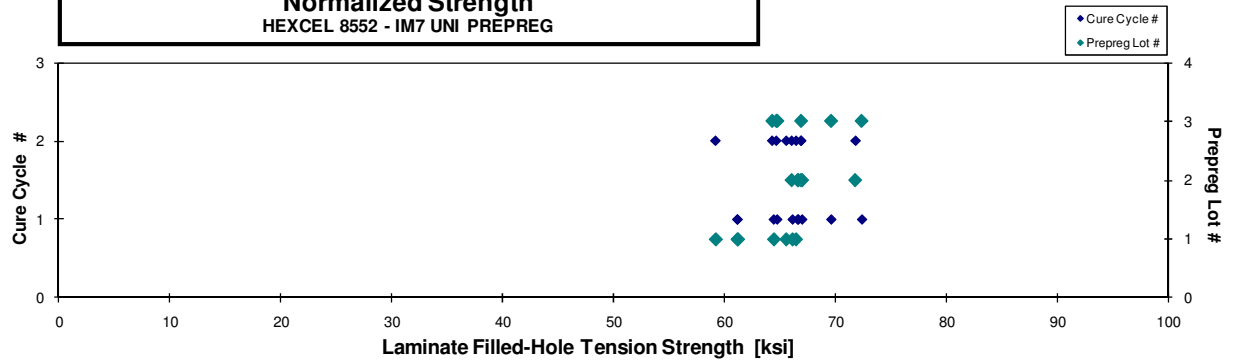
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode
HF14A11BD	A	M1	1	1	67.367	0.118	16	MGM
HF14A11CD	A	M1	1	1	66.790	0.117	16	MGM
HF14A11DD	A	M1	1	1	67.424	0.117	16	MGM
HF14A11FD	A	M1	1	1	64.289	0.117	16	MGM
HF14A218D	A	M2	1	2	69.017	0.117	16	MGM
HF14A21AD	A	M2	1	2	67.726	0.117	16	MGM
HF14A21BD	A	M2	1	2	69.612	0.117	16	MGM
HF14A21CD	A	M2	1	2	67.440	0.116	16	MGM
HF14B118D	B	M1	2	1	69.282	0.115	16	MGM
HF14B11AD	B	M1	2	1	68.161	0.116	16	MGM
HF14B11BD	B	M1	2	1	73.843	0.114	16	MGM
HF14B218D	B	M2	2	2	74.583	0.115	16	MGM
HF14B21BD	B	M2	2	2	72.453	0.115	16	MGM
HF14B21CD	B	M2	2	2	72.070	0.115	16	MGM
HF14C118D	C	M1	3	1	71.303	0.117	16	MGM
HF14C11AD	C	M1	3	1	65.293	0.120	16	MGM
HF14C11BD	C	M1	3	1	72.470	0.117	16	MGM
HF14C11CD	C	M1	3	1	70.193	0.118	16	MGM
HF14C21AD	C	M2	3	2	67.537	0.118	16	MGM
HF14C21BD	C	M2	3	2	71.258	0.116	16	MGM
HF14C21CD	C	M2	3	2	71.493	0.117	16	MGM
HF14C21DD	C	M2	3	2	69.776	0.117	16	MGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0074	68.770
0.0073	67.959
0.0073	68.429
0.0073	65.172
0.0073	69.945
0.0073	68.911
0.0073	70.418
0.0073	67.958
0.0072	69.362
0.0072	68.526
0.0071	72.914
0.0072	74.400
0.0072	72.316
0.0072	71.882
0.0073	72.211
0.0075	67.910
0.0073	73.309
0.0073	71.604
0.0074	69.149
0.0073	71.939
0.0073	72.600
0.0073	70.634

Average 69.517
 Standard Dev. 2.709
 Coeff. of Var. [%] 3.897
 Min. 64.289
 Max. 74.583
 Number of Spec. 22

Average_{norm} 0.0073 70.287
 Standard Dev._{norm} 2.278
 Coeff. of Var. [%]_{norm} 3.240
 Min. 0.0071 65.172
 Max. 0.0075 74.400
 Number of Spec. 22 22

Laminate Filled-Hole Tension Properties (FHT1) -- (ETW)
Normalized Strength
 HEXCEL 8552 - IM7 UNI PREPREG



4.20 Filled-Hole Tension 2 Properties

Laminate Filled-Hole Tension Properties (FHT2) -- (CTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

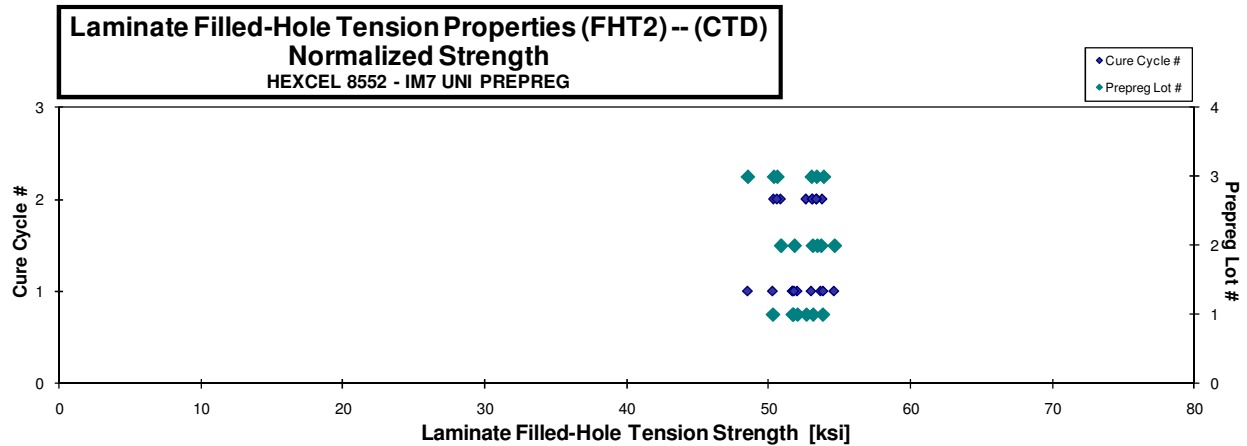
normalizing t_{ply}
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 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode
HF15A115B	A	M1	1	1	51.005	0.146	20	AGM
HF15A116B	A	M1	1	1	51.396	0.146	20	AGM
HF15A117B	A	M1	1	1	50.245	0.148	20	AGM
HF15A118B	A	M1	1	1	51.243	0.141	20	AGM
HF15A215B	A	M2	1	2	51.790	0.148	20	AGM
HF15A216B	A	M2	1	2	51.627	0.147	20	AGM
HF15A217B	A	M2	1	2	52.243	0.148	20	AGM
HF15B183B	B	M1	2	1	54.728	0.144	20	AGM
HF15B184B	B	M1	2	1	53.591	0.144	20	AGM
HF15B185B	B	M1	2	1	51.798	0.144	20	AGM
HF15B215B	B	M2	2	2	53.233	0.145	20	AGM
HF15B216B	B	M2	2	2	53.008	0.144	20	AGM
HF15B219B	B	M2	2	2	50.393	0.145	20	AGM
HF15C116B	C	M1	3	1	53.211	0.144	20	AGM
HF15C117B	C	M1	3	1	53.345	0.145	20	AGM
HF15C118B	C	M1	3	1	50.679	0.138	20	AGM
HF15C216B	C	M2	3	2	50.227	0.144	20	AGM
HF15C217B	C	M2	3	2	53.565	0.144	20	AGM
HF15C218B	C	M2	3	2	51.544	0.141	20	AGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0073	51.749
0.0073	52.038
0.0074	51.693
0.0071	50.306
0.0074	53.127
0.0073	52.661
0.0074	53.809
0.0072	54.640
0.0072	53.697
0.0072	51.822
0.0072	53.424
0.0072	53.106
0.0073	50.877
0.0072	53.026
0.0073	53.876
0.0069	48.544
0.0072	50.378
0.0072	53.386
0.0071	50.613

Average 52.046
 Standard Dev. 1.316
 Coeff. of Var. [%] 2.528
 Min. 50.227
 Max. 54.728
 Number of Spec. 19

Average_{norm} 0.0072 52.251
 Standard Dev._{norm} 1.567
 Coeff. of Var. [%]_{norm} 2.999
 Min. 0.0069 48.544
 Max. 0.0074 54.640
 Number of Spec. 19 19



Laminate Filled-Hole Tension Properties (FHT2) -- (RTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

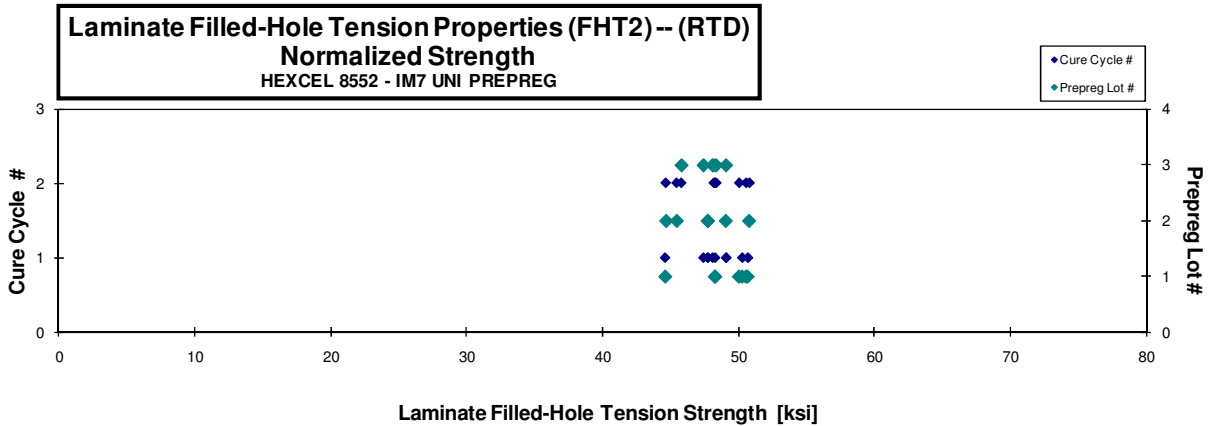
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode
HF15A111A	A	M1	1	1	45.997	0.140	20	AGM
HF15A112A	A	M1	1	1	47.027	0.148	20	AGM
HF15A113A	A	M1	1	1	50.242	0.145	20	AGM
HF15A114A	A	M1	1	1	49.553	0.146	20	AGM
HF15A211A	A	M2	1	2	49.823	0.145	20	AGM
HF15A212A	A	M2	1	2	49.363	0.147	20	AGM
HF15A213A	A	M2	1	2	47.248	0.147	20	AGM
HF15B181A	B	M1	2	1	48.549	0.142	20	AGM
HF15B121A	B	M1	2	1	48.010	0.143	20	AGM
HF15B182A	B	M1	2	1	48.932	0.144	20	AGM
HF15B211A	B	M2	2	2	46.169	0.142	20	AGM
HF15B212A	B	M2	2	2	50.056	0.146	20	AGM
HF15B213A	B	M2	2	2	44.673	0.144	20	AGM
HF15C111A	C	M1	3	1	49.493	0.140	20	AGM
HF15C112A	C	M1	3	1	48.053	0.147	20	AGM
HF15C113A	C	M1	3	1	47.632	0.143	20	AGM
HF15C211A	C	M2	3	2	48.980	0.142	20	AGM
HF15C213A	C	M2	3	2	48.012	0.144	20	AGM
HF15C214A	C	M2	3	2	45.723	0.144	20	AGM

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0070	44.587
0.0074	48.268
0.0073	50.679
0.0073	50.264
0.0072	50.036
0.0074	50.546
0.0074	48.244
0.0071	47.723
0.0072	47.726
0.0072	49.068
0.0071	45.437
0.0073	50.786
0.0072	44.637
0.0070	48.084
0.0074	49.087
0.0072	47.411
0.0071	48.350
0.0072	48.173
0.0072	45.781

Average 48.081
 Standard Dev. 1.605
 Coeff. of Var. [%] 3.337
 Min. 44.673
 Max. 50.242
 Number of Spec. 19

Average_{norm} 0.0072 48.152
 Standard Dev._{norm} 1.941
 Coeff. of Var. [%]_{norm} 4.031
 Min. 0.0070 44.587
 Max. 0.0074 50.786
 Number of Spec. 19



Laminate Filled-Hole Tension Properties (FHT2) -- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

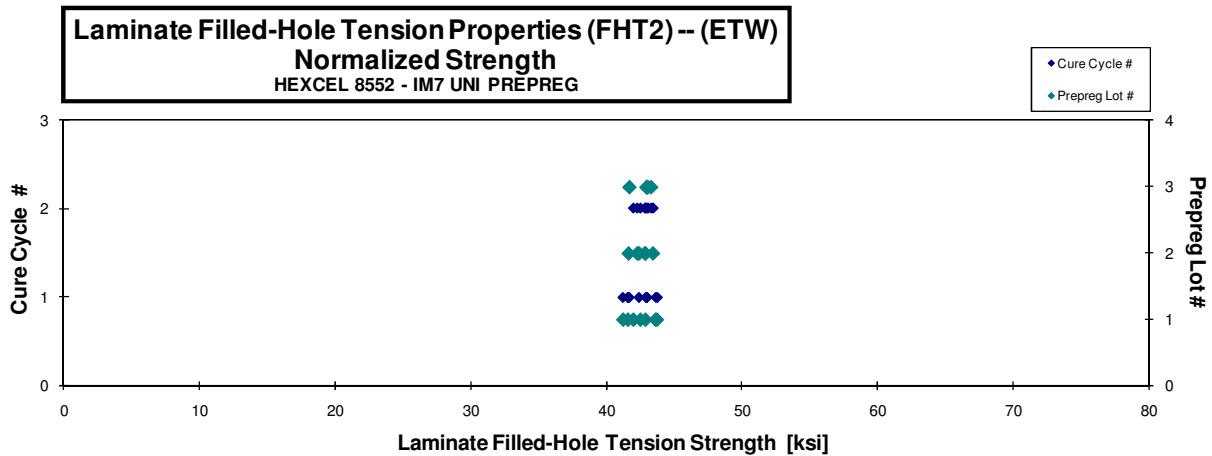
normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
HF15A11AD	A	M1	1	1	40.752	0.146	20	MGM
HF15A11BD	A	M1	1	1	41.247	0.145	20	MGM
HF15A11DD	A	M1	1	1	42.864	0.147	20	MGM
HF15A11ED	A	M1	1	1	42.513	0.148	20	MGM
HF15A21AD	A	M2	1	2	41.976	0.147	20	MGM
HF15A21CD	A	M2	1	2	40.962	0.148	20	MGM
HF15A21DD	A	M2	1	2	41.571	0.147	20	MGM
HF15B186D	B	M1	2	1	42.962	0.144	20	MGM
HF15B122D	B	M1	2	1	41.756	0.144	20	MGM
HF15B187D	B	M1	2	1	42.322	0.144	20	MGM
HF15B21CD	B	M2	2	2	42.137	0.144	20	MGM
HF15B21DD	B	M2	2	2	43.421	0.144	20	MGM
HF15B21ED	B	M2	2	2	42.356	0.146	20	MGM
HF15C11BD	C	M1	3	1	43.106	0.144	20	MGM
HF15C11CD	C	M1	3	1	41.453	0.145	20	MGM
HF15C11DD	C	M1	3	1	42.816	0.145	20	MGM
HF15C21BD	C	M2	3	2	42.810	0.145	20	MGM
HF15C21CD	C	M2	3	2	43.152	0.143	20	MGM
HF15C21ED	C	M2	3	2	43.538	0.143	20	MGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0073	41.219
0.0073	41.572
0.0073	43.643
0.0074	43.753
0.0074	42.885
0.0074	41.986
0.0074	42.509
0.0072	42.898
0.0072	41.621
0.0072	42.400
0.0072	42.264
0.0072	43.451
0.0073	42.842
0.0072	43.002
0.0072	41.683
0.0072	42.974
0.0072	43.067
0.0072	42.982
0.0072	43.307

Average 42.301
 Standard Dev. 0.832
 Coeff. of Var. [%] 1.967
 Min. 40.752
 Max. 43.538
 Number of Spec. 19

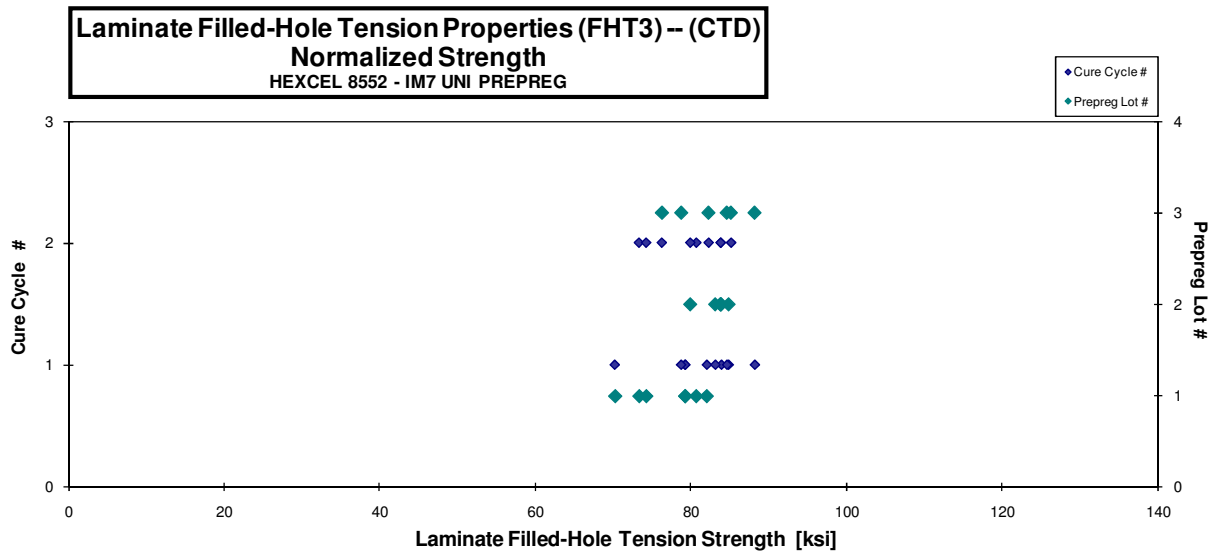
Average_{norm} 0.0073 42.635
 Standard Dev._{norm} 0.738
 Coeff. of Var. [%]_{norm} 1.732
 Min. 0.0072 41.219
 Max. 0.0074 43.753
 Number of Spec. 19 19



4.21 Filled-Hole Tension 3 Properties

Laminate Filled-Hole Tension Properties (FHT3) -- (CTD) Strength HEXCEL 8552 - IM7 UNI PREPREG									normalizing t_{ply} [in] 0.0072	
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]
HF16A111B	A	M1	1	1	76.916	0.148	20	LGM	0.0074	79.230
HF16A112B*	A	M1	1	1	77.654	0.147	20	LGM	0.0074	79.271
HF16A113B	A	M1	1	1	79.761	0.148	20	LGM	0.0074	82.013
HF16A114B	A	M1	1	1	71.758	0.141	20	LGM	0.0070	70.247
HF16A212B	A	M2	1	2	71.220	0.148	20	LGM	0.0074	73.339
HF16A213B	A	M2	1	2	72.885	0.147	20	LGM	0.0073	74.260
HF16A214B	A	M2	1	2	79.149	0.147	20	LGM	0.0073	80.670
HF16B112B	B	M1	2	1	83.462	0.145	20	LGM	0.0072	83.877
HF16B113B	B	M1	2	1	85.087	0.144	20	LGM	0.0072	84.811
HF16B115B	B	M1	2	1	83.583	0.143	20	AGM	0.0072	83.109
HF16B216B	B	M2	2	2	84.691	0.142	20	AGM	0.0071	83.799
HF16B217B	B	M2	2	2	79.312	0.145	20	AGM	0.0073	79.899
HF16B219B*	B	M2	2	2	86.562	0.139	20	AGM	0.0070	83.777
HF16C116B*	C	M1	3	1	88.226	0.144	20	LGM	0.0072	88.154
HF16C117B	C	M1	3	1	83.733	0.145	20	LGM	0.0073	84.595
HF16C118B	C	M1	3	1	80.774	0.140	20	AGM	0.0070	78.726
HF16C216B	C	M2	3	2	85.168	0.144	20	AGM	0.0072	85.119
HF16C217B	C	M2	3	2	82.027	0.144	20	LGM	0.0072	82.245
HF16C218B	C	M2	3	2	78.179	0.140	20	LGM	0.0070	76.252

Average	80.534	Average _{norm}	0.0072	80.705
Standard Dev.	4.936	Standard Dev. _{norm}		4.593
Coeff. of Var. [%]	6.129	Coeff. of Var. [%] _{norm}		5.691
Min.	71.220	Min.	0.0070	70.247
Max.	88.226	Max.	0.0074	88.154
Number of Spec.	19	Number of Spec.	19	19



**Laminate Filled-Hole Tension Properties (FHT3)-- (RTD)
Strength**
HEXCEL 8552 - IM7 UNI PREPREG

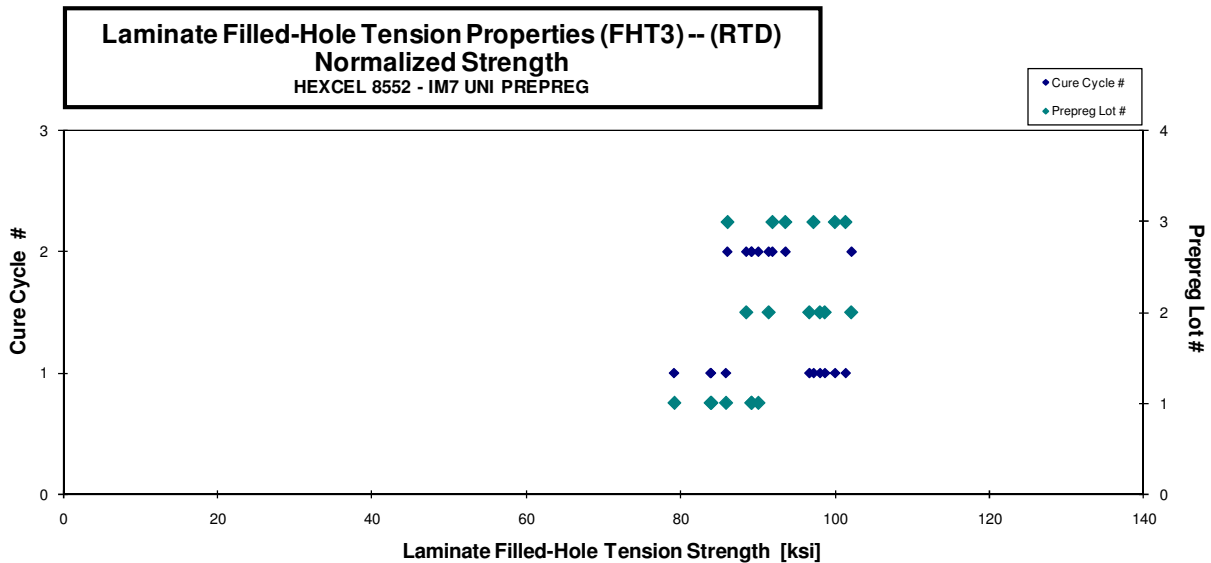
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode
HF16A115A	A	M1	1	1	84.133	0.147	20	LGM
HF16A116A	A	M1	1	1	82.476	0.147	20	LGM
HF16A117A	A	M1	1	1	77.075	0.148	20	LGM
HF16A118A	A	M1	1	1	84.415	0.143	20	LGM
HF16A215A	A	M2	1	2	87.203	0.147	20	LGM
HF16A216A	A	M2	1	2	87.870	0.148	20	LGM
HF16A218A	A	M2	1	2	89.304	0.144	20	LGM
HF16B116A	B	M1	2	1	99.567	0.143	20	LGM
HF16B117A	B	M1	2	1	96.382	0.144	20	LGM
HF16B118A	B	M1	2	1	101.085	0.140	20	LGM
HF16B212A	B	M2	2	2	91.092	0.145	20	LGM
HF16B213A	B	M2	2	2	89.175	0.143	20	LGM
HF16B215A	B	M2	2	2	102.608	0.143	20	LGM
HF16C112A	C	M1	3	1	96.557	0.145	20	LGM
HF16C113A1	C	M1	3	1	100.427	0.143	20	LGM
HF16C114A	C	M1	3	1	101.732	0.144	20	LGM
HF16C211A	C	M2	3	2	90.816	0.136	20	LGM
HF16C212A	C	M2	3	2	91.339	0.145	20	LGM
HF16C215A	C	M2	3	2	93.490	0.144	20	LGM

normalizing t_{ply}
[in]
0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0073	85.876
0.0073	83.956
0.0074	79.154
0.0072	83.887
0.0074	89.212
0.0074	90.077
0.0072	89.169
0.0071	98.714
0.0072	96.694
0.0070	98.066
0.0072	91.419
0.0071	88.514
0.0072	102.156
0.0073	97.238
0.0072	100.020
0.0072	101.391
0.0068	86.065
0.0072	91.900
0.0072	93.588

Average 91.934
Standard Dev. 7.269
Coeff. of Var. [%] 7.906
Min. 77.075
Max. 102.608
Number of Spec. 19

Average_{norm} 0.0072 91.952
Standard Dev._{norm} 6.624
Coeff. of Var. [%]_{norm} 7.204
Min. 0.0068 79.154
Max. 0.0074 102.156
Number of Spec. 19 19



Laminate Filled-Hole Tension Properties (FHT3) -- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode
HF16A21AD	A	M2	1	2	101.196	0.149	20	MGM
HF16A21BD	A	M2	1	2	102.134	0.147	20	MGM
HF16A21ED	A	M2	1	2	101.429	0.148	20	MGM
HF16A119D*	A	M1	1	1	96.211	0.141	20	MGM
HF16A11AD	A	M1	1	1	97.394	0.149	20	MGM
HF16A11BD	A	M1	1	1	92.014	0.147	20	MGM
HF16A11CD	A	M1	1	1	99.674	0.147	20	MGM
HF16B11BD	B	M1	2	1	102.156	0.143	20	MGM
HF16B11CD	B	M1	2	1	96.596	0.143	20	MGM
HF16B11ED	B	M1	2	1	106.183	0.142	20	MGM
HF16B21BD	B	M2	2	2	99.756	0.143	20	MGM
HF16B21CD	B	M2	2	2	97.666	0.143	20	MGM
HF16B21DD	B	M2	2	2	105.477	0.143	20	MGM
HF16C11AD**	C	M1	3	1	100.274	0.144	20	MGM
HF16C11CD	C	M1	3	1	105.904	0.144	20	MGM
HF16C11FD	C	M1	3	1	107.293	0.145	20	MGM
HF16C21BD	C	M2	3	2	100.091	0.144	20	MGM
HF16C21CD	C	M2	3	2	100.494	0.143	20	MGM
HF16C21DD	C	M2	3	2	102.630	0.144	20	MGM

normalizing t_{ply}
 [in]

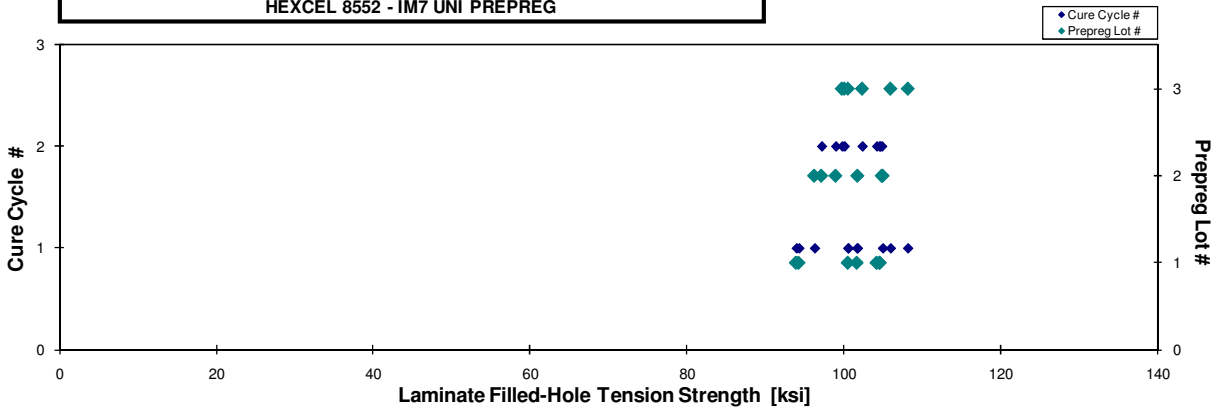
0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0074	104.558
0.0074	104.521
0.0074	104.152
0.0071	94.263
0.0074	100.506
0.0073	93.921
0.0073	101.635
0.0072	101.719
0.0072	96.239
0.0071	104.917
0.0071	98.936
0.0072	97.146
0.0072	104.818
0.0072	100.518
0.0072	105.916
0.0073	108.112
0.0072	99.743
0.0072	100.041
0.0072	102.309

Average 100.767
 Standard Dev. 3.852
 Coeff. of Var. [%] 3.823
 Min. 92.014
 Max. 107.293
 Number of Spec. 19

Average_{norm} 0.0072 101.262
 Standard Dev_{norm} 3.953
 Coeff. of Var. [%]_{norm} 3.904
 Min. 0.0071 93.921
 Max. 0.0074 108.112
 Number of Spec. 19 19

Laminate Filled-Hole Tension Properties (FHT3) -- (ETW)
Normalized Strength
 HEXCEL 8552 - IM7 UNI PREPREG



4.22 Open Hole Compression 1 Properties

Laminate Open Hole Compression Properties (OHC1) -- (RTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

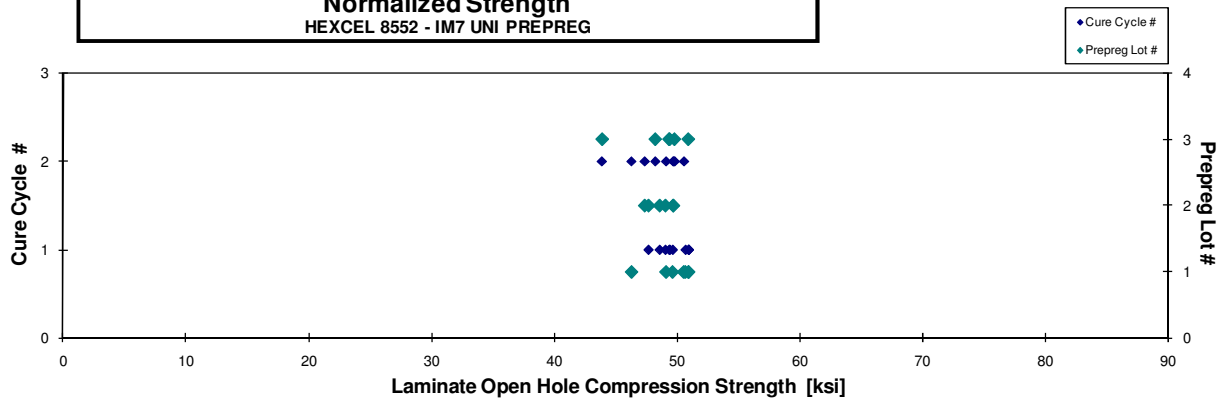
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Modes
HFIGA111A	A	M1	1	1	49.352	0.174	24	LGM
HFIGA112A	A	M1	1	1	48.708	0.181	24	LGM
HFIGA113A	A	M1	1	1	49.494	0.178	24	LGM
HFIGA114A	A	M1	1	1	49.152	0.178	24	LGM
HFIGA211A	A	M2	1	2	47.573	0.168	24	LGM
HFIGA212A	A	M2	1	2	46.871	0.181	24	LGM
HFIGA213A	A	M2	1	2	49.658	0.176	24	LGM
HFIGB111A	B	M1	2	1	51.283	0.165	24	LGM
HFIGB112A	B	M1	2	1	47.434	0.174	24	LGM
HFIGB113A	B	M1	2	1	48.741	0.172	24	LGM
HFIGB211A	B	M2	2	2	49.322	0.166	24	LGM
HFIGB212A	B	M2	2	2	49.005	0.175	24	LGM
HFIGB213A	B	M2	2	2	49.499	0.174	24	LGM
HFIGC111A	C	M1	3	1	50.305	0.170	24	LGM
HFIGC112A	C	M1	3	1	51.152	0.172	24	LGM
HFIGC113A	C	M1	3	1	49.517	0.173	24	LGM
HFIGC211A	C	M2	3	2	45.150	0.168	24	LGM
HFIGC212A	C	M2	3	2	48.727	0.177	24	LGM
HFIGC213A	C	M2	3	2	48.053	0.174	24	LGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0072	49.676
0.0075	50.991
0.0074	50.993
0.0074	50.731
0.0070	46.316
0.0075	49.145
0.0073	50.592
0.0069	49.096
0.0072	47.717
0.0072	48.624
0.0069	47.400
0.0073	49.756
0.0072	49.719
0.0071	49.393
0.0072	50.974
0.0072	49.455
0.0070	43.909
0.0074	49.831
0.0072	48.266

Average 48.894
 Standard Dev. 1.448
 Coeff. of Var. [%] 2.962
 Min. 45.150
 Max. 51.283
 Number of Spec. 19

Average_{norm} 0.0072 49.083
 Standard Dev._{norm} 1.793
 Coeff. of Var. [%]_{norm} 3.653
 Min. 0.0069 43.909
 Max. 0.0075 50.993
 Number of Spec. 19

Laminate Open Hole Compression Properties (OHC1) -- (RTD)
Normalized Strength
 HEXCEL 8552 - IM7 UNI PREPREG



Laminate Open Hole Compression Properties (OHC1) -- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Modes
HFIGA117D	A	M1	1	1	37.501	0.180	24	LGM
HFIGA118D	A	M1	1	1	36.396	0.172	24	LGM
HFIGA119D	A	M1	1	1	36.163	0.179	24	LGM
HFIGA11AD	A	M1	1	1	35.770	0.176	24	LGM
HFIGA216D	A	M2	1	2	35.276	0.177	24	LGM
HFIGA217D	A	M2	1	2	35.697	0.179	24	LGM
HFIGA218D	A	M2	1	2	33.586	0.173	24	LGM
HFIGB116D	B	M1	2	1	34.888	0.172	24	LGM
HFIGB117D	B	M1	2	1	35.442	0.174	24	LGM
HFIGB118D	B	M1	2	1	34.874	0.169	24	LGM
HFIGB216D	B	M2	2	2	36.226	0.173	24	LGM
HFIGB217D	B	M2	2	2	33.749	0.176	24	LGM
HFIGB218D	B	M2	2	2	36.958	0.169	24	LGM
HFIGC116D	C	M	3	1	34.153	0.173	24	LGM
HFIGC117D	C	M1	3	1	33.898	0.176	24	LGM
HFIGC118D	C	M1	3	1	34.086	0.168	24	LGM
HFIGC216D	C	M2	3	2	36.149	0.173	24	LGM
HFIGC217D	C	M2	3	2	34.019	0.177	24	LGM
HFIGC218D	C	M2	3	2	35.613	0.171	24	LGM

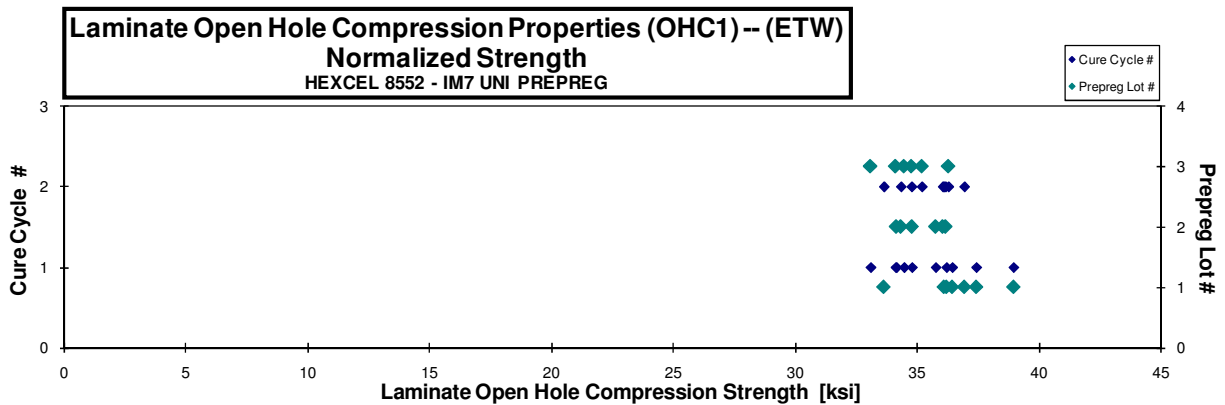
normalizing t_{ply}
 [in]

0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0075	38.956
0.0072	36.203
0.0075	37.426
0.0073	36.436
0.0074	36.102
0.0074	36.933
0.0072	33.628
0.0072	34.781
0.0073	35.757
0.0070	34.144
0.0072	36.163
0.0073	34.329
0.0070	36.049
0.0072	34.110
0.0073	34.457
0.0070	33.080
0.0072	36.278
0.0074	34.764
0.0071	35.190

Average 35.287
 Standard Dev. 1.148
 Coeff. of Var. [%] 3.252
 Min. 33.586
 Max. 37.501
 Number of Spec. 19

Average_{norm} 0.0072 35.515
 Standard Dev._{norm} 1.445
 Coeff. of Var. [%]_{norm} 4.069
 Min. 0.0070 33.080
 Max. 0.0075 38.956
 Number of Spec. 19



4.23 Open Hole Compression 2 Properties

Laminate Open Hole Compression Properties (OHC2) -- (RTD) Strength HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
[in]
0.0072

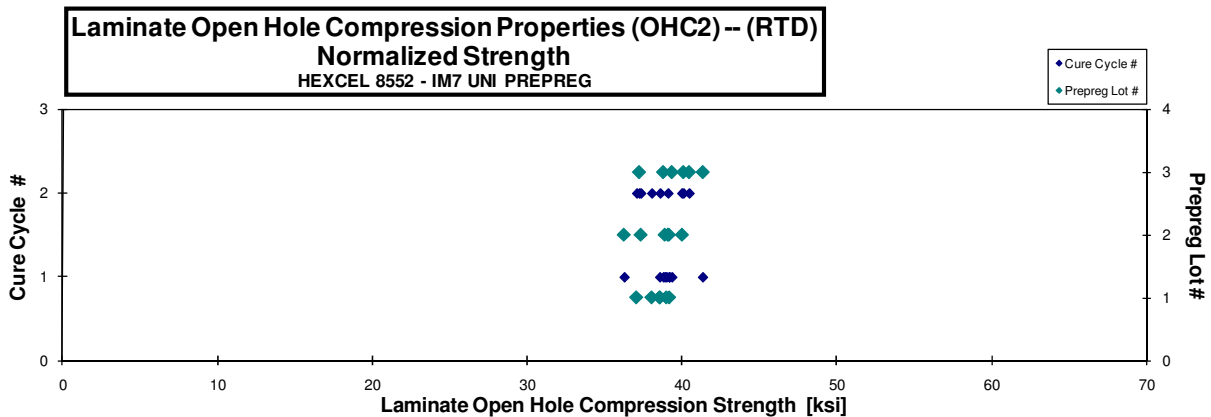
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes
HFIHA111A*	A	M1	1	1				
HFIHA112A	A	M1	1	1	37.632	0.149	20	LGM
HFIHA113A	A	M1	1	1	37.773	0.147	20	AGM / LGM
HFIHA114A	A	M1	1	1	38.392	0.147	20	LGM
HFIHA212A	A	M2	1	2	35.927	0.149	20	LGM
HFIHA213A	A	M2	1	2	37.419	0.146	20	LGM
HFIHA214A	A	M2	1	2	37.776	0.147	20	LGM
HFIHB111A	B	M1	2	1	36.276	0.144	20	LGM
HFIHB112A	B	M1	2	1	39.054	0.143	20	LGM
HFIHB113A	B	M1	2	1	39.284	0.144	20	LGM / AGM
HFIHB212A	B	M2	2	2	39.428	0.143	20	LGM
HFIHB213A	B	M2	2	2	40.133	0.144	20	LGM
HFIHB214A	B	M2	2	2	37.460	0.144	20	LGM
HFIHC111A	C	M1	3	1	39.165	0.143	20	LGM
HFIHC112A	C	M1	3	1	38.456	0.147	20	LGM
HFIHC113A	C	M1	3	1	40.851	0.146	20	LGM
HFIHC212A	C	M2	3	2	37.306	0.144	20	LGM / AGM
HFIHC213A	C	M2	3	2	39.456	0.148	20	LGM
HFIHC214A	C	M2	3	2	39.482	0.146	20	LGM

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0075	38.983
0.0073	38.552
0.0073	39.174
0.0074	37.062
0.0073	38.042
0.0074	38.585
0.0072	36.255
0.0072	38.896
0.0072	39.166
0.0071	39.085
0.0072	39.993
0.0072	37.338
0.0071	38.793
0.0074	39.337
0.0073	41.333
0.0072	37.237
0.0074	40.456
0.0073	40.090

*Data from was removed due to thickness variation due to pinching on edge of panel during bagging.

Average 38.404
Standard Dev. 1.310
Coeff. of Var. [%] 3.412
Min. 35.927
Max. 40.851
Number of Spec. 18

Average_{norm} 0.0073 38.799
Standard Dev._{norm} 1.276
Coeff. of Var. [%]_{norm} 3.290
Min. 0.0071 36.255
Max. 0.0075 41.333
Number of Spec. 18 18



Laminate Open Hole Compression Properties (OHC2) -- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Modes
HFIHA117D	A	M2	1	2	24.954	0.149	20	LGM
HFIHA118D	A	M2	1	2	25.246	0.143	20	LGM
HFIHA119D	A	M2	1	2	25.126	0.148	20	LGM
HFIHA11CD	A	M2	1	2	25.557	0.148	20	LGM
HFIHA217D	A	M2	1	2	25.927	0.148	20	LGM
HFIHA218D	A	M2	1	2	25.139	0.146	20	LGM
HFIHA21AD	A	M2	1	2	26.064	0.148	20	LGM
HFIHB117D	B	M1	2	1	25.576	0.144	20	LGM
HFIHB118D	B	M1	2	1	24.776	0.140	20	LGM
HFIHB119D	B	M1	2	1	25.648	0.144	20	LGM
HFIHB217D	B	M2	2	2	24.900	0.144	20	LGM
HFIHB218D	B	M2	2	2	24.411	0.139	20	LGM
HFIHB219D	B	M2	2	2	26.302	0.145	20	LGM
HFIHC117D	C	M1	3	1	26.780	0.148	20	LGM
HFIHC118D	C	M1	3	1	27.563	0.142	20	LGM
HFIHC11AD	C	M1	3	1	26.133	0.145	20	LGM
HFIHC217D	C	M2	3	2	27.200	0.145	20	LGM
HFIHC218D*	C	M2	3	2	22.243	0.145	20	LGM
HFIHC219D	C	M2	3	2	25.674	0.145	20	LGM
HFIHC21AD	C	M2	3	2	26.151	0.145	20	LGM

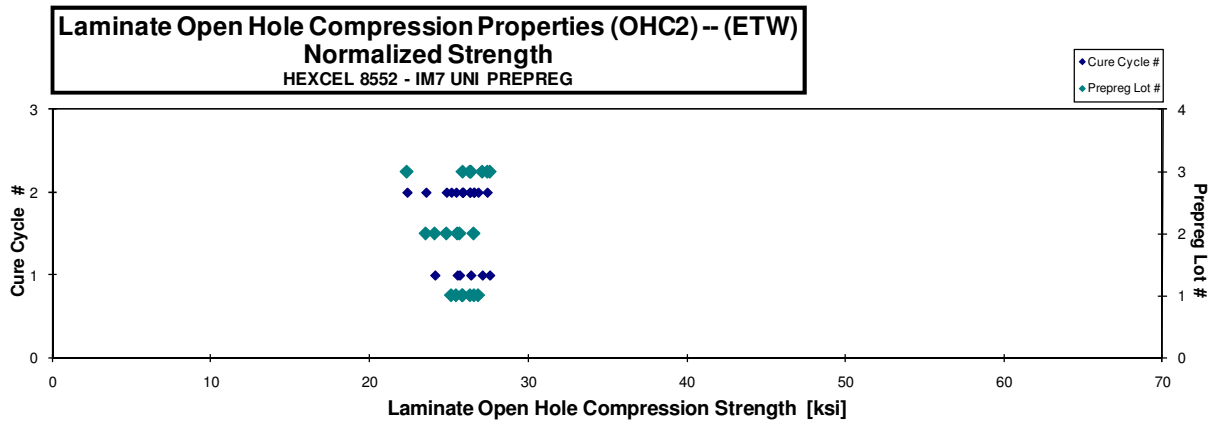
reviewed data and specimens; found no cause for removal

Average 25.568
 Standard Dev. 1.125
 Coeff. of Var. [%] 4.399
 Min. 22.243
 Max. 27.563
 Number of Spec. 20

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0075	25.870
0.0072	25.143
0.0074	25.835
0.0074	26.326
0.0074	26.581
0.0073	25.453
0.0074	26.839
0.0072	25.526
0.0070	24.114
0.0072	25.665
0.0072	24.842
0.0069	23.549
0.0073	26.552
0.0074	27.568
0.0071	27.098
0.0073	26.384
0.0073	27.411
0.0072	22.359
0.0073	25.864
0.0072	26.317

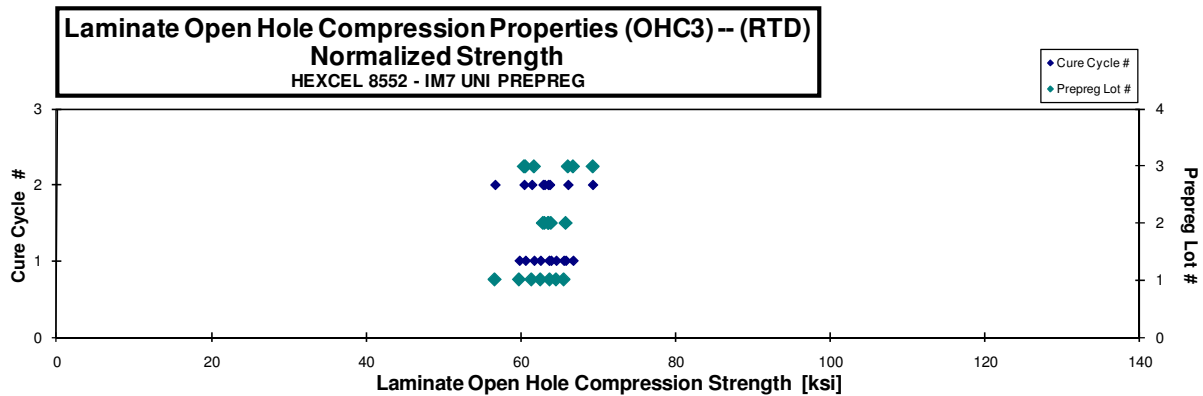
Average_{norm} 0.0073 25.765
 Standard Dev._{norm} 1.295
 Coeff. of Var. [%]_{norm} 5.025
 Min. 0.0069 22.359
 Max. 0.0075 27.568
 Number of Spec. 20 20



4.24 Open Hole Compression 3 Properties

Laminate Open Hole Compression Properties (OHC3) -- (RTD) Strength HEXCEL 8552 - IM7 UNI PREPREG									normalizing t_{ply} [in] 0.0072	
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes	Avg. t_{ply} [in]	Strength _{norm} [ksi]
HFIIA112A	A	M1	1	1	60.942	0.141	20	LGM	0.0071	59.772
HFIIA113A	A	M1	1	1	60.721	0.148	20	LGM	0.0074	62.513
HFIIA114A	A	M1	1	1	64.256	0.147	20	LGM	0.0073	65.520
HFIIA115A	A	M1	1	1	63.061	0.147	20	LGM / AGM	0.0074	64.535
HFIIA211A	A	M2	1	2	59.243	0.138	20	LGM	0.0069	56.631
HFIIA212A	A	M2	1	2	59.063	0.150	20	LGM	0.0075	61.381
HFIIA213A	A	M2	1	2	62.584	0.147	20	LGM	0.0073	63.700
HFII B111A	B	M1	2	1	67.551	0.140	20	LGM	0.0070	65.799
HFII B112A	B	M1	2	1	63.679	0.144	20	AGM	0.0072	63.613
HFII B113A	B	M1	2	1	63.819	0.144	20	LGM	0.0072	63.863
HFII B211A	B	M2	2	2	65.022	0.139	20	LGM	0.0070	62.862
HFII B212A	B	M2	2	2	62.890	0.145	20	LGM	0.0073	63.523
HFII B213A	B	M2	2	2	63.372	0.143	20	LGM	0.0072	63.050
HFII C111A	C	M1	3	1	64.202	0.138	20	LGM	0.0069	61.690
HFII C112A	C	M1	3	1	60.008	0.145	20	LGM	0.0073	60.570
HFII C113A	C	M1	3	1	66.739	0.144	20	LGM	0.0072	66.731
HFII C211A	C	M2	3	2	62.358	0.139	20	LGM	0.0070	60.402
HFII C212A	C	M2	3	2	65.106	0.146	20	LGM	0.0073	66.078
HFII C213A	C	M2	3	2	69.243	0.144	20	LGM	0.0072	69.283

Average	63.361	Average _{norm}	0.0072	63.238
Standard Dev.	2.714	Standard Dev. _{norm}		2.872
Coeff. of Var. [%]	4.284	Coeff. of Var. [%] _{norm}		4.542
Min.	59.063	Min.	0.0069	56.631
Max.	69.243	Max.	0.0075	69.283
Number of Spec.	19	Number of Spec.		19



Laminate Open Hole Compression Properties (OHC3) -- (ETW)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Modes
HFIIA117D	A	M1	1	1	43.892	0.147	20	LGM
HFIIA119D	A	M1	1	1	46.817	0.148	20	LGM
HFIIA11AD	A	M1	1	1	45.668	0.147	20	LGM
HFIIA11BD	A	M1	1	1	47.637	0.147	20	LGM
HFIIA217D	A	M2	1	2	43.825	0.149	20	LGM
HFIIA218D	A	M2	1	2	44.311	0.144	20	LGM
HFIIA219D	A	M2	1	2	46.269	0.148	20	LGM
HFII B117D	B	M1	2	1	50.124	0.145	20	LGM
HFII B118D	B	M1	2	1	45.102	0.143	20	LGM
HFII B119D	B	M1	2	1	48.963	0.147	20	LGM
HFII B217D	B	M2	2	2	44.869	0.145	20	LGM
HFII B218D	B	M2	2	2	45.558	0.142	20	LGM
HFII B21AD	B	M2	2	2	46.396	0.146	20	LGM
HFII C117D	C	M1	3	1	44.907	0.145	20	LGM
HFII C118D	C	M1	3	1	48.614	0.141	20	LGM
HFII C11AD	C	M1	3	1	45.907	0.146	20	LGM
HFII C216D	C	M2	3	2	42.659	0.142	20	LGM
HFII C217D	C	M2	3	2	46.524	0.143	20	LGM
HFII C218D	C	M2	3	2	51.350	0.137	20	LGM
HFII C21AD	C	M2	3	2	44.945	0.143	20	LGM

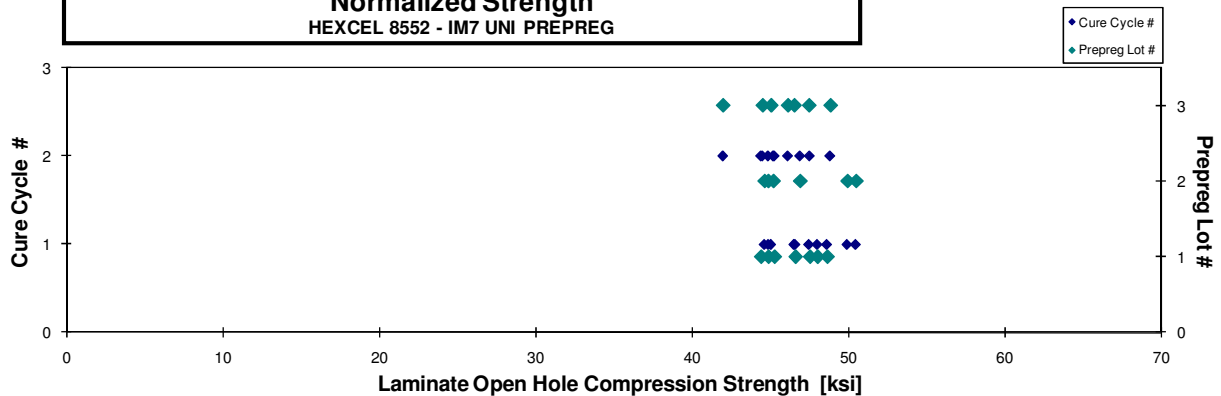
Average 46.217
 Standard Dev. 2.201
 Coeff. of Var. [%] 4.762
 Min. 42.659
 Max. 51.350
 Number of Spec. 20

Average_{norm} 0.0072 46.417
 Standard Dev._{norm} 2.111
 Coeff. of Var. [%]_{norm} 4.548
 Min. 0.0069 42.007
 Max. 0.0074 50.495
 Number of Spec. 20

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0074	44.908
0.0074	48.036
0.0074	46.630
0.0074	48.657
0.0074	45.296
0.0072	44.434
0.0074	47.549
0.0073	50.495
0.0071	44.653
0.0073	49.949
0.0073	45.222
0.0071	44.893
0.0073	46.928
0.0072	45.078
0.0070	47.499
0.0073	46.550
0.0071	42.007
0.0071	46.152
0.0069	48.860
0.0071	44.534

Laminate Open Hole Compression Properties (OHC3) -- (ETW)
Normalized Strength
 HEXCEL 8552 - IM7 UNI PREPREG



4.25 Filled-Hole Compression 1 Properties

Laminate Filled-Hole Compression Properties (FHC1) -- (RTD)
Strength
 HEXCEL 8552 - IM7 UNI PREPREG

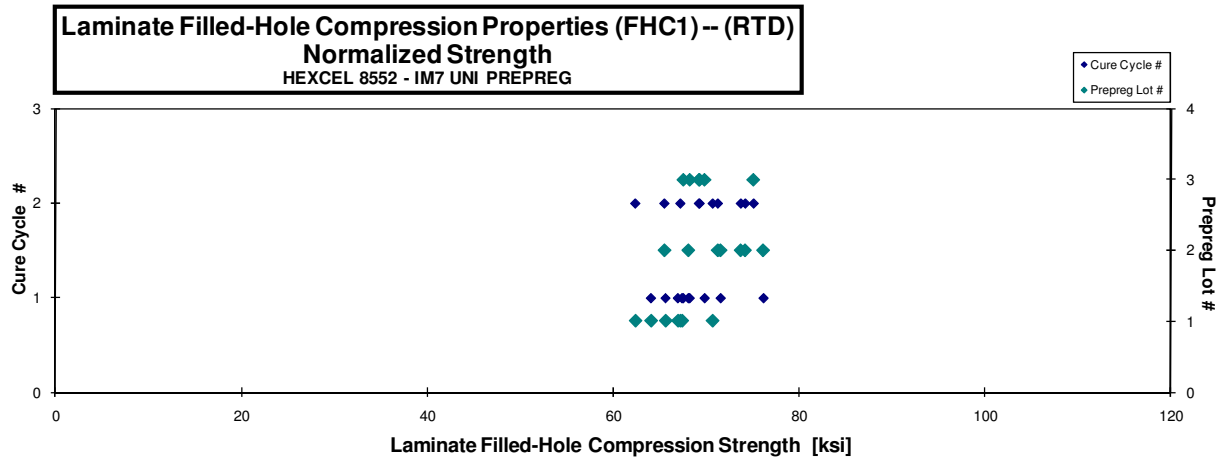
normalizing t_{ply}
 [in]
 0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Failure Mode
HF17A111A	A	M1	1	1	65.463	0.177	24	LGF
HF17A112A	A	M1	1	1	62.442	0.177	24	MGM
HF17A113A	A	M1	1	1	64.338	0.176	24	MGF
HF17A116A	A	M1	1	1	65.893	0.177	24	MGF
HF17A211A	A	M2	1	2	63.946	0.168	24	MGF
HF17A212A	A	M2	1	2	66.211	0.175	24	MGF
HF17A213A	A	M2	1	2	70.538	0.173	24	MGF
HF17B112A	B	M1	2	1	76.196	0.173	24	MGF
HF17B113A	B	M1	2	1	72.336	0.171	24	MGF
HF17B114A	B	M1	2	1	68.620	0.171	24	MGF
HF17B211A	B	M2	2	2	68.994	0.164	24	MGF
HF17B212A	B	M2	2	2	72.258	0.176	24	MGF
HF17B213A	B	M2	2	2	71.491	0.172	24	MGF
HF17B214A	B	M2	2	2	74.418	0.172	24	MGF
HF17C111A	C	M1	3	1	69.807	0.169	24	LGF
HF17C112A	C	M1	3	1	67.037	0.174	24	MGF
HF17C113A	C	M1	3	1	70.097	0.172	24	MGM
HF17C211A	C	M2	3	2	71.561	0.167	24	MGF
HF17C213A	C	M2	3	2	75.282	0.172	24	MGF
HF17C214A	C	M2	3	2	69.069	0.173	24	LGF

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0074	66.953
0.0074	64.032
0.0073	65.610
0.0074	67.393
0.0070	62.343
0.0073	67.201
0.0072	70.695
0.0072	76.167
0.0071	71.555
0.0071	68.064
0.0068	65.481
0.0073	73.728
0.0072	71.250
0.0072	74.210
0.0070	68.218
0.0073	67.515
0.0072	69.820
0.0070	69.277
0.0072	75.100
0.0072	69.222

Average 69.300
 Standard Dev. 3.851
 Coeff. of Var. [%] 5.557
 Min. 62.442
 Max. 76.196
 Number of Spec. 20

Average_{norm} 0.0072 69.192
 Standard Dev._{norm} 3.693
 Coeff. of Var. [%]_{norm} 5.338
 Min. 0.0068 62.343
 Max. 0.0074 76.167
 Number of Spec. 20 20



**Laminate Filled-Hole Compression Properties (FHC1) -- (ETW)
Strength**
HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
HF17A117D	A	M1	1	1	52.767	0.179	24	LGM
HF17A118D	A	M1	1	1	51.092	0.167	24	LGM
HF17A119D	A	M1	1	1	50.055	0.178	24	LGM
HF17A11AD	A	M1	1	1	48.041	0.178	24	LGM
HF17A216D	A	M2	1	2	49.903	0.173	24	LGM
HF17A218D	A	M2	1	2	48.614	0.170	24	LGM
HF17A219D	A	M2	1	2	47.933	0.176	24	LGM
HF17B116D	B	M1	2	1	54.567	0.171	24	LGM
HF17B117D	B	M1	2	1	51.569	0.173	24	LGM
HF17B119D	B	M1	2	1	51.627	0.171	24	LGM
HF17B216D	B	M2	2	2	53.877	0.172	24	LGM
HF17B217D	B	M2	2	2	51.456	0.174	24	LGM
HF17B21AD	B	M2	2	2	51.286	0.163	24	LGM
HF17C116D	C	M1	3	1	51.701	0.172	24	LGM, LGF
HF17C119D	C	M1	3	1	52.987	0.175	24	LGM, LGF
HF17C11AD	C	M1	3	1	53.041	0.172	24	LGM
HF17C217D	C	M2	3	2	53.076	0.174	24	LGM
HF17C218D	C	M2	3	2	52.625	0.174	24	LGM, LGO
HF17C21AD	C	M2	3	2	54.428	0.177	24	LGM

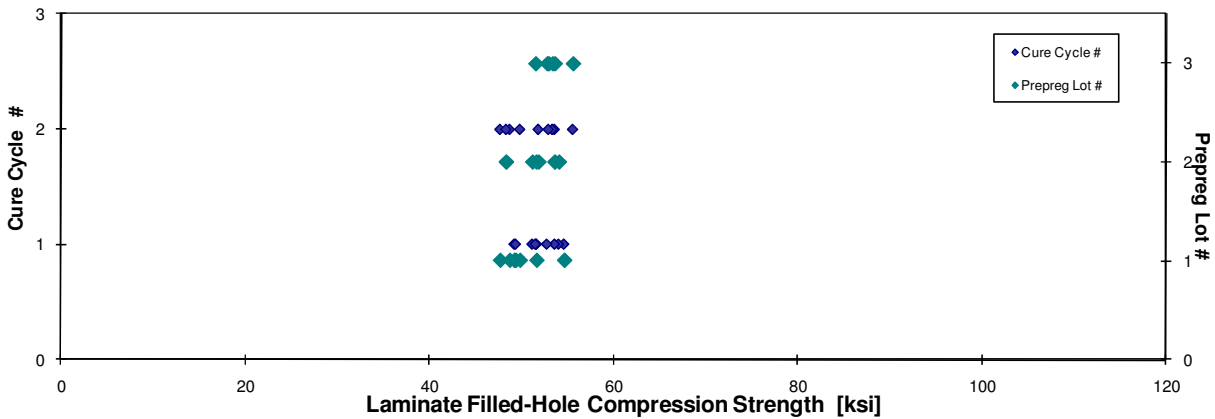
normalizing t_{ply}
[in]
0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.007	54.645
0.007	49.254
0.007	51.653
0.007	49.389
0.007	49.855
0.007	47.705
0.007	48.742
0.007	54.067
0.007	51.623
0.007	51.204
0.007	53.612
0.007	51.863
0.007	48.352
0.007	51.546
0.007	53.631
0.007	52.790
0.007	53.393
0.007	52.965
0.007	55.604

Average 51.613
Standard Dev. 1.990
Coeff. of Var. [%] 3.855
Min. 47.933
Max. 54.567
Number of Spec. 19

Average_{norm} 0.0072 51.679
Standard Dev._{norm} 2.279
Coeff. of Var. [%]_{norm} 4.410
Min. 0.0068 47.705
Max. 0.0075 55.604
Number of Spec. 19 19

**Laminate Filled-Hole Compression Properties (FHC1) -- (ETW)
Normalized Strength**
HEXCEL 8552 - IM7 UNI PREPREG



4.26 Filled-Hole Compression 2 Properties

Laminate Filled-Hole Compression Properties (FHC2) -- (RTD) Strength HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Failure Mode
HF18A111A	A	M1	1	1	52.194	0.141	20	MGF
HF18A112A	A	M1	1	1	56.130	0.148	20	MGF
HF18A113A	A	M1	1	1	56.315	0.146	20	MGF
HF18A114A	A	M1	1	1	54.064	0.147	20	MGF
HF18A212A	A	M2	1	2	55.486	0.147	20	LGF
HF18A213A	A	M2	1	2	53.907	0.146	20	AGM
HF18A214A	A	M2	1	2	54.713	0.147	20	MGF
HF18B111A	B	M1	2	1	51.968	0.140	20	AGM
HF18B112A	B	M1	2	1	53.821	0.146	20	MGF
HF18B113A	B	M1	2	1	56.128	0.144	20	MGF
HF18B211A	B	M2	2	2	54.346	0.142	20	MGF
HF18B212A	B	M2	2	2	50.572	0.144	20	LGM
HF18B213A	B	M2	2	2	53.535	0.144	20	AGM
HF18C111A	C	M1	3	1	54.090	0.144	20	MGF
HF18C112A	C	M1	3	1	53.683	0.144	20	MGF
HF18C113A	C	M1	3	1	57.536	0.144	20	MGF
HF18C211A	C	M2	3	2	52.267	0.144	20	LGF
HF18C215A	C	M2	3	2	55.097	0.146	20	MGF
HF18C216A	C	M2	3	2	54.892	0.146	20	MGF

Note: HF18A211A was not included due to bad failure.

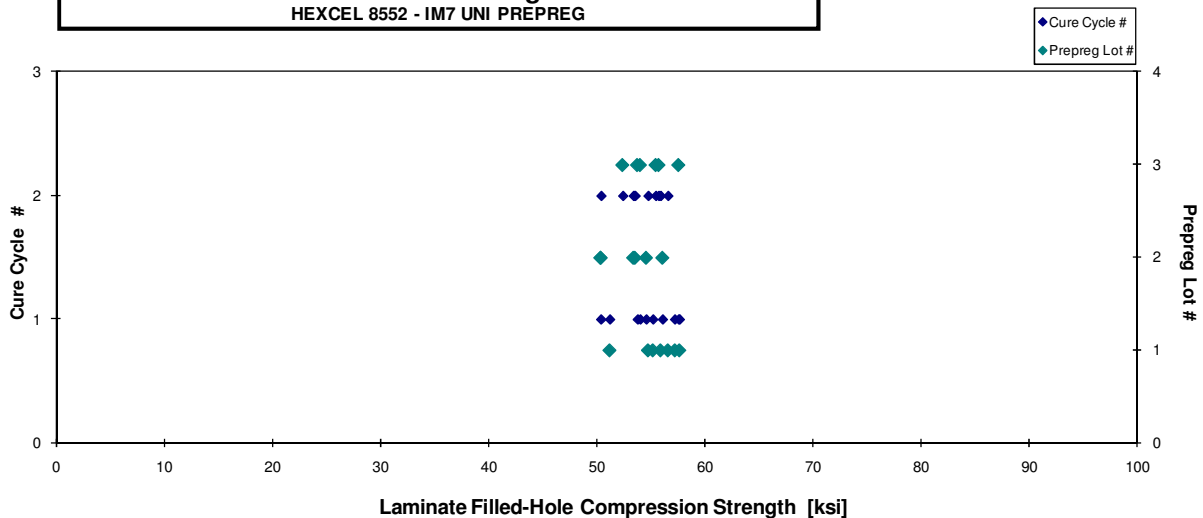
Average 54.250
 Standard Dev. 1.717
 Coeff. of Var. [%] 3.166
 Min. 50.572
 Max. 57.536
 Number of Spec. 19

Average_{norm} 0.0072 54.566
 Standard Dev._{norm} 2.252
 Coeff. of Var. [%]_{norm} 4.127
 Min. 0.0070 50.410
 Max. 0.0074 57.708
 Number of Spec. 19 19

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0071	51.240
0.0074	57.708
0.0073	57.279
0.0074	55.241
0.0074	56.649
0.0073	54.812
0.0074	55.967
0.0070	50.410
0.0073	54.612
0.0072	56.147
0.0071	53.591
0.0072	50.426
0.0072	53.448
0.0072	54.059
0.0072	53.807
0.0072	57.623
0.0072	52.442
0.0073	55.792
0.0073	55.502

Laminate Filled-Hole Compression Properties (FHC2) -- (RTD) Normalized Strength HEXCEL 8552 - IM7 UNI PREPREG



Laminate Filled-Hole Compression Properties (FHC2) -- (ETW) Strength

HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
[in]

0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode
HF18A11AD	A	M1	1	1	42.022	0.148	20	LGM
HF18A11BD	A	M1	1	1	43.199	0.146	20	LGM
HF18A11CD	A	M1	1	1	43.160	0.147	20	LGM,LGO
HF18A11DD	A	M1	1	1	40.875	0.147	20	LGM
HF18A217D	A	M2	1	2	40.631	0.148	20	LGM
HF18A218D	A	M2	1	2	41.624	0.141	20	LGM
HF18A219D	A	M2	1	2	41.044	0.148	20	LGM
HF18B116D	B	M1	2	1	40.181	0.144	20	LGM
HF18B117D	B	M1	2	1	39.512	0.145	20	LGM
HF18B118D	B	M1	2	1	38.952	0.143	20	LGM
HF18B217D	B	M2	2	2	37.862	0.142	20	LGM
HF18B218D	B	M2	2	2	39.184	0.144	20	LGM
HF18B219D	B	M2	2	2	39.181	0.144	20	LGM
HF18C117D	C	M1	3	1	42.391	0.144	20	AGM,LGM
HF18C118D	C	M1	3	1	42.392	0.145	20	AGM,LGM
HF18C119D	C	M1	3	1	40.212	0.144	20	LGM
HF18C217D	C	M2	3	2	40.523	0.145	20	LGM
HF18C218D	C	M2	3	2	41.263	0.146	20	LGM
HF18C219D	C	M2	3	2	42.118	0.145	20	LGM

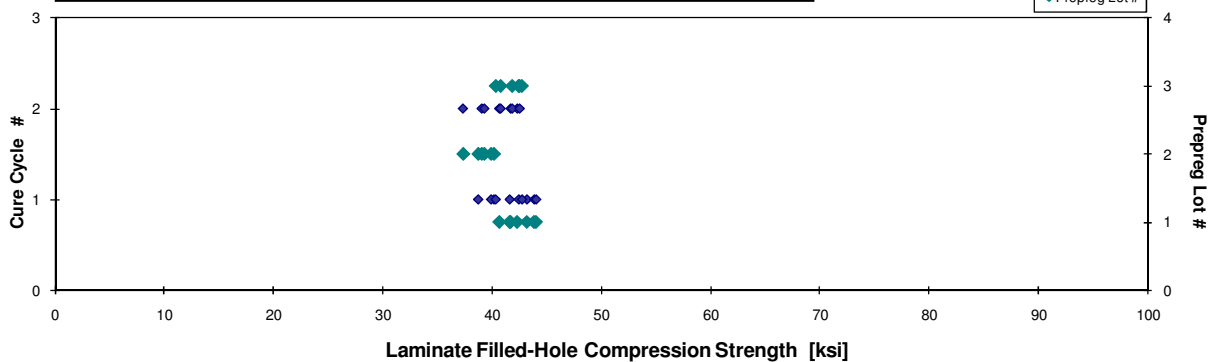
Avg. t_{ply} [in]	Strength _{norm} [ksi]
0.0074	43.160
0.0073	43.809
0.0073	43.994
0.0073	41.594
0.0074	41.670
0.0070	40.646
0.0074	42.279
0.0072	40.167
0.0073	39.906
0.0072	38.736
0.0071	37.358
0.0072	39.052
0.0072	39.290
0.0072	42.411
0.0073	42.711
0.0072	40.324
0.0072	40.763
0.0073	41.826
0.0073	42.493

Average 40.859
Standard Dev. 1.496
Coeff. of Var. [%] 3.661
Min. 37.862
Max. 43.199
Number of Spec. 19

Average_{norm} 0.0073 41.168
Standard Dev._{norm} 1.809
Coeff. of Var. [%]_{norm} 4.394
Min. 0.0070 37.358
Max. 0.0074 43.994
Number of Spec. 19

Laminate Filled-Hole Compression Properties (FHC2) -- (ETW) Normalized Strength

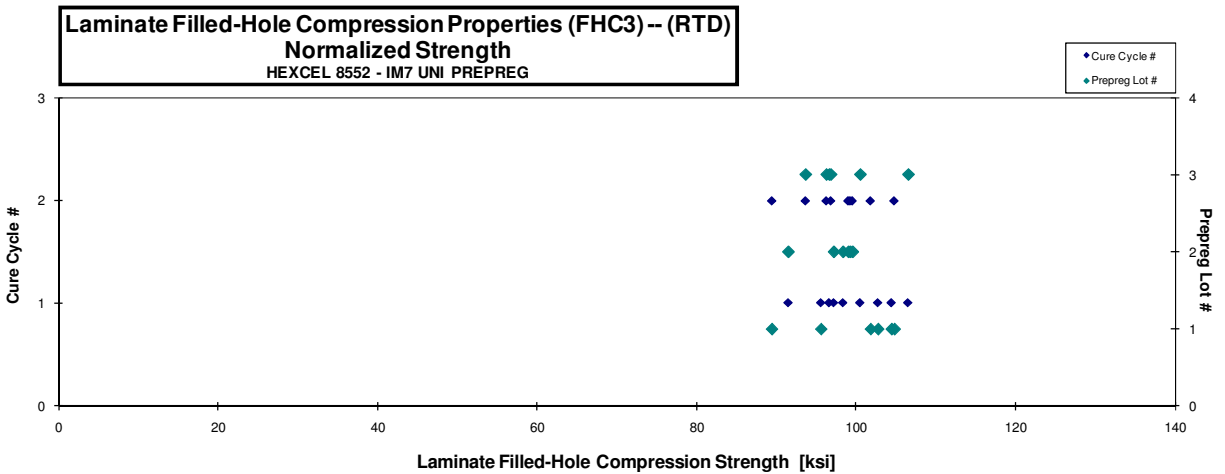
HEXCEL 8552 - IM7 UNI PREPREG



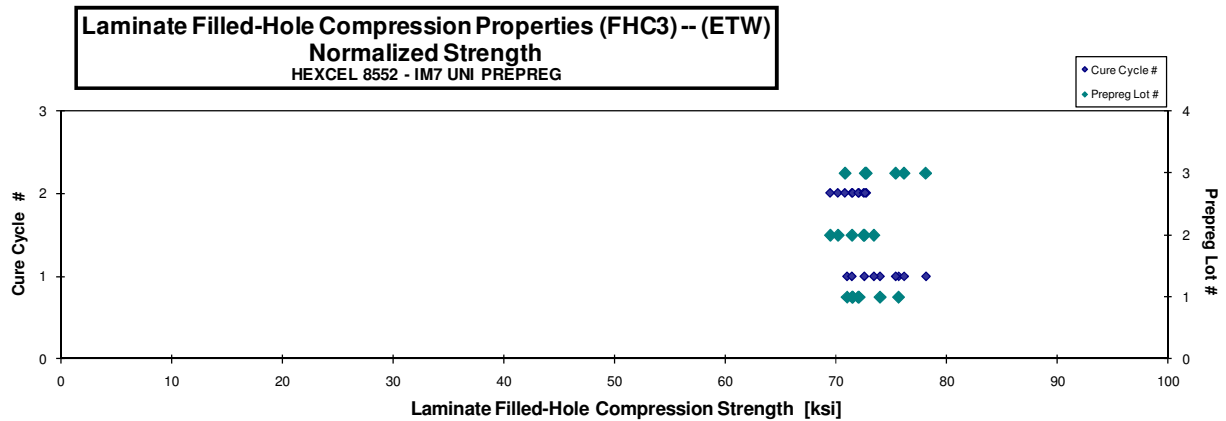
4.27 Filled-Hole Compression 3 Properties

Laminate Filled-Hole Compression Properties (FHC3) -- (RTD) Strength HEXCEL 8552 - IM7 UNI PREPREG									normalizing t_{ply} [in] 0.0072	
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]
HF19A113A	A	M1	1	1	100.899	0.147	20	MGF	0.0073	102.756
HF19A114A	A	M1	1	1	102.545	0.147	20	MGF	0.0073	104.456
HF19A115A	A	M1	1	1	93.040	0.148	20	MGF	0.0074	95.603
HF19A212A	A	M2	1	2	98.641	0.149	20	MGF	0.0074	101.826
HF19A213A	A	M2	1	2	102.738	0.147	20	MGF	0.0073	104.807
HF19A215A	A	M2	1	2	87.810	0.147	20	MGF	0.0073	89.446
HF19B111A	B	M1	2	1	94.763	0.139	20	MGF	0.0070	91.494
HF19B112A	B	M1	2	1	96.989	0.144	20	MGF	0.0072	97.202
HF19B113A	B	M1	2	1	99.323	0.143	20	MGF	0.0071	98.369
HF19B211A	B	M2	2	2	101.931	0.140	20	MGF	0.0070	99.264
HF19B212A	B	M2	2	2	99.865	0.143	20	MGF	0.0071	99.033
HF19B215A	B	M2	2	2	100.124	0.143	20	MGF	0.0072	99.556
HF19C111A	C	M1	3	1	99.109	0.140	20	MGF	0.0070	96.631
HF19C112A	C	M1	3	1	104.248	0.147	20	MGF	0.0074	106.541
HF19C113A	C	M1	3	1	100.123	0.145	20	MGF	0.0072	100.517
HF19C213A	C	M2	3	2	95.335	0.145	20	MGF	0.0073	96.284
HF19C214A	C	M2	3	2	92.969	0.145	20	LGF	0.0073	93.668
HF19C215A	C	M2	3	2	96.374	0.145	20	MGF	0.0072	96.843

Average	98.157	Average _{norm}	0.0072	98.572
Standard Dev.	4.176	Standard Dev _{norm}		4.542
Coeff. of Var. [%]	4.254	Coeff. of Var. [%] _{norm}		4.608
Min.	87.810	Min.	0.0070	89.446
Max.	104.248	Max.	0.0074	106.541
Number of Spec.	18	Number of Spec.		18

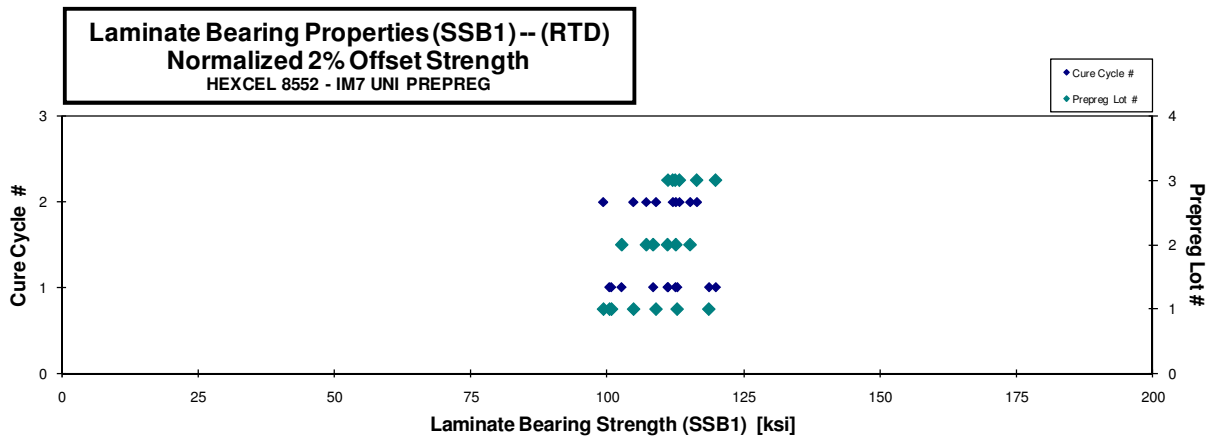


Laminate Filled-Hole Compression Properties (FHC3) -- (ETW) Strength HEXCEL 8552 - IM7 UNI PREPREG									normalizing t_{ply} [in] 0.0072	
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]
HF19A117D	A	M1	1	1	69.224	0.148	20	LGM	0.0074	70.995
HF19A118D	A	M1	1	1	74.689	0.146	20	LGM	0.0073	75.648
HF19A11AD	A	M1	1	1	71.517	0.149	20	LGM	0.0074	73.976
HF19A11CD	A	M1	1	2	70.467	0.146	20	LGM	0.0073	71.446
HF19A216D	A	M2	1	2	70.881	0.146	20	LGM	0.0073	72.070
HF19A217D	A	M2	1	2	71.904	0.143	20	LGM	0.0072	71.505
HF19A218D	A	M2	1	2	70.754	0.147	20	LGM	0.0073	72.006
HF19B116D	B	M1	2	1	71.675	0.144	20	LGM	0.0072	71.435
HF19B117D	B	M1	2	1	72.240	0.145	20	LGM	0.0072	72.558
HF19B11AD	B	M1	2	1	73.884	0.143	20	LGM	0.0072	73.413
HF19B217D	B	M2	2	2	73.508	0.142	20	LGM	0.0071	72.487
HF19B218D	B	M2	2	2	69.873	0.145	20	LGM	0.0072	70.181
HF19B219D	B	M2	2	2	69.943	0.143	20	LGM	0.0072	69.474
HF19C116D	C	M1	3	1	77.225	0.146	20	LGM	0.0073	78.092
HF19C117D	C	M1	3	1	74.844	0.146	20	LGM	0.0073	76.134
HF19C118D	C	M1	3	1	75.632	0.144	20	LGM	0.0072	75.378
HF19C217D	C	M2	3	2	72.003	0.145	20	LGM	0.0073	72.728
HF19C218D	C	M2	3	2	72.482	0.144	20	LGM	0.0072	72.624
HF19C219D	C	M2	3	2	68.986	0.148	20	LGM	0.0074	70.806
Average					72.196	Average _{norm}			0.0073	72.787
Standard Dev.					2.264	Standard Dev _{norm}				2.205
Coeff. of Var. [%]					3.135	Coeff. of Var. [%] _{norm}				3.029
Min.					68.986	Min.			0.0071	69.474
Max.					77.225	Max.			0.0074	78.092
Number of Spec.					19	Number of Spec.			19	19



4.28 Single Shear Bearing 1 Properties

Laminate Bearing Properties (SSB1) -- (RTD) Strength & Modulus HEXCEL 8552 - IM7 UNI PREPREG								normalizing t_{ply} [in] 0.0072		
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Comments	Avg. t_{ply} [in]	2% Strength _{norm} [ksi]
HF11A112A	A	M1	1	1	106.298	0.109	16	B11 / 2% OFFSET FOR UBS*	0.0068	100.423
HF11A113A	A	M1	1	1	107.274	0.108	16	B11 / 2% OFFSET FOR UBS*	0.0068	100.771
HF11A114A	A	M1	1	1	111.618	0.116	16	B11 / 2% OFFSET FOR UBS*	0.0073	112.829
HF11A115A	A	M1	1	1	116.831	0.117	16	B11 / 2% OFFSET FOR UBS*	0.0073	118.623
HF11A211A	A	M2	1	2	107.034	0.107	16	B11 / 2% OFFSET FOR UBS*	0.0067	99.307
HF11A212A	A	M2	1	2	112.704	0.111	16	B11 / 2% OFFSET FOR UBS*	0.0070	108.953
HF11A213A	A	M2	1	2	107.280	0.113	16	B11 / 2% OFFSET FOR UBS*	0.007	104.812
HF11B111A	B	M1	2	1	111.703	0.106	16	B11 / 2% OFFSET FOR UBS*	0.007	102.653
HF11B112A	B	M1	2	1	112.467	0.111	16	B11 / 2% OFFSET FOR UBS*	0.0069	108.431
HF11B113A	B	M1	2	1	115.988	0.110	16	B11 / 2% OFFSET FOR UBS*	0.0069	111.055
HF11B211A	B	M2	2	2	118.291	0.112	16	B11 / 2% OFFSET FOR UBS*	0.0070	115.193
HF11B212A	B	M2	2	2	114.477	0.113	16	B11 / 2% OFFSET FOR UBS*	0.0071	112.572
HF11B213A	B	M2	2	2	109.247	0.113	16	B11 / 2% OFFSET FOR UBS*	0.0071	107.161
HF11C111A	C	M1	3	1	117.118	0.111	16	B11 / 2% OFFSET FOR UBS*	0.0069	112.475
HF11C112A	C	M1	3	1	113.824	0.112	16	B11 / 2% OFFSET FOR UBS*	0.0070	111.140
HF11C113A	C	M1	3	1	118.980	0.116	16	B11 / 2% OFFSET FOR UBS*	0.0073	119.858
HF11C211A	C	M2	3	2	116.861	0.110	16	B11 / 2% OFFSET FOR UBS*	0.0069	112.008
HF11C212A	C	M2	3	2	113.651	0.118	16	B11 / 2% OFFSET FOR UBS*	0.0074	116.413
HF11C213A	C	M2	3	2	114.993	0.113	16	B11 / 2% OFFSET FOR UBS*	0.0071	113.229
Ultimate Bearing Strength / B11: B:Bearing, 1:first hole, t: inapplicable (not on bolt, nut or head side)										
*Ultimate Strength not obtained										
Average					112.981	Average _{norm} 0.0070 109.890				
Standard Dev.					4.018	Standard Dev. _{norm} 6.059				
Coeff. of Var. [%]					3.556	Coeff. of Var. [%] _{norm} 5.514				
Min.					106.298	Min. 0.0066 99.307				
Max.					118.980	Max. 0.0074 119.858				
Number of Spec.					19	Number of Spec. 19 19				



Laminate Bearing Properties (SSB1)-- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Comments
HF11A117D	A	M1	1	1	92.906	0.114	16	B11/ 2% OFFSET FOR UBS*
HF11A118D	A	M1	1	1	86.483	0.115	16	B11/ 2% OFFSET FOR UBS*
HF11A119D	A	M1	1	1	94.390	0.116	16	B11/ 2% OFFSET FOR UBS*
HF11A11AD	A	M1	1	1	94.925	0.117	16	B11/ 2% OFFSET FOR UBS*
HF11A217D	A	M2	1	2	95.782	0.115	16	B11/ 2% OFFSET FOR UBS*
HF11A218D	A	M2	1	2	99.813	0.117	16	B11/ 2% OFFSET FOR UBS*
HF11A219D	A	M2	1	2	92.654	0.117	16	B11/ 2% OFFSET FOR UBS*
HF11B116D	B	M1	2	1	96.354	0.111	16	B11/ 2% OFFSET FOR UBS*
HF11B117D	B	M1	2	1	98.015	0.109	16	B11/ 2% OFFSET FOR UBS*
HF11B118D	B	M1	2	1	96.256	0.111	16	B11/ 2% OFFSET FOR UBS*
HF11B119D	B	M1	2	1	75.485	0.117	16	B11/ 2% OFFSET FOR UBS*
HF11B216D	B	M2	2	2	95.780	0.117	16	B11/ 2% OFFSET FOR UBS*
HF11B217D	B	M2	2	2	79.089	0.111	16	B11/ 2% OFFSET FOR UBS*
HF11B219D	B	M2	2	2	77.542	0.118	16	B11/ 2% OFFSET FOR UBS*
HF11B21AD	B	M2	2	2	68.615	0.116	16	B11/ 2% OFFSET FOR UBS*
HF11C116D	C	M1	3	1	95.379	0.112	16	B11/ 2% OFFSET FOR UBS*
HF11C117D	C	M1	3	1	83.578	0.103	16	B11/ 2% OFFSET FOR UBS*
HF11C118D	C	M1	3	1	94.145	0.106	16	B11/ 2% OFFSET FOR UBS*
HF11C216D	C	M2	3	2	88.240	0.118	16	B11/ 2% OFFSET FOR UBS*
HF11C217D	C	M2	3	2	86.389	0.103	16	B11/ 2% OFFSET FOR UBS*
HF11C218D	C	M2	3	2	95.743	0.111	16	B11/ 2% OFFSET FOR UBS*

*Ultimate Strength not obtained

Average 89.884
 Standard Dev. 8.534
 Coeff. of Var. [%] 9.495
 Min. 68.615
 Max. 99.813
 Number of Spec. 21.000

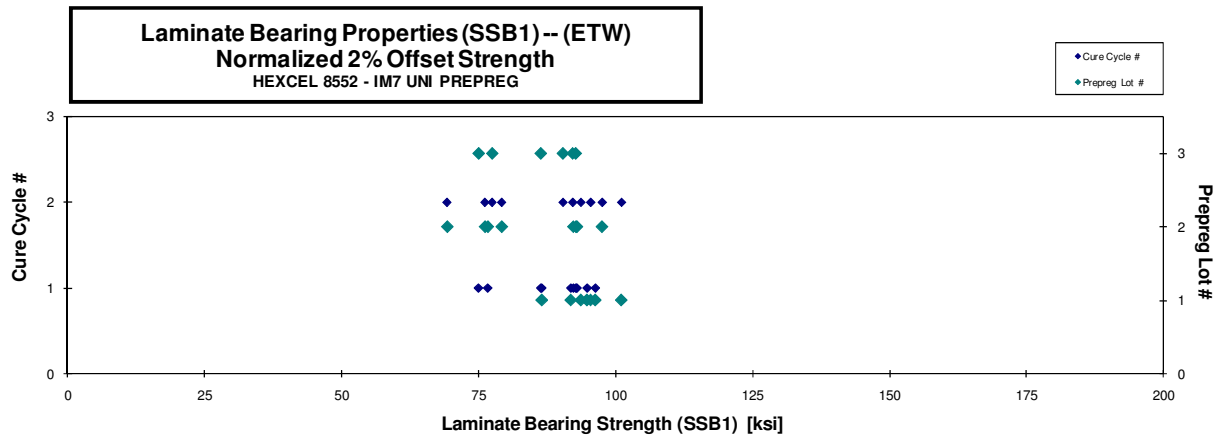
normalizing t_{ply}

[in]

0.0072

Avg. t_{ply} [in]	2% Strength _{norm} [ksi]
0.0071	91.858
0.0072	86.520
0.0072	94.827
0.0073	96.339
0.0072	95.491
0.0073	101.128
0.007	93.699
0.0069	92.813
0.0068	92.329
0.0070	92.997
0.0073	76.642
0.0073	97.595
0.0069	76.125
0.0074	79.191
0.0073	69.191
0.0070	92.771
0.0065	74.945
0.0066	86.354
0.0074	90.423
0.0065	77.440
0.0069	92.211

Average_{norm} 0.0071 88.138
 Standard Dev_{norm} 8.903
 Coeff. of Var. [%]_{norm} 10.101
 Min. 0.0065 69.191
 Max. 0.0074 101.128
 Number of Spec. 21 21



4.29 Single Shear Bearing 2 Properties

Laminate Bearing Properties (SSB2) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
 [in]
 0.0072

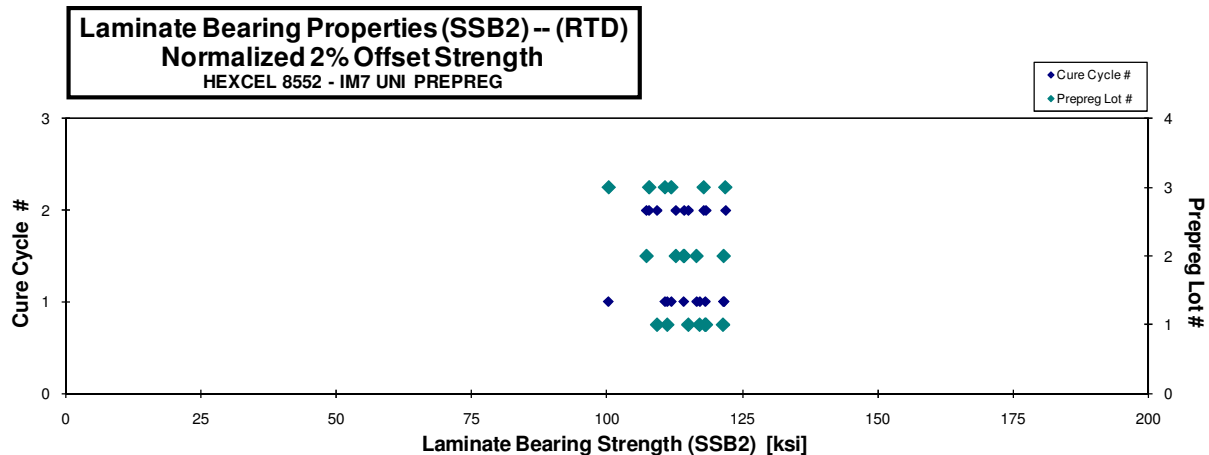
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Comments
HF12A111A	A	M1	1	1	109.784	0.146	20	B11 / 2% OFFSET FOR UBS*
HF12A113A	A	M1	1	1	115.844	0.146	20	B11 / 2% OFFSET FOR UBS*
HF12A114A	A	M1	1	1	119.732	0.146	20	B11 / 2% OFFSET FOR UBS*
HF12A115A	A	M1	1	1	116.225	0.146	20	B11 / 2% OFFSET FOR UBS*
HF12A212A	A	M2	1	2	107.330	0.147	20	B11 / 2% OFFSET FOR UBS*
HF12A213A	A	M2	1	2	113.680	0.146	20	B11 / 2% OFFSET FOR UBS*
HF12A214A	A	M2	1	2	116.978	0.146	20	B11 / 2% OFFSET FOR UBS*
HF12B111A	B	M1	2	1	122.564	0.143	20	B11 / 2% OFFSET FOR UBS*
HF12B112A	B	M1	2	1	113.243	0.145	20	B11 / 2% OFFSET FOR UBS*
HF12B113A	B	M1	2	1	117.116	0.143	20	B11 / 2% OFFSET FOR UBS*
HF12B212A	B	M2	2	2	111.830	0.145	20	B11 / 2% OFFSET FOR UBS*
HF12B213A	B	M2	2	2	114.749	0.143	20	B11 / 2% OFFSET FOR UBS*
HF12B215A	B	M2	2	2	109.087	0.142	20	B11 / 2% OFFSET FOR UBS*
HF12C111A	C	M1	3	1	104.420	0.138	20	B11 / 2% OFFSET FOR UBS*
HF12C112A	C	M1	3	1	114.777	0.139	20	B11 / 2% OFFSET FOR UBS*
HF12C113A	C	M1	3	1	115.248	0.140	20	B11 / 2% OFFSET FOR UBS*
HF12C211A	C	M2	3	2	111.985	0.139	20	B11 / 2% OFFSET FOR UBS*
HF12C212A	C	M2	3	2	118.646	0.148	20	B11 / 2% OFFSET FOR UBS*
HF12C213A	C	M2	3	2	116.496	0.146	20	B11 / 2% OFFSET FOR UBS*

Avg. t_{ply} [in]	2% Strength _{norm} [ksi]
0.0073	111.093
0.0073	117.051
0.0073	121.381
0.0073	118.068
0.0073	109.231
0.0073	114.969
0.0073	118.210
0.0071	121.500
0.0073	114.108
0.0072	116.492
0.0073	112.672
0.0072	114.205
0.0071	107.269
0.0069	100.298
0.0069	110.659
0.0070	111.833
0.0069	107.760
0.0074	121.805
0.0073	117.804

Ultimate Bearing Strength / B11:
 B: Bearing, 1: first hole, t: inapplicable
 (not on bolt, nut or head side)

Average 114.197
 Standard Dev. 4.413
 Coeff. of Var. [%] 3.865
 Min. 104.420
 Max. 122.564
 Number of Spec. 19

Average_{norm} 0.0072 114.021
 Standard Dev._{norm} 5.566
 Coeff. of Var. [%]_{norm} 4.882
 Min. 0.0069 100.298
 Max. 0.0074 121.805
 Number of Spec. 19



Laminate Bearing Properties (SSB2) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Comments
HF12A118D	A	M1	1	1	92.682	0.147	20	B11/ 2% OFFSET FOR UBS*
HF12A119D	A	M1	1	1	81.650	0.139	20	B11/ 2% OFFSET FOR UBS*
HF12A11AD	A	M1	1	1	91.223	0.140	20	B11/ 2% OFFSET FOR UBS*
HF12A11BD	A	M1	1	1	97.233	0.140	20	B11/ 2% OFFSET FOR UBS*
HF12A216D	A	M2	1	2	88.887	0.148	20	B11/ 2% OFFSET FOR UBS*
HF12A218D	A	M2	1	2	77.484	0.146	20	B11/ 2% OFFSET FOR UBS*
HF12A219D	A	M2	1	2	92.381	0.145	20	B11/ 2% OFFSET FOR UBS*
HF12B115D	B	M1	2	1	89.332	0.144	20	B11/ 2% OFFSET FOR UBS*
HF12B116D	B	M1	2	1	86.144	0.137	20	B11/ 2% OFFSET FOR UBS*
HF12B117D	B	M1	2	1	91.640	0.144	20	B11/ 2% OFFSET FOR UBS*
HF12B216D	B	M2	2	2	82.833	0.145	20	B11/ 2% OFFSET FOR UBS*
HF12B217D	B	M2	2	2	86.520	0.137	20	B11/ 2% OFFSET FOR UBS*
HF12B21AD	B	M2	2	2	90.471	0.144	20	B11/ 2% OFFSET FOR UBS*
HF12C116D	C	M1	3	1	83.364	0.148	20	B11/ 2% OFFSET FOR UBS*
HF12C118D	C	M1	3	1	77.965	0.146	20	B11/ 2% OFFSET FOR UBS*
HF12C119D	C	M1	3	1	79.807	0.146	20	B11/ 2% OFFSET FOR UBS*
HF12C216D	C	M2	3	2	84.712	0.142	20	B11/ 2% OFFSET FOR UBS*
HF12C217D	C	M2	3	2	86.483	0.135	20	B11/ 2% OFFSET FOR UBS*
HF12C218D	C	M2	3	2	89.800	0.146	20	B11/ 2% OFFSET FOR UBS*

Ultimate Bearing Strength / B11:
 B: Bearing, 1: first hole, i: inapplicable
 (not on bolt, nut or head side)

normalizing t_{ply}
 [in]

0.0072

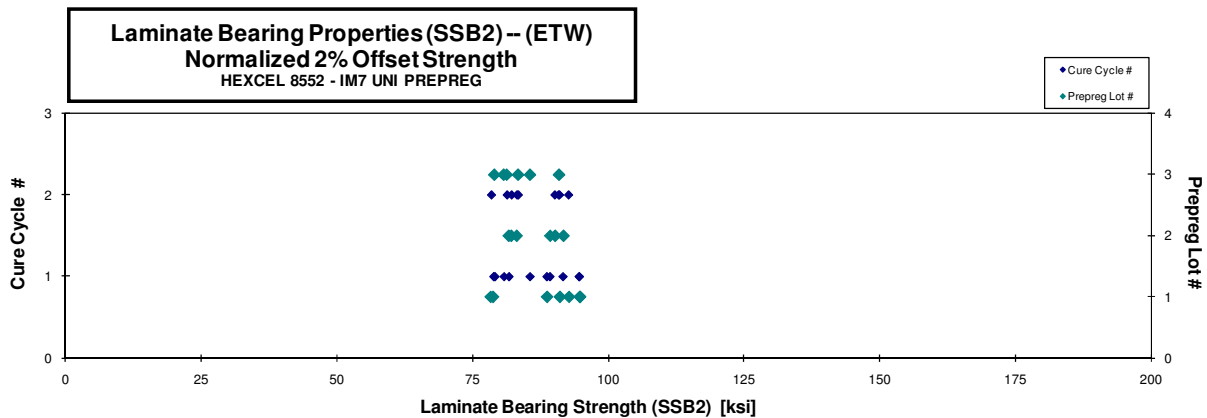
Avg. t_{ply} [in]	2% Strength _{norm} [ksi]
0.0074	94.731
0.0070	78.815
0.0070	88.700
0.0070	94.701
0.0074	91.047
0.0073	78.398
0.0072	92.734
0.0072	89.270
0.0068	81.678
0.0072	91.704
0.0072	83.149
0.0068	82.154
0.0072	90.178
0.0074	85.574
0.0073	79.048
0.0073	80.758
0.0071	83.399
0.0068	81.318
0.0073	90.881

Average 86.874
 Standard Dev. 5.393
 Coeff. of Var. [%] 6.208
 Min. 77.484
 Max. 97.233
 Number of Spec. 19

Average
 Standard Dev.
 Coeff. of Var. [%]
 Min.
 Max.
 Number of Spec.

Average_{norm} 0.0071
 Standard Dev._{norm}
 Coeff. of Var. [%]_{norm}
 Min. 0.0068
 Max. 0.0074
 Number of Spec. 19

86.223
 5.624
 6.522
 78.398
 94.731
 19



4.30 Single Shear Bearing 3 Properties

Laminate Bearing Properties (SSB3) -- (RTD)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Comments
HF3A112A	A	M1	1	1	111.329	0.147	20	B11 / 2% OFFSET FOR UBS*
HF3A113A	A	M1	1	1	110.555	0.140	20	B11 / 2% OFFSET FOR UBS*
HF3A114A	A	M1	1	1	110.982	0.139	20	B11 / 2% OFFSET FOR UBS*
HF3A115A	A	M1	1	1	110.014	0.137	20	B11 / 2% OFFSET FOR UBS*
HF3A212A	A	M2	1	2	118.853	0.147	20	B11 / 2% OFFSET FOR UBS*
HF3A213A	A	M2	1	2	118.684	0.146	20	B11 / 2% OFFSET FOR UBS*
HF3A214A	A	M2	1	2	118.053	0.147	20	B11 / 2% OFFSET FOR UBS*
HF3B111A	B	M1	2	1	112.900	0.137	20	B11 / 2% OFFSET FOR UBS*
HF3B112A	B	M1	2	1	108.476	0.147	20	B11 / 2% OFFSET FOR UBS*
HF3B113A	B	M1	2	1	109.396	0.144	20	B11 / 2% OFFSET FOR UBS*
HF3B211A	B	M2	2	2	116.878	0.139	20	B11 / 2% OFFSET FOR UBS*
HF3B212A	B	M2	2	2	115.519	0.146	20	B11 / 2% OFFSET FOR UBS*
HF3B213A	B	M2	2	2	122.041	0.144	20	B11 / 2% OFFSET FOR UBS*
HF3C111A	C	M1	3	1	113.847	0.147	20	B11 / 2% OFFSET FOR UBS*
HF3C112A	C	M1	3	1	116.374	0.144	20	B11 / 2% OFFSET FOR UBS*
HF3C114A	C	M1	3	1	115.629	0.145	20	B11 / 2% OFFSET FOR UBS*
HF3C212A	C	M2	3	2	104.569	0.146	20	B11 / 2% OFFSET FOR UBS*
HF3C213A	C	M2	3	2	114.501	0.149	20	B11 / 2% OFFSET FOR UBS*
HF3C215A	C	M2	3	2	116.007	0.146	20	B11 / 2% OFFSET FOR UBS*

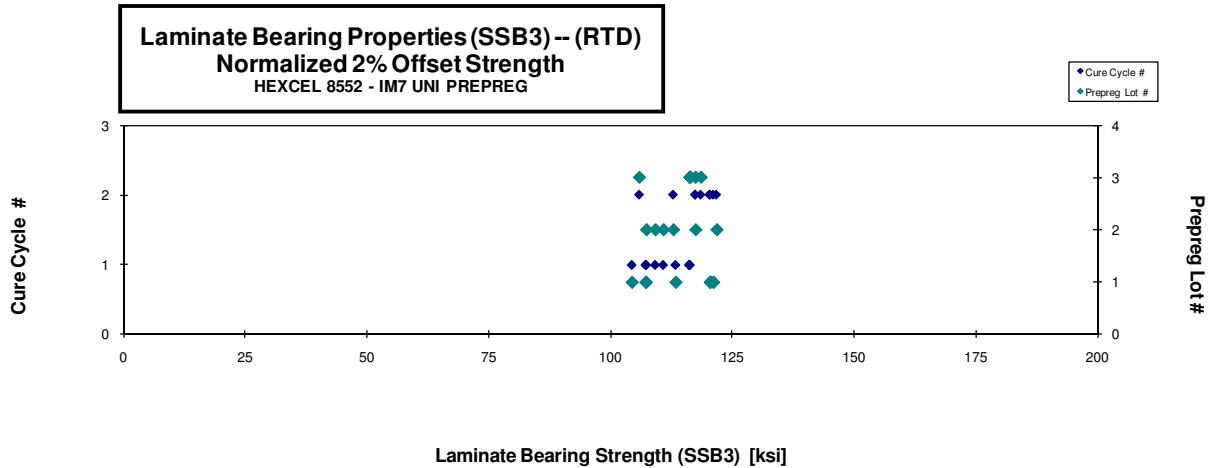
Ultimate Bearing Strength / B11:
 B: Bearing, 1: first hole, t: Inapplicable
 (not on bolt, nut or head side)

Average 113.927
 Standard Dev. 4.317
 Coeff. of Var. [%] 3.790
 Min. 104.569
 Max. 122.041
 Number of Spec. 19

Average_{norm} 0.0072 113.896
 Standard Dev._{norm} 5.710
 Coeff. of Var. [%]_{norm} 5.014
 Min. 0.0068 104.322
 Max. 0.0075 121.801
 Number of Spec. 19 19

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	2% Strength _{norm} [ksi]
0.0073	113.352
0.0070	107.151
0.0070	107.244
0.0068	104.322
0.0073	121.123
0.0073	120.428
0.007	120.458
0.007	107.307
0.0074	110.812
0.0072	109.142
0.0070	112.861
0.0073	117.445
0.0072	121.801
0.0074	116.219
0.0072	116.361
0.0072	116.191
0.0073	105.840
0.0075	118.543
0.0073	117.417



Laminate Bearing Properties (SSB3) -- (ETW)
Strength & Modulus
 HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Comments
HF3A117D	A	M1	1	1	99.478	0.139	20	B11/ 2% OFFSET FOR UBS*
HF3A119D	A	M1	1	1	87.757	0.145	20	B11/ 2% OFFSET FOR UBS*
HF3A11AD	A	M1	1	1	94.216	0.145	20	B11/ 2% OFFSET FOR UBS*
HF3A11BD	A	M1	1	1	91.661	0.143	20	B11/ 2% OFFSET FOR UBS*
HF3A216D	A	M2	1	2	99.866	0.148	20	B11/ 2% OFFSET FOR UBS*
HF3A218D	A	M2	1	2	99.109	0.145	20	B11/ 2% OFFSET FOR UBS*
HF3A219D	A	M2	1	2	95.924	0.144	20	B11/ 2% OFFSET FOR UBS*
HF3B116D	B	M1	2	1	101.302	0.146	20	B11/ 2% OFFSET FOR UBS*
HF3B117D	B	M1	2	1	92.665	0.141	20	B11/ 2% OFFSET FOR UBS*
HF3B118D	B	M1	2	1	98.556	0.139	20	B11/ 2% OFFSET FOR UBS*
HF3B216D	B	M2	2	2	94.921	0.145	20	B11/ 2% OFFSET FOR UBS*
HF3B217D	B	M2	2	2	85.275	0.134	20	B11/ 2% OFFSET FOR UBS*
HF3B218D	B	M2	2	2	86.622	0.141	20	B11/ 2% OFFSET FOR UBS*
HF3C116D	C	M1	3	1	86.888	0.144	20	B11/ 2% OFFSET FOR UBS*
HF3C117D	C	M1	3	1	87.638	0.146	20	B11/ 2% OFFSET FOR UBS*
HF3C118D	C	M1	3	1	81.004	0.146	20	B11/ 2% OFFSET FOR UBS*
HF3C216D	C	M2	3	2	85.372	0.147	20	B11/ 2% OFFSET FOR UBS*
HF3C217D	C	M2	3	2	83.126	0.147	20	B11/ 2% OFFSET FOR UBS*
HF3C218D	C	M2	3	2	92.797	0.145	20	B11/ 2% OFFSET FOR UBS*

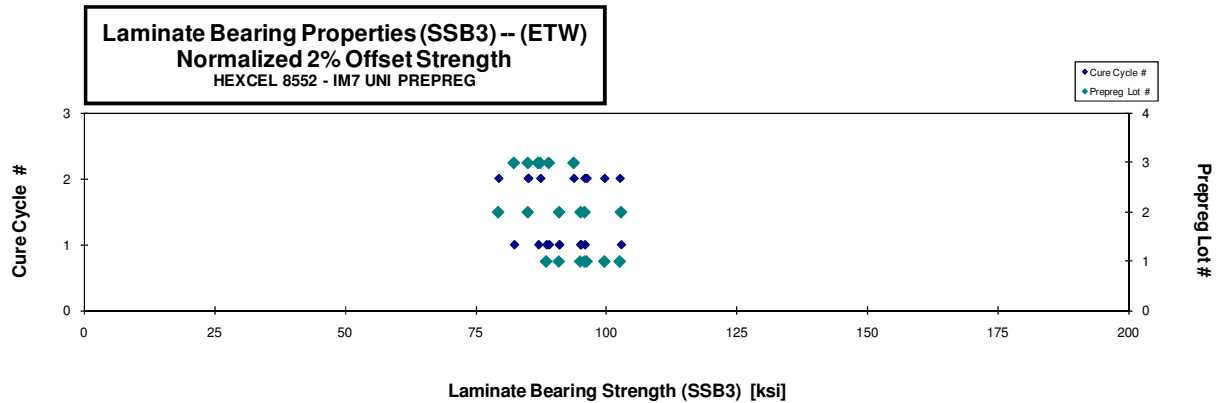
Ultimate Bearing Strength / B11
 B Bearing, 1st hole, 1st
 Inapplicable (not on bolt, nut or head side)

Average 91.799
 Standard Dev. 6.272
 Coeff. of Var. [%] 6.832
 Min. 81.004
 Max. 101.302
 Number of Spec. 19

Average_{norm} 0.0072 91.673
 Standard Dev_{norm} 6.556
 Coeff. of Var. [%]_{norm} 7.152
 Min. 0.0067 79.333
 Max. 0.0074 102.780
 Number of Spec. 19

normalizing t_{ply}
 [in]
 0.0072

Avg. t_{ply} [in]	2% Strength _{norm} [ksi]
0.0069	95.828
0.0073	88.489
0.0073	94.979
0.0071	90.898
0.0074	102.525
0.0072	99.591
0.0072	96.191
0.0073	102.780
0.0071	90.970
0.0069	95.088
0.0073	95.800
0.0067	79.333
0.0071	84.988
0.0072	86.958
0.0073	88.987
0.0073	82.316
0.0074	87.358
0.0074	84.993
0.0073	93.720



4.31 Compression Strength After Impact 1 Properties

**Laminate Compression After Impact Properties (CAI) -- (RTD)
Strength**
HEXCEL 8552 - IM7 UNI PREPREG

normalizing t_{ply}
[in]

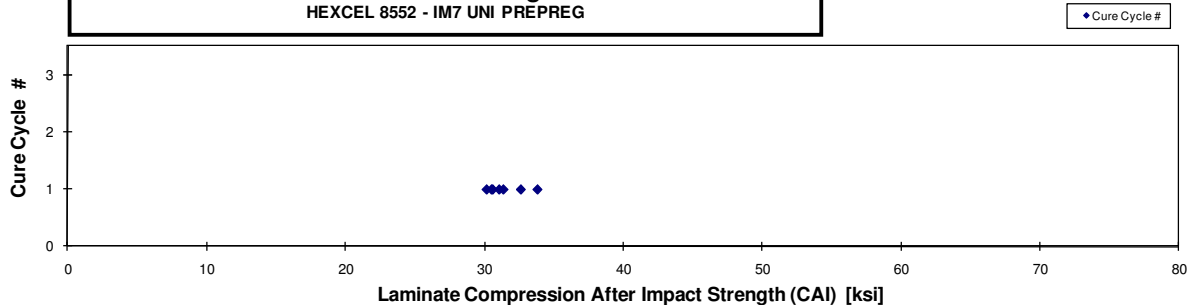
0.0072

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Measured Impact Energy (in-lbf)	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	Strength _{norm} [ksi]
HFIKA112A	A	M1	1	1	261.23	30.134	0.175	24	LDM	0.0073	30.599
HFIKA113A	A	M1	1	1	264.22	30.591	0.176	24	LDM	0.0073	31.072
HFIKA114A	A	M1	1	1	265.46	29.761	0.177	24	LDM	0.0074	30.525
HFIKA115A	A	M1	1	1	261.64	32.374	0.174	24	LDM	0.0073	32.618
HFIKA116A	A	M1	1	1	266.12	29.529	0.177	24	LDM	0.0074	30.170
HFIKA117A	A	M1	1	1	262.11	30.898	0.175	24	LDM	0.0073	31.372
HFIKA118A	A	M1	1	1	262.37	33.434	0.175	24	LDM	0.0073	33.798

Average 30.960
Standard Dev. 1.439
Coeff. of Var. [%] 4.649
Min. 29.529
Max. 33.434
Number of Spec. 7

Average_{norm} 0.00732 31.451
Standard Dev._{norm} 1.307
Coeff. of Var. [%]_{norm} 4.155
Min. 0.0073 30.170
Max. 0.0074 33.798
Number of Spec. 7

**Laminate Compression After Impact Properties 1 (CAI1) -- (RTD)
Normalized Strength**
HEXCEL 8552 - IM7 UNI PREPREG



4.32 Interlaminar Tension Properties

Laminate Curved Beam Strength Properties (CBS) -- (CTD) Strength

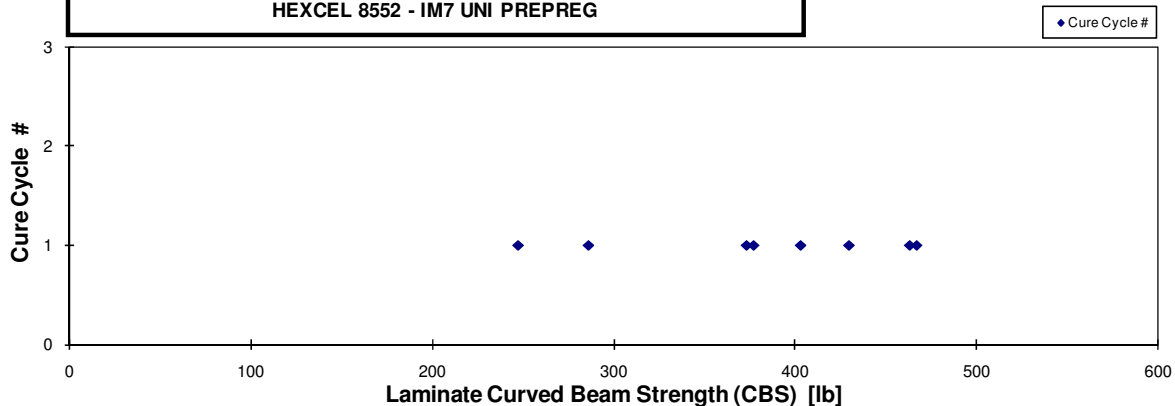
HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
HFIMA119B	A	M1	1	1	286.007	8.970	0.151	22	0.0069
HFIMA11AB	A	M1	1	1	402.797	13.144	0.146	22	0.0066
HFIMA11BB	A	M1	1	1	429.446	13.340	0.152	22	0.0069
HFIMA11CB	A	M1	1	1	376.970	12.066	0.148	22	0.0067
HFIMA11DB	A	M1	1	1	247.302	7.635	0.153	22	0.0070
HFIMA11EB	A	M1	1	1	462.853	14.709	0.149	22	0.0068
HFIMA11FB	A	M1	1	1	373.011	11.782	0.150	22	0.0068
HFIMA11GB	A	M1	1	1	466.694	14.018	0.157	22	0.0071

Average	380.635	11.958	Average	0.0069
Standard Dev.	79.141	2.472	Min.	0.0066
Coeff. of Var. [%]	20.792	20.675	Max.	0.0071
Min.	247.302	7.635		
Max.	466.694	14.709		
Number of Spec.	8	8		

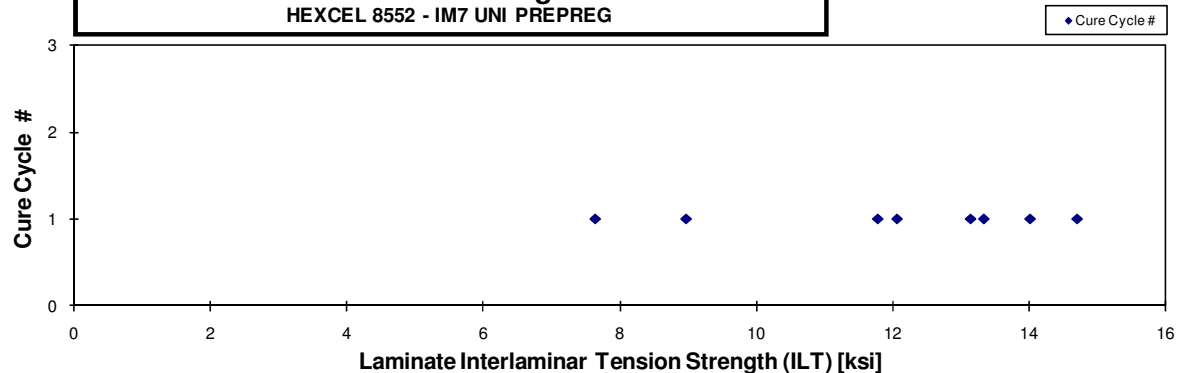
Laminate Interlaminar Tension Strength (ILT) -- (CTD) Measured Strength

HEXCEL 8552 - IM7 UNI PREPREG



Laminate Interlaminar Tension Strength (ILT) -- (CTD) Measured Strength

HEXCEL 8552 - IM7 UNI PREPREG



Laminate Curved Beam Strength Properties (CBS) -- (RTD) Strength

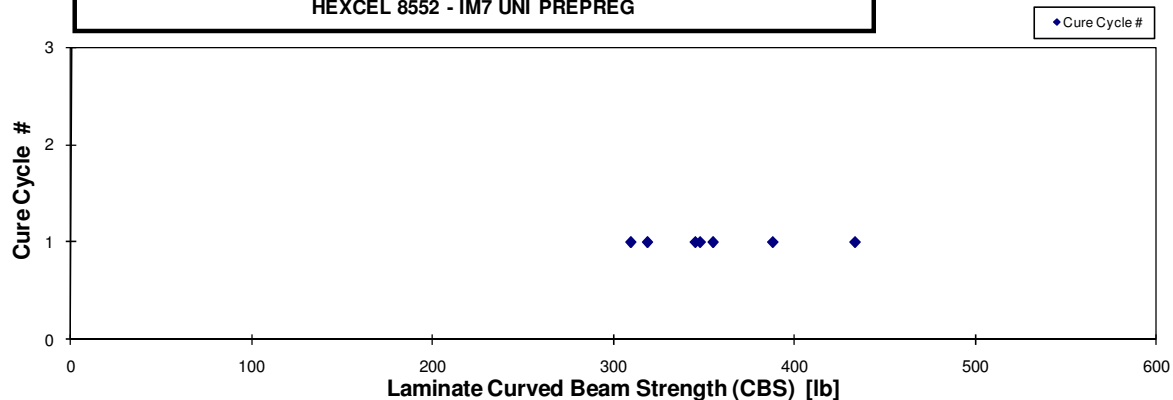
HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
HFIMA111A	A	M1	1	1	433.114	13.246	0.154	22	0.0070
HFIMA112A	A	M1	1	1	355.037	10.806	0.155	22	0.0070
HFIMA113A	A	M1	1	1	345.304	10.490	0.155	22	0.0071
HFIMA114A	A	M1	1	1	387.874	11.821	0.155	22	0.0070
HFIMA115A	A	M1	1	1	309.813	9.990	0.148	22	0.0067
HFIMA116A	A	M1	1	1	347.870	10.869	0.152	22	0.0069
HFIMA117A	A	M1	1	1	318.963	10.061	0.150	22	0.0068

Average	356.853	11.041	Average	0.0069
Standard Dev.	42.119	1.149	Min.	0.0067
Coeff. of Var. [%]	11.803	10.410	Max.	0.0071
Min.	309.813	9.990		
Max.	433.114	13.246		
Number of Spec.	7	7		

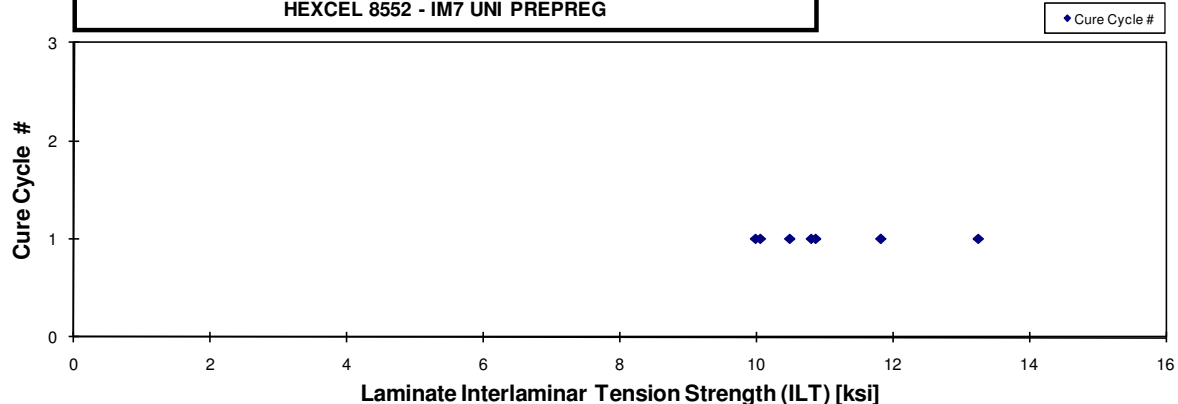
Laminate Curved Beam Strength Properties (CBS)-- (RTD) Measured Strength

HEXCEL 8552 - IM7 UNI PREPREG



Laminate Interlaminar Tension Strength (ILT)-- (RTD) Measured Strength

HEXCEL 8552 - IM7 UNI PREPREG



Laminate Curved Beam Strength Properties (CBS) -- (ETW) Strength

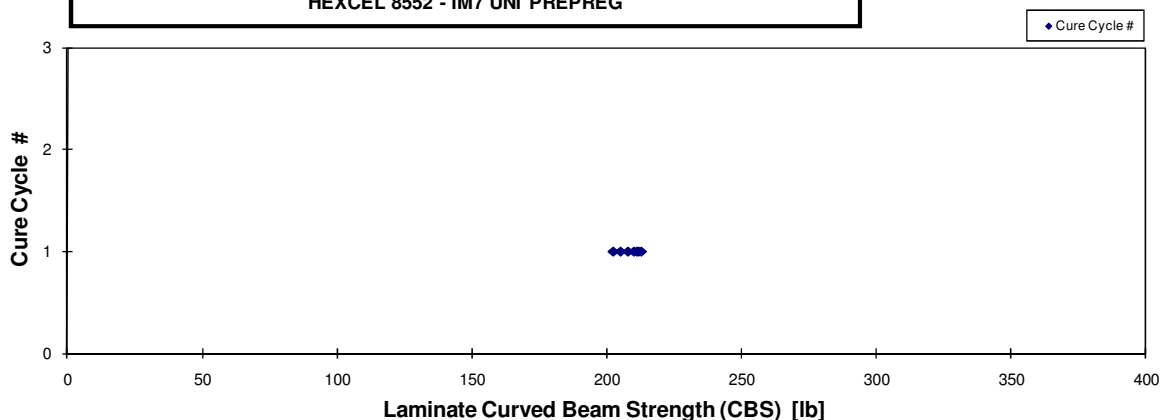
HEXCEL 8552 - IM7 UNI PREPREG

Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [lb]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
HFIMA11HD	A	M1	1	1	207.829	6.391	0.154	22	0.0070
HFIMA11ID	A	M1	1	1	211.004	6.608	0.151	22	0.0069
HFIMA11JD	A	M1	1	1	209.973	6.601	0.151	22	0.0069
HFIMA11KD	A	M1	1	1	202.503	6.192	0.154	22	0.0070
HFIMA11LD	A	M1	1	1	212.626	6.715	0.150	22	0.0068
HFIMA11MD	A	M1	1	1	211.706	6.490	0.154	22	0.0070
HFIMA11ND	A	M1	1	1	205.110	6.230	0.155	22	0.0071

Average	208.679	6.461	Average	0.0069
Standard Dev.	3.729	0.199	Min.	0.0068
Coeff. of Var. [%]	1.787	3.077	Max.	0.0071
Min.	202.503	6.192		
Max.	212.626	6.715		
Number of Spec.	7	7		

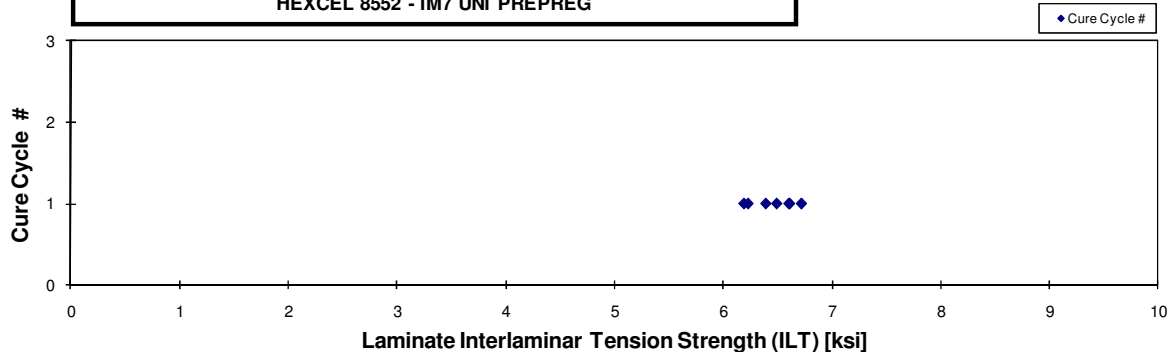
Laminate Curved Beam Strength Properties (CBS) -- (ETW) Measured Strength

HEXCEL 8552 - IM7 UNI PREPREG

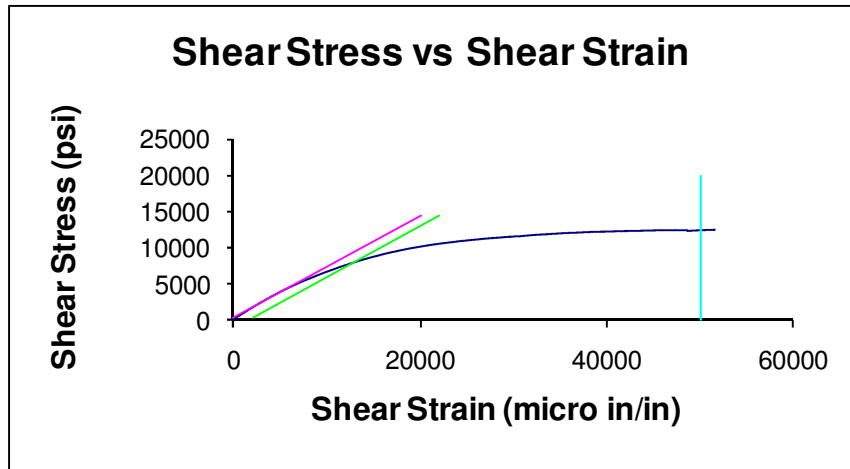


Laminate Interlaminar Tension Strength (ILT) -- (ETW) Measured Strength

HEXCEL 8552 - IM7 UNI PREPREG



5. Shear Stress vs. Shear Strain, RTD



6. FLUID SENSITIVITY COMPARISON

Fluid	Average Short Beam	Same Environment Short Beam Strength		Worst Case Environment Short	% Strength Reduction With
	Strength With Fluid (ksi)	Without Fluid (ksi) (ETD)		Beam Strength (ksi) (ETW)	Respect to ETD (no fluid)
a	18.131	16.96		14.81	-6.895
b	16.821	16.96		14.81	0.828
c	16.749	16.96		14.81	1.252
d	16.561	16.96		14.81	2.361
e	16.480	16.96		14.81	2.843
f	16.221	16.96		14.81	4.369
g	15.835	16.96		14.81	6.643
h	16.586	16.96		14.81	2.214
i	15.852	16.96		14.81	6.545
j	16.804	16.96		14.81	0.930
k	16.794	16.96		14.81	0.989
l	16.297	16.96		14.81	3.916
r	15.819	16.96		14.81	6.735
A	16.962	16.96		14.81	0.000
t	14.811	16.96		14.81	12.681

- a 100 Low lead Fuel
- b SAE AMS 2629 JRF
- c Mil-PRF-5606 Hydraulic Oil
- d Mil-PRF-83282 Hydraulic Oil
- e Engine Lube Oil Mil-L-7808
- f Engine Lube Oil Mil-L-23699
- g Salt Water
- h Skydrol LD-4
- i 50% Water + 50% Skydrol
- j MEK Washing Fluid
- k Polypropylene Glycol Deicer
- l Isopropyl Alcohol Deicing Agent
- r Distilled Water
- A Dry (Room Temp)
- t 160°F±5°F(85%±5%) until Equilibrium

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Fluid	Average Short Beam	Same Environment Short Beam	Worst Case Environment Short	% Strength Reduction With
	Strength With Fluid (ksi)	Strength Without Fluid (ksi) (ETD)	Beam Strength (ksi) (ETW)	Respect to ETD (no fluid)
1	10.630	11.008	8.193	3.429
2	11.298	11.008	8.193	-2.635
3	11.053	11.008	8.193	-0.413
4	10.934	11.008	8.193	0.674
5	10.442	11.008	8.193	5.135
6	10.451	11.008	8.193	5.062
7	9.847	11.008	8.193	10.542
8	10.463	11.008	8.193	4.952
9	9.527	11.008	8.193	13.454
m	11.050	11.008	8.193	-0.381
n	11.133	11.008	8.193	-1.135
p	11.120	11.008	8.193	-1.018
s	9.642	11.008	8.193	12.407
C	11.008	11.008	8.193	0.000
D	8.193	11.008	8.193	25.574

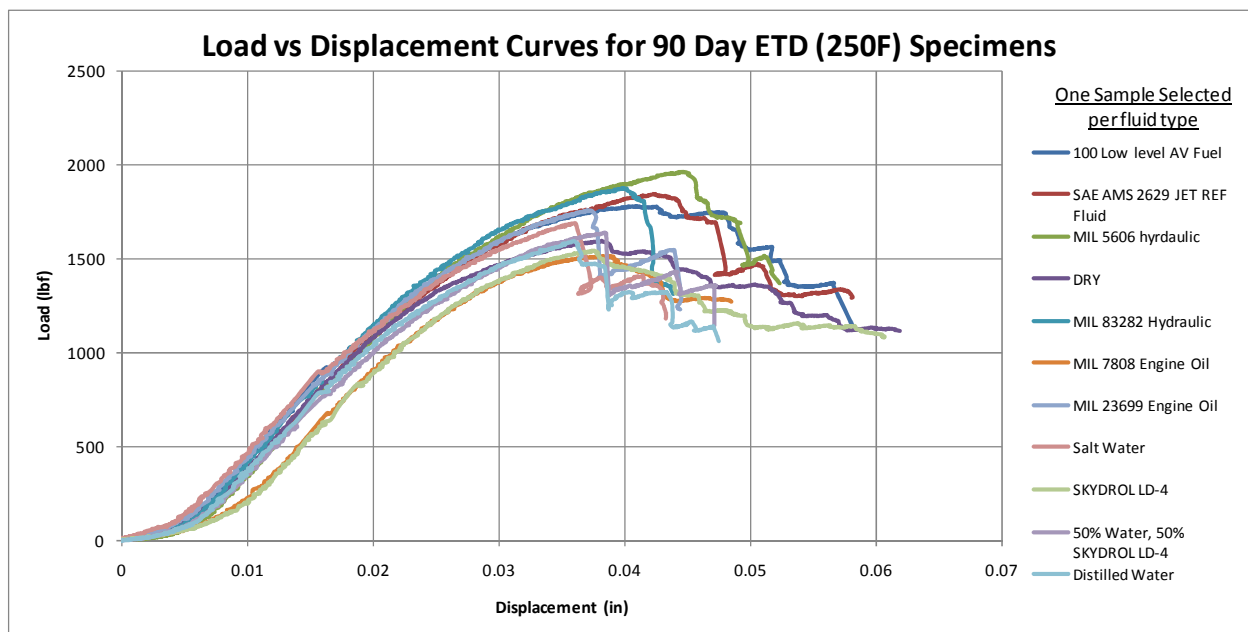
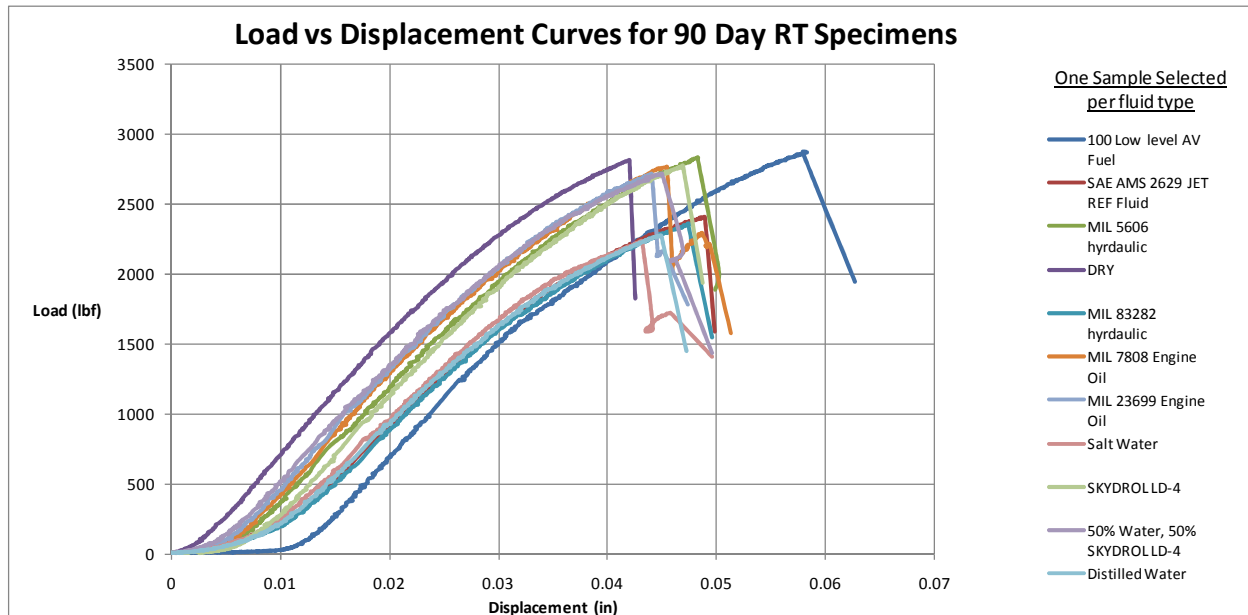
- 1 100 Low lead Fuel
- 2 SAE AMS 2629 JRF
- 3 Mil-PRF-5606 Hydraulic Oil
- 4 Mil-PRF-83282 Hydraulic Oil
- 5 Engine Lube Oil Mil-L-7808
- 6 Engine Lube Oil Mil-L-23699
- 7 Salt Water
- 8 Skydrol LD-4
- 9 50% Water + 50% Skydrol
- m MEK Washing Fluid
- n Polypropylene Glycol Deicer
- p Isopropyl Alcohol Deicing Agent
- s Distilled Water
- C Dry (Room Temp)
- D 160 °F±5 °F(85%±5%) until Equilibrium

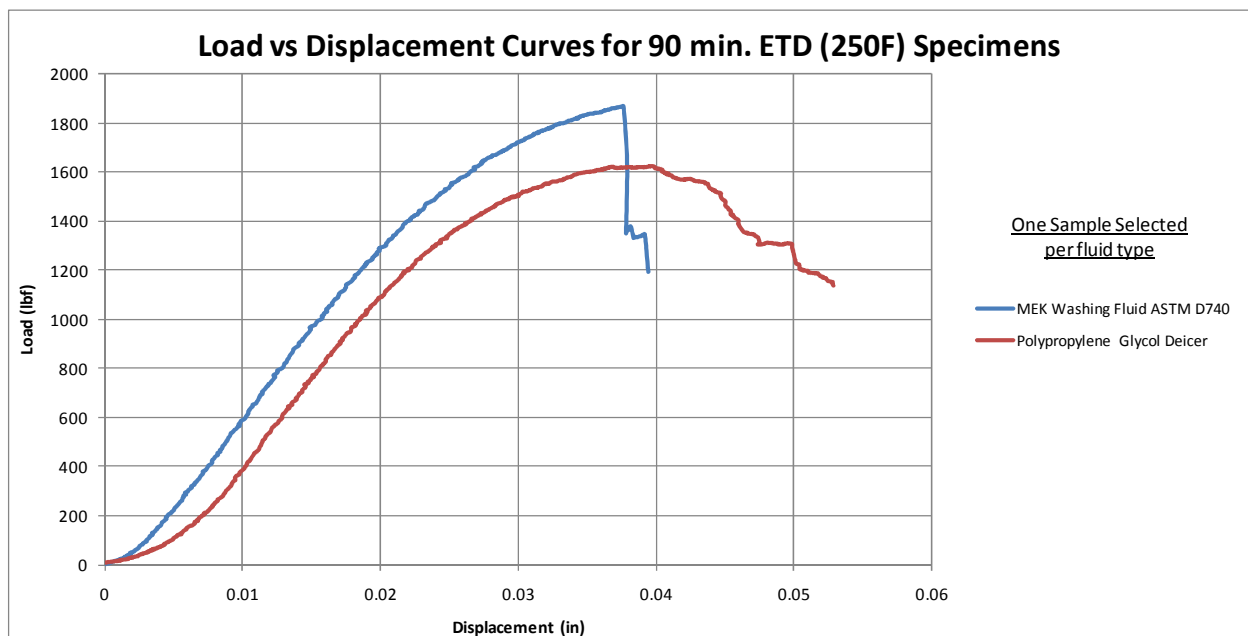
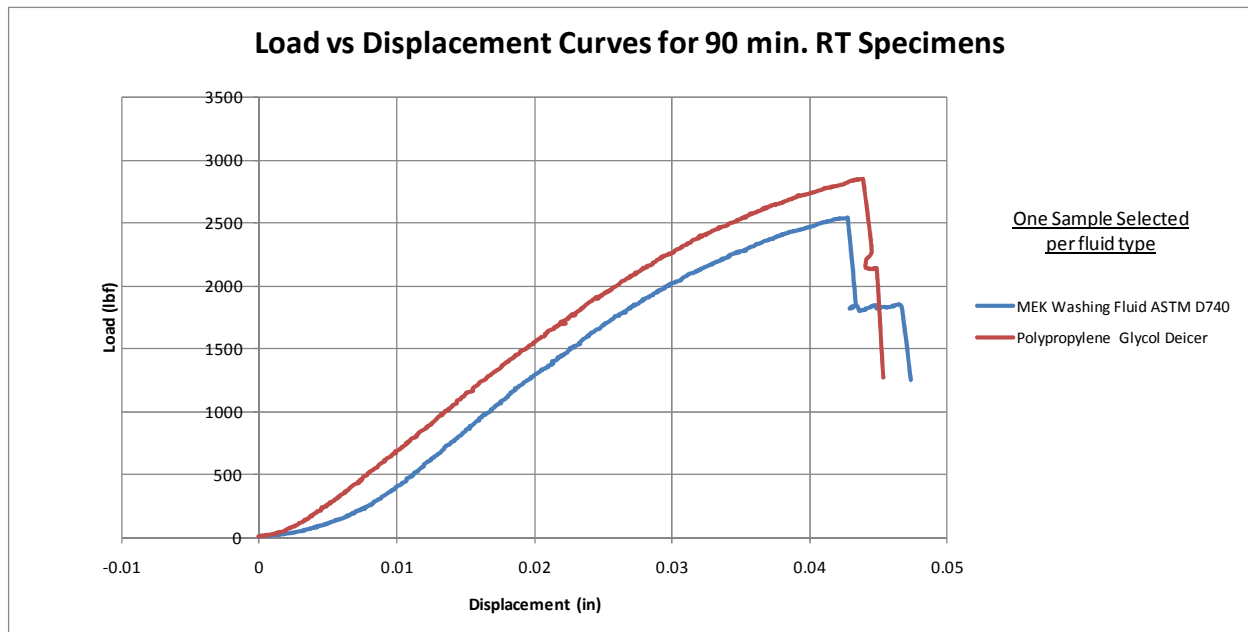
Fluid Sensitivity Screening Short Beam Strength Properties (FSBS)-- (RTD) Strength HEXCEL 8552 - IM7 UNI PREPREG									
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
HF1QA121a	A	MH1	1	1	21.418	0.200	34	0.0059	INTERLAMINAR SHEAR
HF1QA122a	A	MH1	1	1	17.274	0.212	34	0.0062	INTERLAMINAR SHEAR
HF1QA123a	A	MH1	1	1	17.170	0.223	34	0.0066	INTERLAMINAR SHEAR
HF1QA124a	A	MH1	1	1	17.648	0.233	34	0.0068	INTERLAMINAR SHEAR
HF1QA125a	A	MH1	1	1	17.687	0.238	34	0.0070	INTERLAMINAR SHEAR
HF1QA126a	A	MH1	1	1	17.589	0.241	34	0.0071	INTERLAMINAR SHEAR
HF1QA121b	A	MH1	1	2	16.630	0.216	34	0.0063	INTERLAMINAR SHEAR
HF1QA121b	A	MH1	1	2	16.780	0.226	34	0.0066	INTERLAMINAR SHEAR
HF1QA121b	A	MH1	1	2	16.647	0.237	34	0.0070	INTERLAMINAR SHEAR
HF1QA121b	A	MH1	1	2	16.886	0.245	34	0.0072	INTERLAMINAR SHEAR
HF1QA121b	A	MH1	1	2	16.931	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA120b	A	MH1	1	2	17.053	0.254	34	0.0075	INTERLAMINAR SHEAR
HF1QA131c	A	MH1	1	3	16.482	0.256	34	0.0075	INTERLAMINAR SHEAR
HF1QA132c	A	MH1	1	3	16.659	0.257	34	0.0076	INTERLAMINAR SHEAR
HF1QA133c	A	MH1	1	3	16.777	0.257	34	0.0076	INTERLAMINAR SHEAR
HF1QA134c	A	MH1	1	3	16.804	0.257	34	0.0076	INTERLAMINAR SHEAR
HF1QA135c	A	MH1	1	3	16.651	0.257	34	0.0075	INTERLAMINAR SHEAR
HF1QA136c	A	MH1	1	3	17.121	0.257	34	0.0076	INTERLAMINAR SHEAR
HF1QA130d	A	MH1	1	4	16.450	0.214	34	0.0063	INTERLAMINAR SHEAR
HF1QA13Ed	A	MH1	1	4	16.582	0.224	34	0.0066	INTERLAMINAR SHEAR
HF1QA13Fd	A	MH1	1	4	16.250	0.234	34	0.0069	INTERLAMINAR SHEAR
HF1QA13Gd	A	MH1	1	4	16.805	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA13Hd	A	MH1	1	4	16.287	0.249	34	0.0073	INTERLAMINAR SHEAR
HF1QA13Id	A	MH1	1	4	16.993	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA141e	A	MH1	1	5	16.326	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA142e	A	MH1	1	5	16.538	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA143e	A	MH1	1	5	16.367	0.247	34	0.0073	INTERLAMINAR SHEAR
HF1QA144e	A	MH1	1	5	16.283	0.242	34	0.0071	INTERLAMINAR SHEAR
HF1QA145e	A	MH1	1	5	16.436	0.235	34	0.0069	INTERLAMINAR SHEAR
HF1QA146e	A	MH1	1	5	16.928	0.226	34	0.0067	INTERLAMINAR SHEAR
HF1QA140f	A	MH1	1	6	16.064	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA14Ef	A	MH1	1	6	16.548	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA14Ff	A	MH1	1	6	16.399	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA14Gf	A	MH1	1	6	16.014	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA14Hf	A	MH1	1	6	16.087	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA14If	A	MH1	1	6	16.213	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA151g	A	MH1	1	7	15.457	0.216	34	0.0064	INTERLAMINAR SHEAR
HF1QA152g	A	MH1	1	7	16.263	0.227	34	0.0067	INTERLAMINAR SHEAR
HF1QA153g	A	MH1	1	7	14.951	0.236	34	0.0069	INTERLAMINAR SHEAR
HF1QA154g	A	MH1	1	7	15.984	0.243	34	0.0072	INTERLAMINAR SHEAR
HF1QA155g	A	MH1	1	7	15.915	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA156g	A	MH1	1	7	16.441	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA150h	A	MH1	1	8	16.374	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA15Eh	A	MH1	1	8	16.910	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA15Fh	A	MH1	1	8	16.811	0.247	34	0.0073	INTERLAMINAR SHEAR
HF1QA15Gh	A	MH1	1	8	16.291	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA15Hh	A	MH1	1	8	16.567	0.235	34	0.0069	INTERLAMINAR SHEAR
HF1QA15Ih	A	MH1	1	8	16.564	0.226	34	0.0066	INTERLAMINAR SHEAR
HF1QA161i	A	MH1	1	9	16.090	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA162i	A	MH1	1	9	16.125	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA163i	A	MH1	1	9	15.797	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA164i	A	MH1	1	9	15.769	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA165i	A	MH1	1	9	15.476	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA16Dj	A	MH1	1	10	17.656	0.215	34	0.0063	INTERLAMINAR SHEAR
HF1QA16Ej	A	MH1	1	10	17.078	0.226	34	0.0066	INTERLAMINAR SHEAR
HF1QA16Fj	A	MH1	1	10	16.641	0.235	34	0.0069	INTERLAMINAR SHEAR
HF1QA16Gj	A	MH1	1	10	16.892	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA16Hj	A	MH1	1	10	16.266	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA16Ij	A	MH1	1	10	16.290	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA171k	A	MH1	1	11	16.905	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA172k	A	MH1	1	11	16.930	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA173k	A	MH1	1	11	16.382	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA174k	A	MH1	1	11	16.512	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA175k	A	MH1	1	11	17.143	0.237	34	0.0070	INTERLAMINAR SHEAR
HF1QA176k	A	MH1	1	11	16.891	0.229	34	0.0067	INTERLAMINAR SHEAR
HF1QA17DL	A	MH1	1	12	16.419	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA17EL	A	MH1	1	12	16.410	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA17FL	A	MH1	1	12	16.230	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA17GL	A	MH1	1	12	16.639	0.253	34	0.0075	INTERLAMINAR SHEAR
HF1QA17HL	A	MH1	1	12	15.845	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA17IL	A	MH1	1	12	16.241	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA181r	A	MH1	1	13	15.918	0.213	34	0.0063	INTERLAMINAR SHEAR
HF1QA182r	A	MH1	1	13	15.536	0.226	34	0.0066	INTERLAMINAR SHEAR
HF1QA183r	A	MH1	1	13	15.983	0.235	34	0.0069	INTERLAMINAR SHEAR
HF1QA184r	A	MH1	1	13	15.599	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA185r	A	MH1	1	13	15.765	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA186r	A	MH1	1	13	16.116	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA18DA	A	MH1	1	14	16.659	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA18EA	A	MH1	1	14	16.852	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA18FA	A	MH1	1	14	16.800	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA18GA	A	MH1	1	14	16.898	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA18HA	A	MH1	1	14	17.201	0.236	34	0.0069	INTERLAMINAR SHEAR
HF1QA18IA	A	MH1	1	14	17.359	0.227	34	0.0067	INTERLAMINAR SHEAR
HF1QA191t	A	MH1	1	15	15.132	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA192t	A	MH1	1	15	14.993	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA193t	A	MH1	1	15	14.716	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA194t	A	MH1	1	15	15.192	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA195t	A	MH1	1	15	13.958	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA196t	A	MH1	1	15	14.874	0.253	34	0.0074	INTERLAMINAR SHEAR

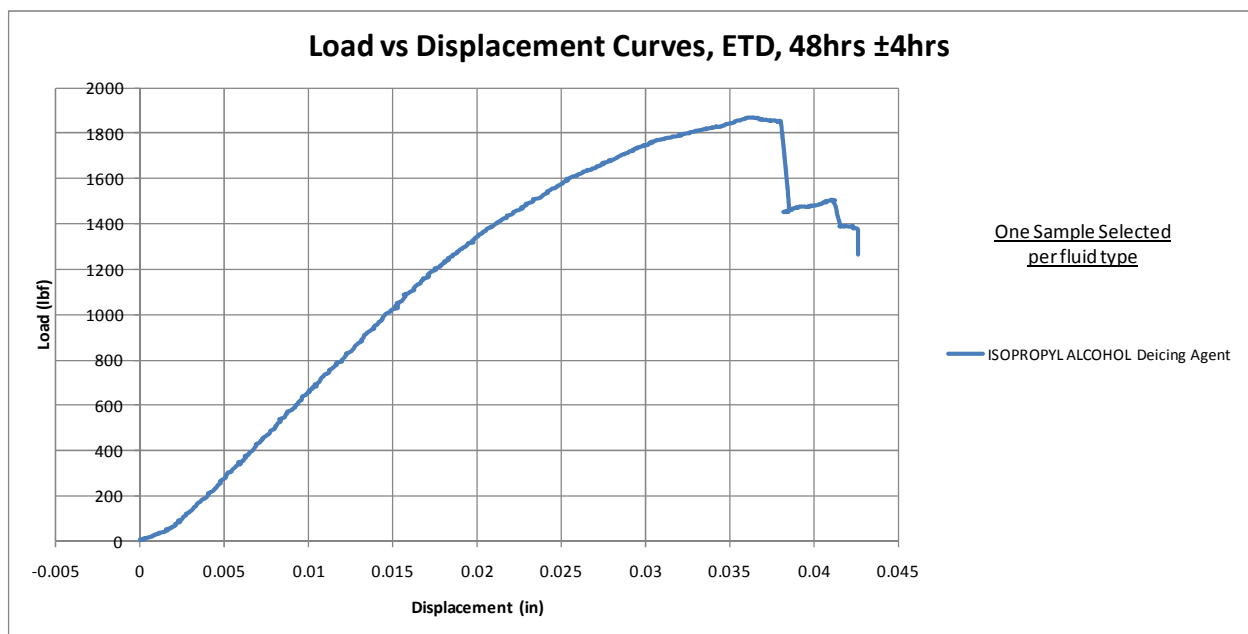
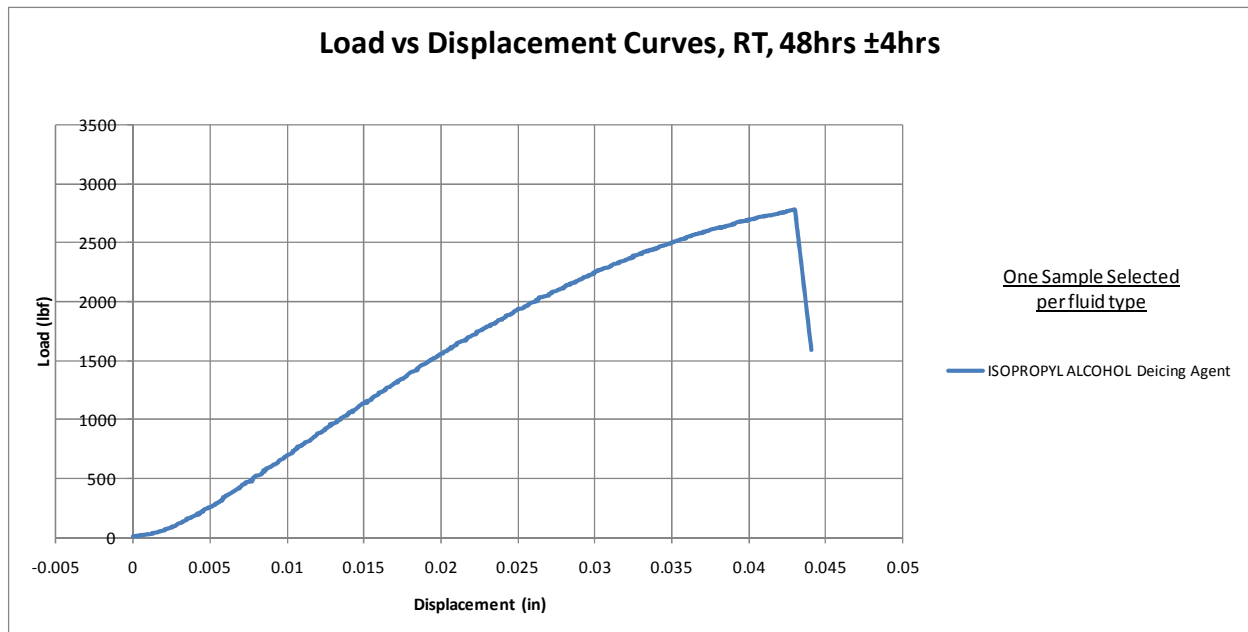
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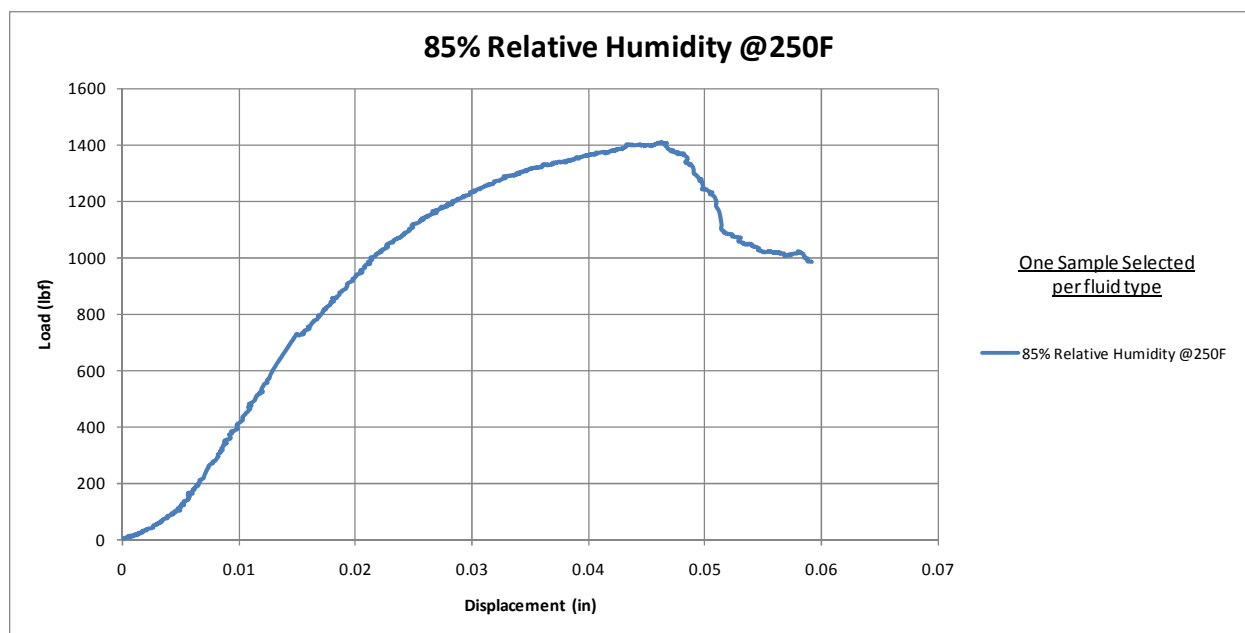
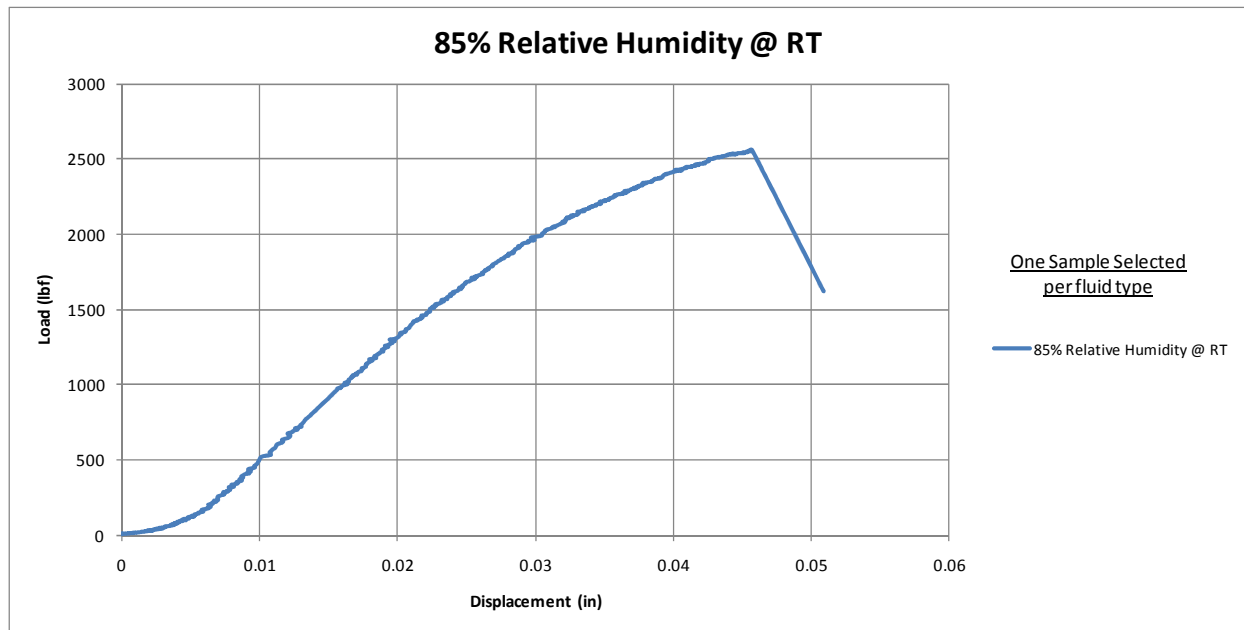
Fluid Sensitivity Screening Short Beam Strength Properties (FSBS)-- (ETD) Strength HEXCEL 8552 - IM7 UNI PREPREG									
Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Fluid	Strength [ksi]	Avg. Specimen Thichn. [in]	# Piles in Laminata	Avg. tply [in]	Failure Mode
HF1QA1271	A	MH1	1	1	10.925	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA1281	A	MH1	1	1	11.029	0.242	34	0.0071	INTERLAMINAR SHEAR
HF1QA1291	A	MH1	1	1	10.866	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA12A1	A	MH1	1	1	8.809	0.242	34	0.0071	INTERLAMINAR SHEAR
HF1QA12B1	A	MH1	1	1	11.063	0.242	34	0.0071	INTERLAMINAR SHEAR
HF1QA12C1	A	MH1	1	1	11.090	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA12D2	A	MH1	1	2	11.334	0.243	34	0.0072	INTERLAMINAR SHEAR
HF1QA12E2	A	MH1	1	2	11.269	0.240	34	0.0071	INTERLAMINAR SHEAR
HF1QA12F2	A	MH1	1	2	11.302	0.236	34	0.0069	INTERLAMINAR SHEAR
HF1QA12G2	A	MH1	1	2	11.200	0.231	34	0.0068	INTERLAMINAR SHEAR
HF1QA12H2	A	MH1	1	2	11.603	0.224	34	0.0066	INTERLAMINAR SHEAR
HF1QA12I2	A	MH1	1	2	11.080	0.214	34	0.0063	INTERLAMINAR SHEAR
HF1QA1373	A	MH1	1	3	11.415	0.256	34	0.0075	INTERLAMINAR SHEAR
HF1QA1383	A	MH1	1	3	11.188	0.254	34	0.0075	INTERLAMINAR SHEAR
HF1QA1393	A	MH1	1	3	11.167	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA13A3	A	MH1	1	3	10.870	0.245	34	0.0072	INTERLAMINAR SHEAR
HF1QA13B3	A	MH1	1	3	10.971	0.237	34	0.0070	INTERLAMINAR SHEAR
HF1QA13C3	A	MH1	1	3	10.708	0.228	34	0.0067	INTERLAMINAR SHEAR
HF1QA13J4	A	MH1	1	4	11.031	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA13K4	A	MH1	1	4	10.999	0.253	34	0.0075	INTERLAMINAR SHEAR
HF1QA13L4	A	MH1	1	4	10.744	0.253	34	0.0075	INTERLAMINAR SHEAR
HF1QA13M4	A	MH1	1	4	10.975	0.254	34	0.0075	INTERLAMINAR SHEAR
HF1QA13N4	A	MH1	1	4	10.913	0.253	34	0.0075	INTERLAMINAR SHEAR
HF1QA13O4	A	MH1	1	4	10.939	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA1475	A	MH1	1	5	10.534	0.214	34	0.0063	INTERLAMINAR SHEAR / COMPRESSION
HF1QA1485	A	MH1	1	5	10.598	0.225	34	0.0066	INTERLAMINAR SHEAR
HF1QA1495	A	MH1	1	5	10.451	0.234	34	0.0069	INTERLAMINAR SHEAR
HF1QA14A5	A	MH1	1	5	10.467	0.241	34	0.0071	INTERLAMINAR SHEAR
HF1QA14B5	A	MH1	1	5	10.248	0.247	34	0.0073	INTERLAMINAR SHEAR
HF1QA14C5	A	MH1	1	5	10.357	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA14J6	A	MH1	1	6	10.398	0.252	34	0.0074	INTERLAMINAR SHEAR / COMPRESSION
HF1QA14K6	A	MH1	1	6	10.327	0.250	34	0.0074	INTERLAMINAR SHEAR / COMPRESSION
HF1QA14L6	A	MH1	1	6	10.047	0.247	34	0.0073	INTERLAMINAR SHEAR / COMPRESSION
HF1QA14M6	A	MH1	1	6	10.455	0.241	34	0.0071	INTERLAMINAR SHEAR / COMPRESSION
HF1QA14N6	A	MH1	1	6	10.712	0.234	34	0.0069	INTERLAMINAR SHEAR / COMPRESSION
HF1QA14O6	A	MH1	1	6	10.764	0.226	34	0.0066	INTERLAMINAR SHEAR / COMPRESSION
HF1QA1577	A	MH1	1	7	9.993	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA1587	A	MH1	1	7	9.909	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA1597	A	MH1	1	7	9.651	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA15A7	A	MH1	1	7	9.877	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA15B7	A	MH1	1	7	9.774	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA15C7	A	MH1	1	7	9.880	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA15J8	A	MH1	1	8	10.641	0.216	34	0.0063	INTERLAMINAR SHEAR / COMPRESSION
HF1QA15K8	A	MH1	1	8	10.674	0.226	34	0.0066	INTERLAMINAR SHEAR / COMPRESSION
HF1QA15L8	A	MH1	1	8	10.532	0.234	34	0.0069	INTERLAMINAR SHEAR / COMPRESSION
HF1QA15M8	A	MH1	1	8	10.321	0.243	34	0.0071	INTERLAMINAR SHEAR / COMPRESSION
HF1QA15N8	A	MH1	1	8	10.386	0.248	34	0.0073	INTERLAMINAR SHEAR / COMPRESSION
HF1QA15O8	A	MH1	1	8	10.221	0.251	34	0.0074	INTERLAMINAR SHEAR / COMPRESSION
HF1QA1679	A	MH1	1	9	9.691	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA1689	A	MH1	1	9	9.274	0.251	34	0.0074	INTERLAMINAR SHEAR / COMPRESSION
HF1QA1699	A	MH1	1	9	9.467	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA16A9	A	MH1	1	9	9.419	0.244	34	0.0072	INTERLAMINAR SHEAR
HF1QA16B9	A	MH1	1	9	9.633	0.236	34	0.0069	INTERLAMINAR SHEAR
HF1QA16C9	A	MH1	1	9	9.675	0.227	34	0.0067	INTERLAMINAR SHEAR
HF1QA16Jm	A	MH1	1	10	11.079	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA16Km	A	MH1	1	10	11.226	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA16Lm	A	MH1	1	10	10.934	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA16Mm	A	MH1	1	10	11.036	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA16Nm	A	MH1	1	10	10.943	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA16Om	A	MH1	1	10	11.081	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA177n	A	MH1	1	11	11.388	0.214	34	0.0063	INTERLAMINAR SHEAR
HF1QA178n	A	MH1	1	11	11.276	0.225	34	0.0066	INTERLAMINAR SHEAR
HF1QA179n	A	MH1	1	11	11.319	0.235	34	0.0069	INTERLAMINAR SHEAR
HF1QA17An	A	MH1	1	11	11.043	0.244	34	0.0072	INTERLAMINAR SHEAR
HF1QA17Bn	A	MH1	1	11	10.959	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA17Cn	A	MH1	1	11	10.811	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA17Jp	A	MH1	1	12	11.070	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA17Kp	A	MH1	1	12	11.014	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA17Lp	A	MH1	1	12	11.074	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA17Mp	A	MH1	1	12	11.082	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA17Np	A	MH1	1	12	11.290	0.237	34	0.0070	INTERLAMINAR SHEAR
HF1QA17Op	A	MH1	1	12	11.189	0.228	34	0.0067	INTERLAMINAR SHEAR
HF1QA187s	A	MH1	1	13	9.424	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA188s	A	MH1	1	13	9.683	0.253	34	0.0075	INTERLAMINAR SHEAR
HF1QA189s	A	MH1	1	13	9.554	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA18As	A	MH1	1	13	9.697	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA18Bs	A	MH1	1	13	9.712	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA18Cs	A	MH1	1	13	9.783	0.253	34	0.0074	INTERLAMINAR SHEAR
HF1QA18Jc	A	MH1	1	14	11.122	0.215	34	0.0063	INTERLAMINAR SHEAR
HF1QA18Kc	A	MH1	1	14	10.883	0.225	34	0.0066	INTERLAMINAR SHEAR
HF1QA18Lc	A	MH1	1	14	10.986	0.236	34	0.0069	INTERLAMINAR SHEAR
HF1QA18Mc	A	MH1	1	14	11.400	0.244	34	0.0072	INTERLAMINAR SHEAR
HF1QA18Nc	A	MH1	1	14	10.839	0.248	34	0.0073	INTERLAMINAR SHEAR
HF1QA18Oc	A	MH1	1	14	10.817	0.251	34	0.0074	INTERLAMINAR SHEAR
HF1QA197D	A	MH1	1	15	8.335	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA198D	A	MH1	1	15	8.207	0.252	34	0.0074	INTERLAMINAR SHEAR
HF1QA199D	A	MH1	1	15	8.324	0.247	34	0.0073	INTERLAMINAR SHEAR
HF1QA19AD	A	MH1	1	15	7.842	0.243	34	0.0071	INTERLAMINAR SHEAR
HF1QA19BD	A	MH1	1	15	8.293	0.235	34	0.0069	INTERLAMINAR SHEAR
HF1QA19CD	A	MH1	1	15	8.154	0.225	34	0.0066	INTERLAMINAR SHEAR

Average 0.0071
Min 0.0063
Max 0.0075



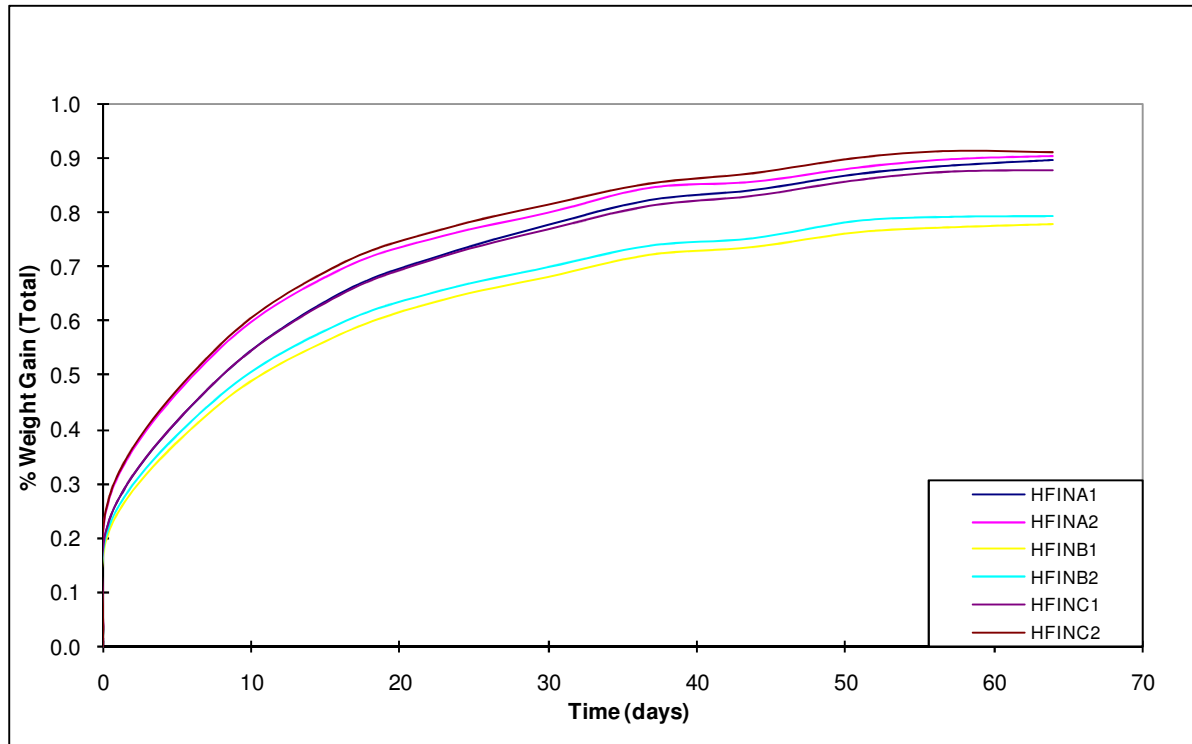




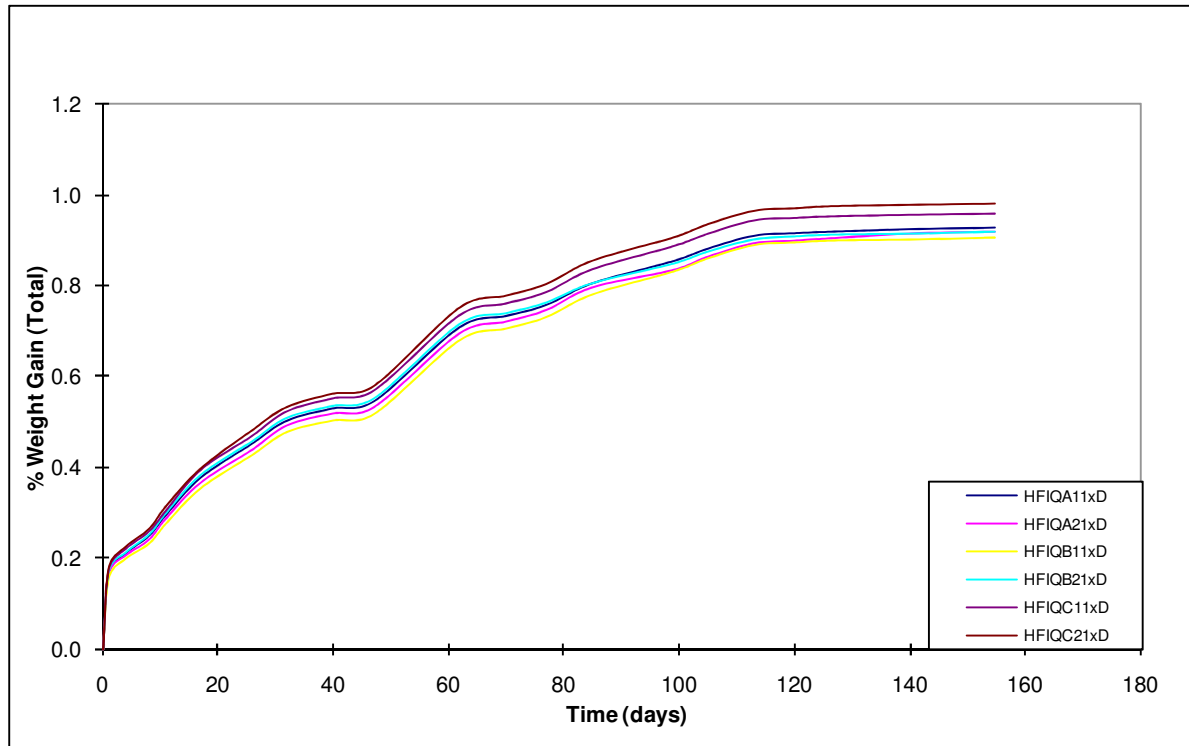


7. MOISTURE CONDITIONING CHARTS

7.1 In-Plane Shear– Thinnest Panel



7.2 Short Beam Strength- Thickest Panel



The rest of the curves can be found on the CD that accompanies this report.

8. DMA Results

The charts and graphs below are only examples. The remaining files can be obtained from the CD provided with this report.

DMA Results Summary				
Hexcel / Cessna HF 071105C1 (TT) Wet				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Average		Average	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
HFIDA 11	160.50	320.90	174.65	346.36
HFIDA 21	159.82	319.67	173.38	344.08
HFIDB 11	160.28	320.50	172.74	342.93
HFIDB 21	158.75	317.74	171.56	340.80
HFIDC 11	159.21	318.57	172.69	342.83
HFIDC 21	158.27	316.88	171.91	341.43
	AVERAGE	319.04		

DMA Results Summary				
Hexcel / Cessna HF 071105C1 (UNT3) Wet				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Average		Average	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
HFIDA 11	162.39	324.30	178.21	352.77
HFIDA 21	161.98	323.56	176.77	350.19
HFIDB 11	162.03	323.65	176.59	349.85
HFIDB 21	161.46	322.63	177.09	350.76
HFIDC 11	161.68	323.02	176.25	349.24
HFIDC 21	163.09	325.55	177.15	350.87
	AVERAGE	323.79		

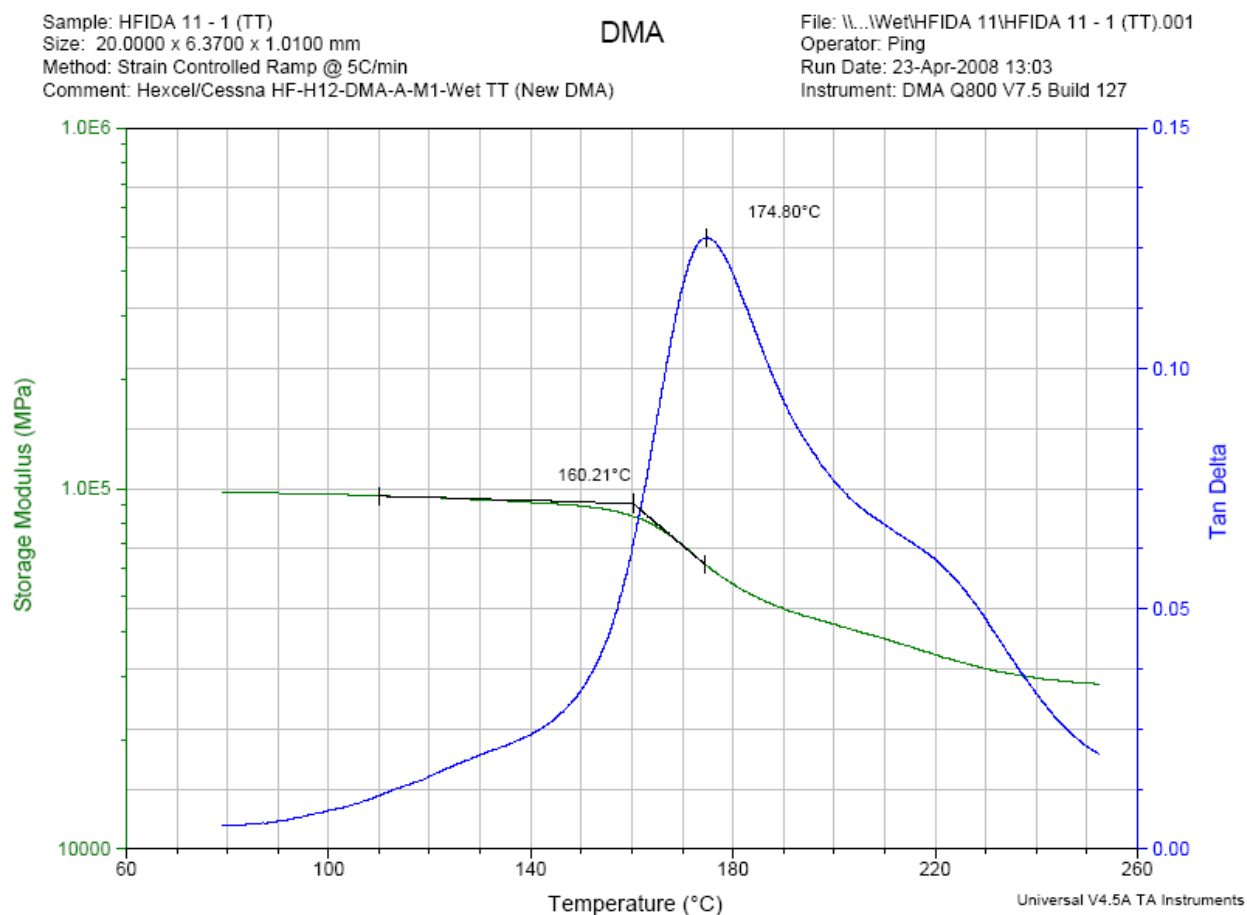
Table 8-1: DMA Wet Results

DMA Results Summary				
Hexcel / Cessna HF 071105C1 (TT) Dry				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Average		Average	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
HFIDA 11	207.27	405.08	228.19	442.73
HFIDA 21	209.23	408.61	231.93	449.47
HFIDB 11	209.35	408.82	231.76	449.16
HFIDB 21	207.37	405.26	231.58	448.84
HFIDC 11	204.70	400.45	232.99	451.37
HFIDC 21	206.82	404.28	233.50	452.30
	AVERAGE	405.41		

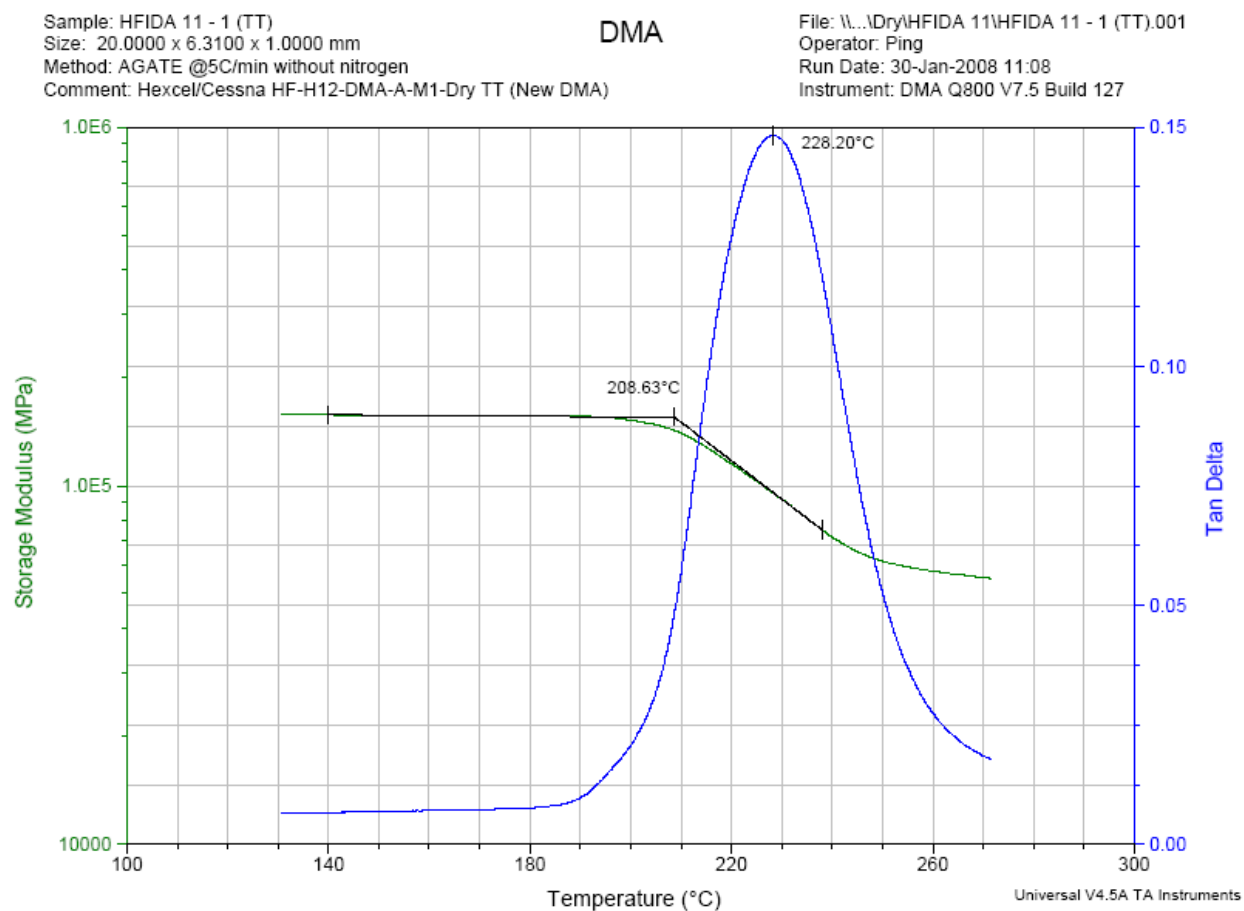
DMA Results Summary				
Hexcel / Cessna HF 071105C1 (UNT3) Dry				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	Average		Average	
	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
HFIDA 11	209.37	408.87	234.62	454.31
HFIDA 21	208.99	408.17	234.89	454.79
HFIDB 11	206.87	404.37	235.17	455.31
HFIDB 21	210.96	411.73	236.27	457.29
HFIDC 11	207.34	405.21	235.41	455.74
HFIDC 21	207.94	406.28	235.60	456.08
	AVERAGE	407.44		

Table 8-2: DMA Dry Results

8.1 DMA Wet Batch A




8.2 DMA Dry Batch A



9. TMA Results


The TMA results were tested at Hexcel. Specimens were taken from the same panels as DMA and wet and dry testing was tested concurrently.


4/23/2008

Wet Specimens tested for Tg by TMA to HSP-T2 (NMS 128)

Sample ID	Rep	Thickness (mm)	Tg (Deg C)		Avg
HF071105C1 IAU2 2 HFITA21	1	0.1036	222.25	432.05	428.13
HF071105C1 IAU2 2 HFITA21	2	0.1346	217.89	424.20	
HF071105C1 IBU1 1 HFITB11	1	0.1863	218.91	426.04	422.81
HF071105C1 IBU1 1 HFITB11	2	0.1715	215.32	419.58	
HF071105C1 IAU1 1 HFITA 11	1	0.1652	220.96	429.73	429.78
HF071105C1 IAU1 1 HFITA 11	2	0.1482	221.02	429.84	
HF071105C1 IBU12 2	1	0.1910	216.55	421.79	419.79
HF071105C1 IBU12 2	2	0.1783	214.33	417.79	
HF071105C1 ICU1 1 HFITC 11	1	0.1585	219.76	427.57	421.57
HF071105C1 ICU1 1 HFITC 11	2	0.1477	213.09	415.56	
HF071105C1 ICU2 2 HFITC 21	1	0.1644	217.99	424.38	424.40
HF071105C1 ICU2 2 HFITC 21	2	0.1614	218.01	424.42	
HF071105C1 IAC1 1 HFITA 11	1	0.1627	221.11	430.00	428.50
HF071105C1 IAC1 1 HFITA 11	2	0.1707	219.45	427.01	
HF071105C1 ICC2 2 HFITC 21	1	0.1464	221.74	431.13	430.79
HF071105C1 ICC2 2 HFITC 21	2	0.1825	221.36	430.45	
HF071105C1 IAC2 2 HFITA 21	1	0.1702	212.45	414.41	414.98
HF071105C1 IAC2 2 HFITA 21	2	0.1658	213.08	415.54	
HF071105C1 IAC1 1 HFITC 11	1	0.1432	219.08	426.34	426.78
HF071105C1 IAC1 1 HFITC 11	2	0.1321	219.56	427.21	
HF071105C1 IBC1 1 HFITB 11	1	0.1750	212.53	414.55	417.18
HF071105C1 IBC1 1 HFITB 11	2	0.1785	215.45	419.81	
HF071105C1 IBC2 2 HFITB 21	1	0.1492	218.42	425.16	426.02
HF071105C1 IBC2 2 HFITB 21	2	0.1427	219.38	426.88	
AVERAGE					424.23

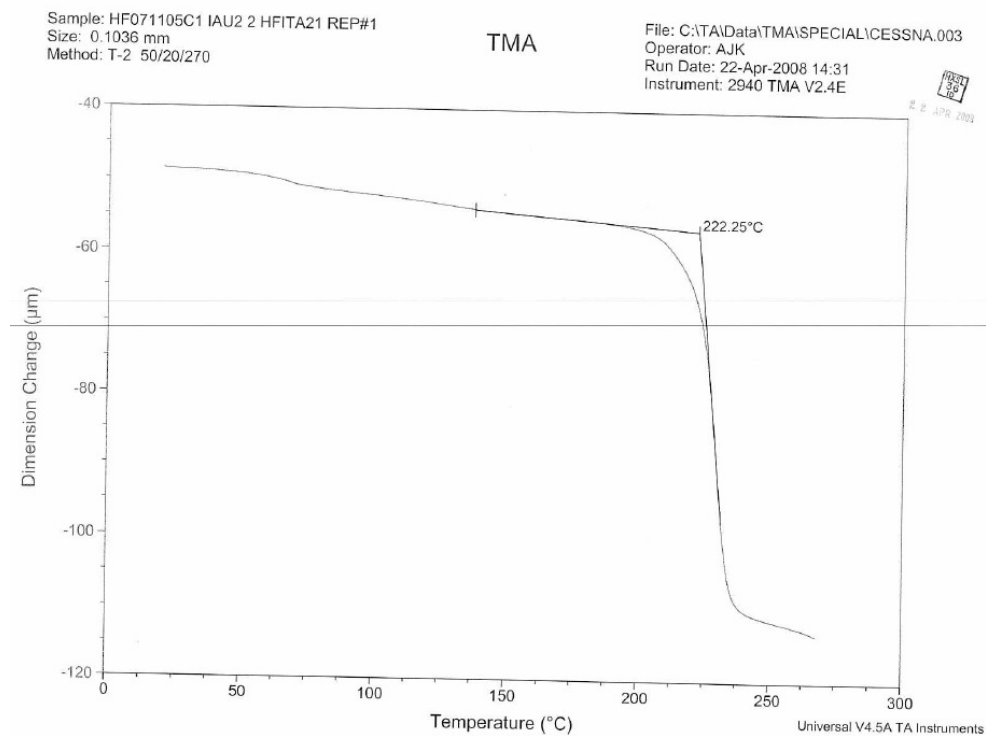
Table 9-1: Wet TMA Results


1/21/2008

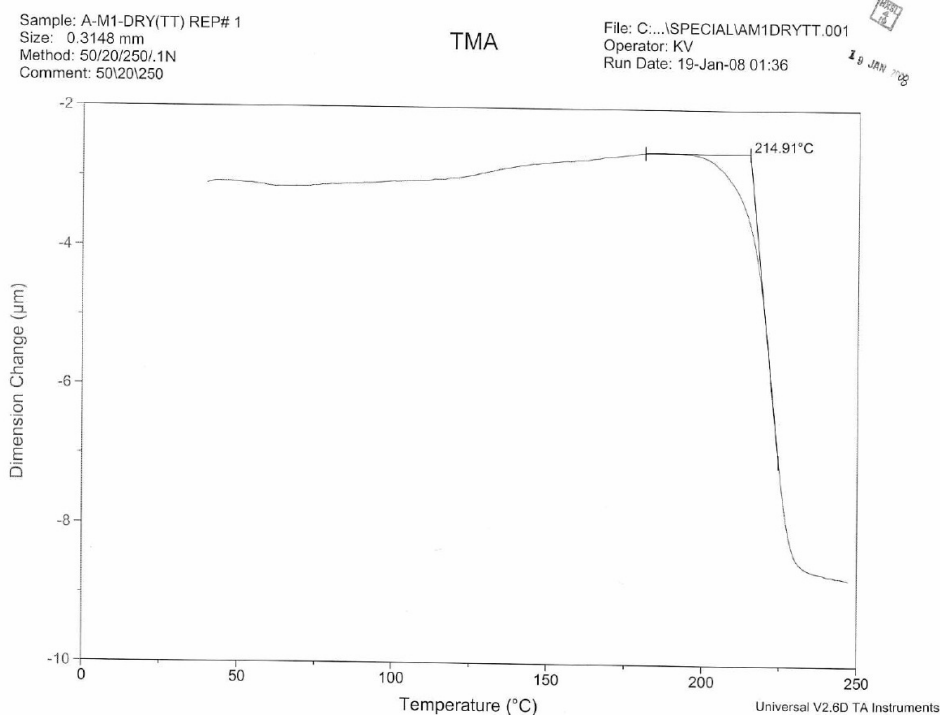
Summary of Dry NCAMP Supplied Tg (TMA) Specimens							
Specimen ID	Rep	Tg	Avg		Test Date	Time	Operator
HF-H12-TMA-A-M1-Dry (TT)	1	214.91	216.36	421.44	1/19/2008	1:36	KV
	2	217.80			1/19/2008	0:37	KV
HF-H12-TMA-A-M2-Dry (TT)	1	216.52	218.24	424.83	1/19/2008	1:54	KV
	2	219.96			1/19/2008	2:11	KV
HF-H12-TMA-B-M1-Dry (TT)	1	217.71	216.22	421.20	1/19/2008	2:35	KV
	2	214.73			1/19/2008	3:17	KV
HF-H12-TMA-B-M2-Dry (TT)	1	215.29	214.83	418.69	1/19/2008	3:42	KV
	2	214.37			1/19/2008	4:23	KV
HF-H12-TMA-C-M1-Dry (TT)	1	212.16	210.86	411.55	1/19/2008	5:02	KV
	2	209.56			1/19/2008	5:19	KV
HF-H12-TMA-C-M2-Dry (TT)	1	215.03	217.35	423.22	1/19/2008	5:35	KV
	2	219.66			1/19/2008	5:52	KV
HF-H12-TMA-A-M1-Dry (UNT3)	1	221.79	222.64	432.74	1/21/2008	7:09	KV
	2	223.48			1/21/2008	7:24	KV
HF-H12-TMA-A-M2-Dry (UNT3)	1	221.24	219.60	427.27	1/21/2008	7:41	KV
	2	217.95			1/21/2008	7:58	KV
HF-H12-TMA-B-M1-Dry (UNT3)	1	212.86	212.99	415.37	1/21/2008	8:16	KV
	2	213.11			1/21/2008	8:34	KV
HF-H12-TMA-B-M2-Dry (UNT3)	1	220.95	220.23	428.41	1/21/2008	8:51	KV
	2	219.50			1/21/2008	9:06	KV
HF-H12-TMA-C-M1-Dry (UNT3)	1	216.67	217.65	423.76	1/21/2008	9:53	KV
	2	218.62			1/21/2008	10:09	KV
HF-H12-TMA-C-M2-Dry (UNT3)	1	217.71	217.31	423.15	1/21/2008	10:37	KV
	2	216.90			1/21/2008	10:52	KV
AVERAGE							
AVERAGE				422.64			

Table 9-2: Dry TMA Results

9.1 TMA Wet Batch A Results



9.2 TMA Wet Batch A Results



10. Physical Test Results

The following physical test results were obtained at Hexcel. Remaining results required per section 4 of the test plan can be found on the CD accompanying this report.

NMS 128/2 Rev.- IM7G/8552 Type35, Class1, Grade190													
IM7G	8552												
Lot	spl	rep	Date	Ind	Avg	Test ID	Ind	Avg	Test ID	Ind	Avg	Test ID	
P6942-4SQ	1	1	25-Jan-07	12	12	GEL350	13.26	13.25	X_FLOW350B	0.688	0.711	X_VOL350P	
P6942-4SQ		2	25-Jan-07	12		GEL350	12.98		X_FLOW350B	0.615		X_VOL350P	
		3					13.5		X_FLOW350B	0.831		X_VOL350P	
P6942-4SQ	16	1	25-Jan-07	12	12	GEL350	13.12	13.06	X_FLOW350B	0.966	0.981	X_VOL350P	
P6942-4SQ		2	25-Jan-07	12		GEL350	12.95		X_FLOW350B	0.931		X_VOL350P	
		3					13.1		X_FLOW350B	1.045		X_VOL350P	
P6944	1	1	2-Mar-07	13	13	GEL350	13.69	12.36	X_FLOW350B	0.556	0.572	X_VOL350P	
P6944		2	2-Mar-07	13		GEL350	11.38		X_FLOW350B	0.57		X_VOL350P	
		3					12		X_FLOW350B	0.589		X_VOL350P	
P6944	14	1	2-Mar-07	12	12.2	GEL350	13.17	11.7	X_FLOW350B	0.569	0.501	X_VOL350P	
P6944		2	2-Mar-07	12.5		GEL350	11.34		X_FLOW350B	0.495		X_VOL350P	
		3					10.6		X_FLOW350B	0.438		X_VOL350P	
P7059	1	1	1-Mar-07	12.75	12.6	GEL350	14.42	14.75	X_FLOW350B	0.46	0.582	X_VOL350P	
P7059		2	1-Mar-07	12.5		GEL350	14.95		X_FLOW350B	0.645		X_VOL350P	
		3					14.87		X_FLOW350B	0.642		X_VOL350P	
P7059	16	1	1-Mar-07	13	13	GEL350	15.72	16.38	X_FLOW350B	0.733	0.59	X_VOL350P	
P7059		2	1-Mar-07	13		GEL350	16.27		X_FLOW350B	0.601		X_VOL350P	

Table 10-1: Hexcel Physical Testing Results

11. Deviations

1. For fluid sensitivity testing, the Jet Reference fluid called out in the NCAMP test plan is a rare fuel and therefore extremely expensive. As a replacement, we used Jet Fuel A per ASTM D1655. AMS2629 is a jet reference fuel intended to simulate jet engine fuel only. This was approved by all participating panel fabricators.
2. For the ETW testing, it was discovered that the original adhesive used to bond the strain gauges was not rated for the 250 degree F testing. Therefore, specimens were refabricated and retested for modulus. This caused a delay in the program due the time required to recondition and retest the specimens. Below is a summary of what decisions were made affecting this Hexcel 8552 program.
 - CLC's – Gauge bonded with M Bond 600, cured for 1 hour 30 minutes at 300F
 - Gauges were be applied before drying and then moisture conditioned.
 - Previously Tested CLC specimens - Hot Dry 250F : NCAMP looked for scraps for modulus specimens – more specimens were found and retested
 - ALL CLC specimens with Hot Wet 250F testing required 6 specimens per panel; 3 for modulus (gauged) and 3 for strength (not gauged). The number of specimens were 'doubled' because the protective coating applied on the gage might prevent (or slow down) moisture absorption rate in the gauged section.