

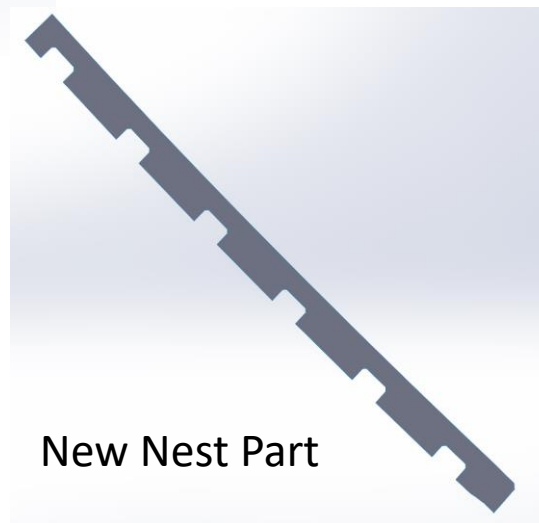
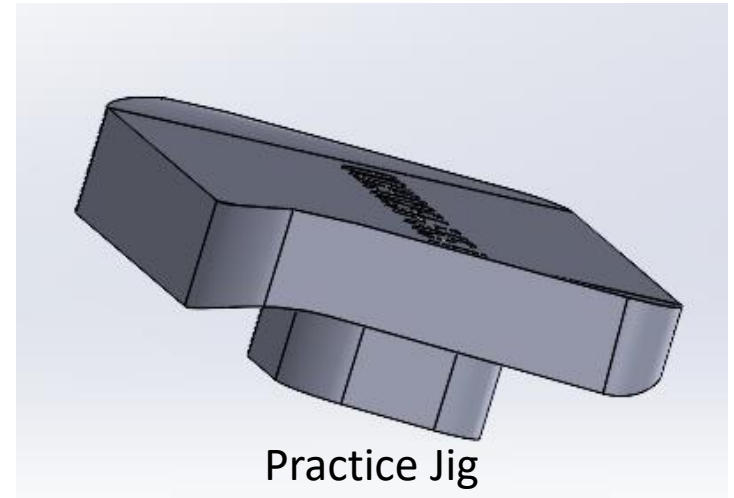
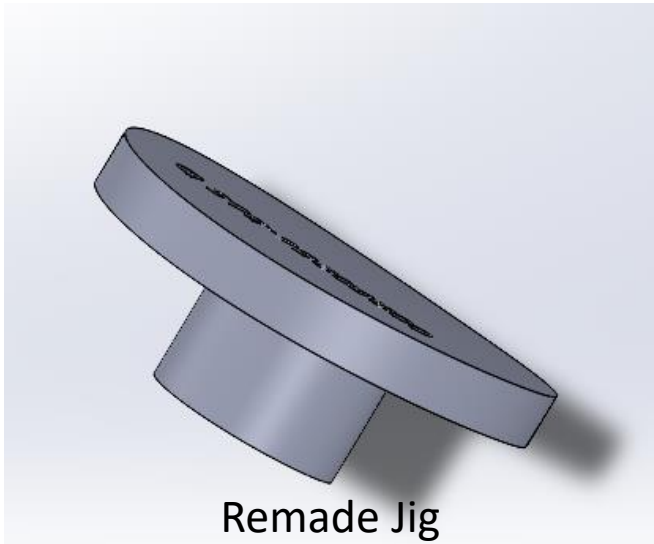
Summer 2021 Continuous Improvement Engineering Internship

Shubh Raval

Week 1: Project Introduction and Shadowing

- Learned from several presentations about the composite production process from Arshie
- Learned about Standard Work from Sean and the manufacturing/workflow management software's
- Was introduced to the TPS Project and what the overall goals will be for it
- Shadowed Eric as he worked on a TPS part using the old process to cut open slots
 - Learned about how the other processes work and what steps are taken
 - Began to consider where there was scope for improvement
- Was Introduced to Solidworks' Surfaces feature
- Began to learn from Arshie how the nesting software Patternsmith is used to create Pyron cutouts
- Began to attempt making my own solid models of the necessary jigs for TPS
 - Received a lot of guidance from Ruben and was able to become comfortable with the methods and was able to remake an old jig to be more accurate

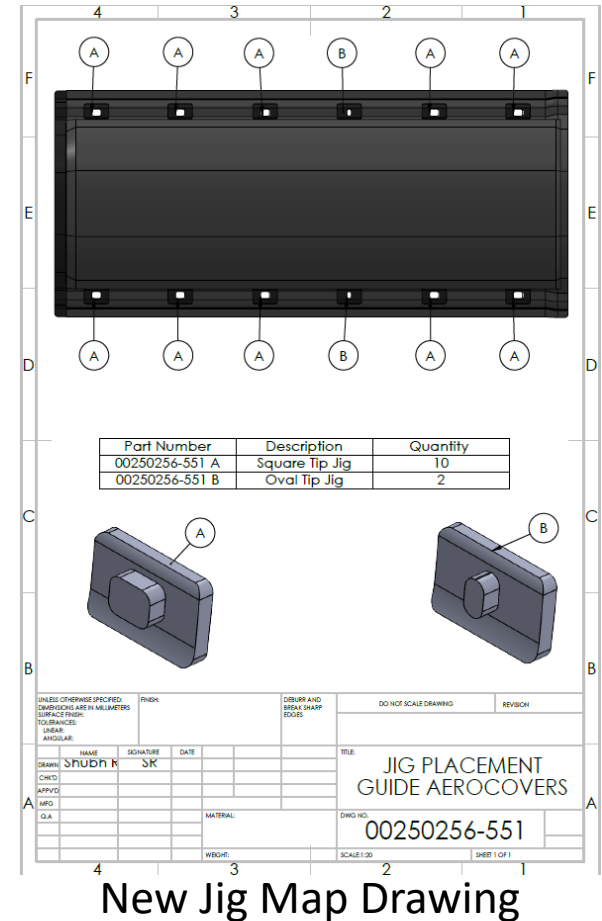
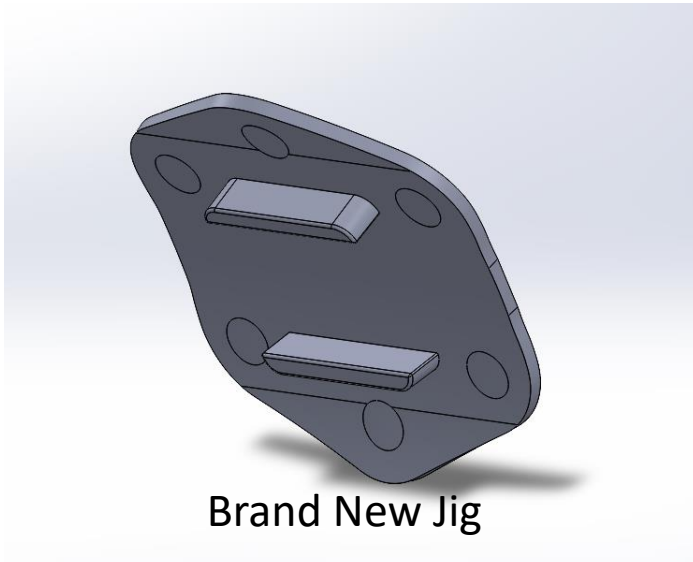
Week 1: Project Introduction and Shadowing



Week 2: Continuing work on Jigs and Start of TPS Standard Work

- Continued to improve both in speed and in complexity of jig design to a very high level of maturity
- Began to review reference material for TPS such as SpaceX specifications as well as prior MIS
- Began to shadow the TPS Lead Luis and with his help was able to see and learn the entire Pyron application process
- Was able to learn hands-on using a test part, of what the process feels like and how time consuming it can be
- Replaced an inaccurate Jig map in TPS with an accurate and updated version for TPS just before the audit there
- Started to take pictures and document the TPS process using detailed notes
- Began a first attempt at creating MIS_085 and worked to combine my accumulated knowledge and the photographs I have taken to fully describe the process
- Got feedback regarding design and style choices from Sean and content related feedback from Ruben and Luis

Week 2: Continuing work on Jigs and Start of TPS Standard Work



Week 3: Jig improvement and Major Standard Work Progress

- Worked to finalize Jig dimensions and test how to better improve the fit
- Ordered correct fitting steel pegs to standardize the Doghouse production process
- Continued taking pictures and improve on the Standard Work Document while getting feedback from Luis, Ruben, and Arshie
- Learned the full nest/ Pyron cutout process from Arshie and made several of my own
 - After working on them more and getting Luis' feed back improved upon the nests that I made
- Received a list of TPS parts that were made chronologically in the prior year from Jared and compiled that into an excel sheet that was the full list of all TPS parts organized by part number
- Used that to create the initial slide of the Standard Work
- Spoke to Shelby about getting part numbers for all consumables
 - After receiving products ordered list, I used my knowledge and updated the standard work to have accurate part numbers
- After receiving more input, I progressed the Standard Work to a nearly completed state awaiting relevant approvals
- Organized and created a set of folders to include all TPS parts, their drawings, 3D models, Jigs, and Nests

Week 3: Jig improvement and Major Standard Work Progress



Manufacturing Instruction Sheet

Revision Level A
Release Date 08/19/2021

Part ID	Part Name	Bill Of Materials
00250250-533	Aerocover, Fuel Extension, FWD, Primary Raceway	Item ID Description
00250250-545	Access Door, Aerocover, Fuel Extension, Primary Raceway	AX-2121LT Red and White Cover over Blue Film Adhesive
00250251-551	Aerocover, Fuel Tank, Primary Raceway	Pyron .250/ .350/ .50/1" Pyron of Various Lengths
00250251-553	Aerocover, Fuel Tank Weld, AFT, Primary Raceway	ULTEM Jigs Cream Colored 3D printed Jigs
00250251-555	Aerocover, Fuel Tank Weld, FWD, Primary Raceway	
00250251-557	Aerocover, Common Dome Weld, Primary Raceway	
00250251-559	Aerocover, Fuel Tank, Primary Raceway	
00250251-561	Aerocover, Common Dome Weld, Primary Raceway	
00250252-551	Aerocover, Fuel Tank Bulkhead, AFT, Primary Raceway	
00250252-563	Aerocover, Fuel Tank Bulkhead, FWD, Primary Raceway	
00250253-551	Aerocover, Fuel Transition, AFT, Primary Raceway	
00250253-553	Aerocover, Fuel Transition, FWD Primary Raceway	
00250254-561	Aerocover, Fuel Doghouse, AFT, Primary Raceway	
00250254-567	Aerocover, Fuel Doghouse, FWD, Primary Raceway	
00250255-551	Aerocover, Lox Transition, Primary Raceway	
00250256-551	Aerocover, Lox Tank, Primary Raceway	
00250256-553	Aerocover, Lox Tank AFT Weld, Primary Raceway	
00250256-557	Aerocover, Lox Tank, Short Primary Raceway	
00250256-561	Aerocover, AFT, Antenna, Lox Tank, Primary Raceway	
00250256-565	Aerocover, AFT, Antenna, Lox Tank, Primary Raceway	
00250256-573	Aerocover, FWD, Antenna, Lox Tank, Primary Raceway	
00250257-553	Aerocover, Lox Doghouse Transition, FWD, Primary Raceway	
00250258-573	Aerocover, Lox Doghouse, Primary Raceway	
00318602-561	QD Aerocover	
00318602-563	QD Aerocover	
00469401-503	Assy, Flange, OML, Bearing Cover, Interstage	
00469401-505	Assy, Flange, OML, Bearing Cover, Interstage	
00730371-523	Cover Assy, Secondary Raceway, Pusher Fitting, Monolithic	
00730371-524	Cover Assy, Primary Raceway, Pusher Fitting, Monolithic	
Customer		
Name		SpaceX
Approvals		MIS 084_Revision 1.0, Date 8/19/2021
Engineering		Ruben Botello
Manufacturing		John Tchinski
Quality		Nikola Mrmak
SKCB-H-2738		Exacto Cutting Blades and Snap Blades: Both Angled and Flat Blades
700-MC		Freeplate for ULTEM Jigs

MIS First Slide

Manufacturing Instruction Sheet – Form

Applied Composites 25671 Commercenter Dr. Lake Forest CA 92630 (Proprietary Information)

1
Controlled Document

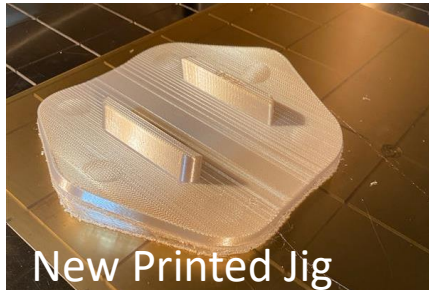
Part #	Part Name	Material	Jigs Required (Y/N)	Jigs Made (Y/N)	Jigs Used (Y/N)	Jigs Printed (Date/Plt)	Next Required (Y/N)	Next Made (Y/N)	File Location	Date Last Updated	Revisions	Next Release Date (ExpM)
00250250-533	Aerocover, Fuel Extension, FWD, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250250-533 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250250-545	Access Door, Aerocover, Fuel Extension, Primary Raceway	Pyron	N	N	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250250-545 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250251-551	Aerocover, Fuel Tank, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250251-551 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250251-553	Aerocover, Fuel Tank Weld, AFT, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250251-553 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250251-555	Aerocover, Fuel Tank Weld, FWD, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250251-555 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250251-557	Aerocover, Common Dome Weld, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250251-557 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250251-559	Aerocover, Fuel Tank, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250251-559 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250251-561	Aerocover, Common Dome Weld, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250251-561 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250252-551	Aerocover, Fuel Tank Bulkhead, AFT, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250252-551 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250252-563	Aerocover, Fuel Tank Bulkhead, FWD, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250252-563 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250253-551	Aerocover, Fuel Transition, AFT, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250253-551 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250253-553	Aerocover, Fuel Transition, FWD Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250253-553 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250254-561	Aerocover, Fuel Doghouse, AFT, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250254-561 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250254-567	Aerocover, Fuel Doghouse, FWD, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250254-567 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250255-551	Aerocover, Lox Transition, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250255-551 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250256-551	Aerocover, Lox Tank, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250256-551 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250256-553	Aerocover, Lox Tank AFT Weld, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250256-553 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250256-557	Aerocover, Lox Tank, Short Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250256-557 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250256-561	Aerocover, AFT, Antenna, Lox Tank, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250256-561 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250256-565	Aerocover, AFT, Antenna, Lox Tank, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250256-565 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250256-573	Aerocover, FWD, Antenna, Lox Tank, Primary Raceway	Pyron	Y	Y	Y	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250256-573 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250257-553	Aerocover, Lox Doghouse Transition, FWD, Primary Raceway	Pyron	Y	Y	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250257-553 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00250258-573	Aerocover, Lox Doghouse, Primary Raceway	Pyron	Y	N	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00250258-573 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00318602-561	QD Aerocover	Pyron	Y	Y	Y	Y (Unknown)	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00318602-561 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00318602-563	QD Aerocover	Pyron	Y	Y	Y	Y (Unknown)	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Aerocover\00318602-563 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00469401-503	Assy, Flange, OML, Bearing Cover, Interstage	Pyron	N	N	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Bearing Cover\00469401-503 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00469401-505	Assy, Flange, OML, Bearing Cover, Interstage	Pyron	N	N	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Bearing Cover\00469401-505 (1-8-20)	8/19/2021	Jig peg update offset 06/26	
00730371-523	Cover Assy, Secondary Raceway, Pusher Fitting, Monolithic	Pyron	Y	N	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Pusher Fitting\00730371-523	8/19/2021	Jig peg update offset 06/26	
00730371-524	Cover Assy, Primary Raceway, Pusher Fitting, Monolithic	Pyron	Y	N	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Pusher Fitting\00730371-524	8/19/2021	Jig peg update offset 06/26	
00505272-525	Jeep Grill Cover	Cork	Y	Y	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Jeep Grill Cover\00505272-525	8/19/2021	Jig peg update offset 06/26	
00505085-521	Separation Cover, S2	Cork	Y	Y	N	N	Y	Y	L:\locam\Users\Shubh Ravat\TPS\Separation Covers\00505085-521 (1-8-20)	24-Aug	Remove a Body Next of New Cuts	
00505085-525	Separation Cover with Transition, S2	Cork	Y	N	N	N	Y	N	L:\locam\Users\Shubh Ravat\TPS\Separation Covers\00505085-525 (1-8-20)	24-Aug	Remove a Body Next of New Cuts	

Fully Organized TPS
List

Week 4: Nest Improvements, Jig Printing, and MIS 085 Release

- Updated all Nests currently being used
- Made any relevant touch ups to the MIS and pushed it further along for release
- Followed up on getting new Table tops for the Eastman ordered
- Got a quote for updating the old hardware and software for the Eastman to make it more controllable
- Looked through how the Test part performed in the quality inspection
 - Validated with quality and final finish that the methods are acceptable
 - Will be looking to perform one more test and then push the new TPS Pyron method for production
- Began to plan a training course modeled after the lamination training for TPS
- Planned a test print to determine tolerances of 3D printer
- Tested brand new jig fitting and planned production of second test leading into the following week
- Went over and made final adjustments to MIS with Arshie
- Released MIS to Quality for review
- Started to work through other lower production TPS parts which will require nests

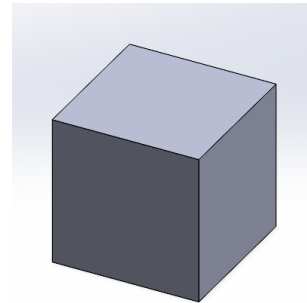
Week 4: Nest Improvements, Jig Printing, and MIS 085 Release



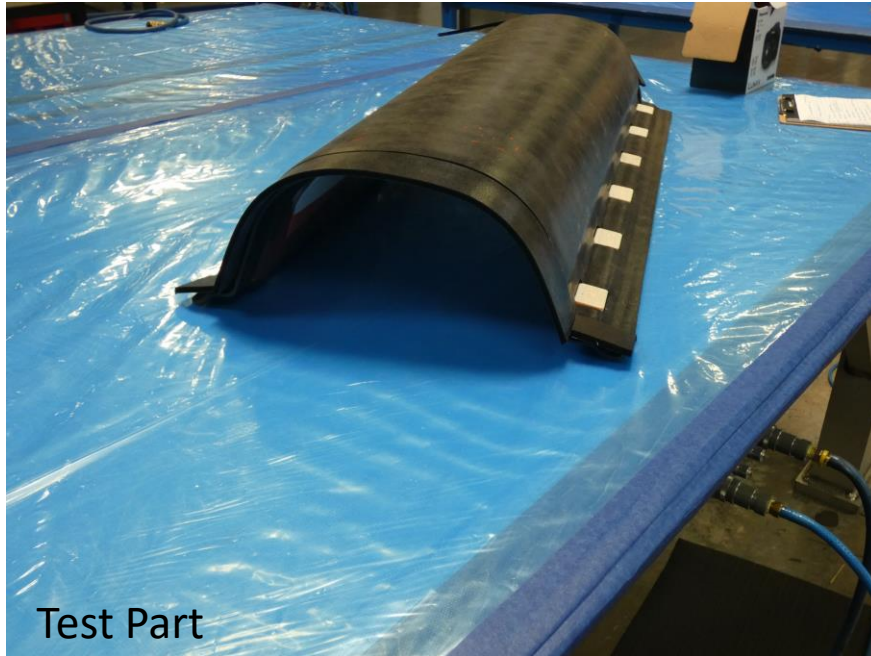
New Printed Jig



New Printed Jigs



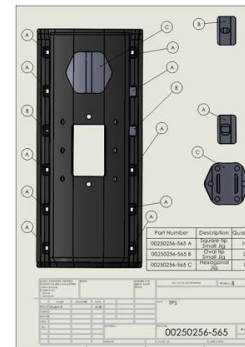
Testing Cube



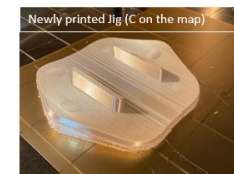
Test Part

Section 3.1: Pyron Installation: Jig Usage

- Jigs in TPS are made from ULTEM a 3D printing material designed for high heat applications
 - They are cream in color and will have a part number written on them
- In TPS they are used to position the Pyron during Section 3 with respect to their slots.
- They are also used to hold those pieces in place during the cure process in the Oven thereby preventing any shifting of the material which could lead to a nonconformity as seen in Section 4.2.1
- After cure they serve as guides for slot cleanup



Example Jig map showing location of Jig placement.



Newly printed Jig (C on the map)



Part with jigs having been used for aligning pieces of Pyron



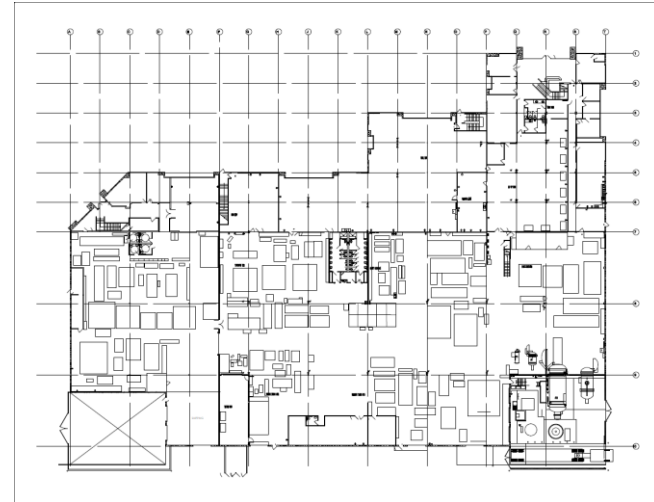
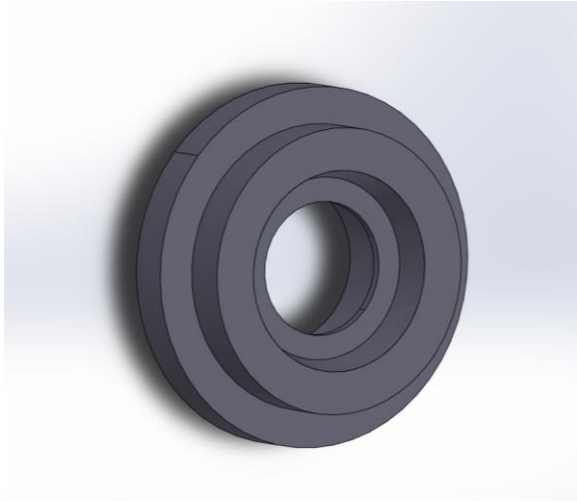
Part with jigs holding pieces in place during debulk

Addition to MIS

Week 5: Los Alamitos Vertical Storage Solution Support

- Given tour of Los Alamitos Operation by Michael M. who spoke about products made and various logistical considerations
- Connected with Adrian, the Engineering Intern, designing the Storage prototype
- Aided in fabrication of the prototype ranging from brakes and other moving component installation to shelving and frame structure installation
- Worked on generating an accurate floorplan drawing
- Designed Bumpers, which were 3D printed, to serve as stoppers for sliding cart mechanism
- Redesigned wheels to improve sliding mechanism of the cassette
- Helped identify areas in need of redesign and reinstalled outer carriage railings to optimize their sliding.
- Also focused determining what modifications were needed on outsourced parts (i.e. incorrect hole size needing to be redrilled)
- Identified areas of prior floor plan that need to be changed to show the current building layout

Week 5: Los Alamitos Vertical Storage Solution Support



Week 6: Jig and Nest Development and TPS second test

- Started to create Jigs and Nests for all TPS parts following successful first test of new process
- Charted out path forward to begin releasing and using the new process for upcoming TPS parts
- Received recommendations during approvals process for MIS 084 and made necessary adjustments
- Began to start the testing of nests for other parts
- Started to coordinate jig printing for production
- Used QT9 to have maintenance install new table covers
- Coordinated with production team to get update traveler for test part with all the relevant correct information.
- Improved on nests made for parts after mock fittings and feedback from TPS lead Luis

Week 6: Jig and Nest Development and TPS second test



Brand New Nests in a Poly test

Week 7: Jig, Nest, and TPS training development

- Continued to make jigs for more complex TPS parts, as well as start to make Nests for these parts while consulting with the TPS lead
- Got to see the first debulk of second test, which turned out very nice
- Started to make a TPS training using inspiration from the Lamination trainings
- Created first nest for Separation covers, to try and push for an improved easier TPS layup process
- Tested Separation cover with intent to perform an actual cut using cork this week
- Took part in team building event, which involved lunch and an escape room challenge
- Created first module for TPS training based off training in lamination, and charted what TPS training should entail
- Released MIS 084
- Took lead on performing maintenance for Eastman as well as seeking out servicing
- Began documenting TPS cork process
- Brought up idea of creating SOP for 3D printer

Week 7: Jig, Nest, and TPS training development



What is the Thermal Protection System?
The Thermal Protection System is what is along the space craft to protect the body and components from extreme temperatures and heat.

For SpaceX this system must be reusable allowing for multiple escapes and re-entries.

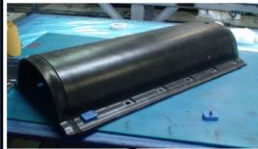
Composites made here are used to aid and help progress the space industry. The parts you make are being used to make a critical subsystem of rocket.



SpaceX Falcon 9



SpaceX Falcon 9 Closeup



TPS part finished and its installation on the Falcon 9 rocket.

TPS Training Module



Team Building Event

Section 6

11

Controlled Document

Visual Aid - Form
Applied Composites 25671 Commercenter Dr. Lake Forest CA 92630 (Proprietary Information)

Second Test Part



Week 8: Jig, Nest, and TPS training development

- Continued to make jigs for more complex TPS parts, as well as start to make Nests for these parts while consulting with the TPS lead
- Performed first attempt at using new process on a production part
- Continuously reworked nest for separation cover, while consulting with technicians for feedback.
- Started doing research on finding replacement cutting table for pre-preg
- Made several phone calls to generate quotes for new cutting table
- Created training timeline to document the full new process for new TPS hires
- Developed new Jig maps for parts with new Jigs
- Used the TPS full parts data sheet I made to continuously track completion on TPS nests, Jigs, and releases.
- Looking into creating a practical training worksheet inline with the lamination practical training worksheet

Week 8: Jig, Nest, and TPS training development



Autometrix

- Type of Cutting: Conventional drag blade, can also use a circular blade
- Cost: Radium is 75,000 and Argon is 85,000. Catalyst 150,000
- Size: 6' x 6' with the ability to cut parts longer than 6'
- Software: Autometrix patternsmith, any computer and is connected via ethernet to operate the machine
- Cutting speed: 45in/s Radium and 65in/s Argon

ADDITIONAL COMMENTS

Two models Argon and Radium only difference is one cuts about 25 percent faster

- Also available is the conveyor belt fed Catalyst which could use either an Argon or Radium gantry

Based in California, still awaiting detailed information regarding repair costs. Also based on California Law replacement parts must be made available for at least 7 years after purchase so perhaps some cost saving options there. Yearly maintenance cost is around 2,000 for a servicing contract. Upgrade machine is about 60-70 percent the cost of a new machine and replaces everything inside the machine

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3

Applied Composites Training Record									
Subject: TPS New Hire Training									
Department: TPS									
Instructor: Luis Hernandez									
Documents: Shop Practice									
Notes: The purpose of this training is to validate that the TPS technician is qualified to work on the TPS process. The training will consist of the following: 1. Hands on training with the TPS lead. The training will focus on the Pyron application and detail bagging. The training record will be filled out and objective evidence (i.e. pictures) will be provided. Fill out Attachment 1. 2. Hands on training with the TPS lead. The training will focus on the Pyron finishing (slot cleaning) following care. The training record will be filled out and objective evidence (i.e. pictures) will be provided. Fill out Attachment 1. The part is to be validated by QC. Please email images to the responsible ME. 3. If step 1 & 2 are completed successfully, the technician is to perform step 1 & 2 by themselves. The Lead is to monitor supervision and objective evidence should be provided. The part is to be validated by QC. Please email images to the responsible ME. 4. Same as Step 3. Completing this 3-step training provides objective evidence that the technician is qualified to work on the TPS process. 5. At the end of this training the TPS lead is to review with the technician to go over any notes or suggestions.									
Instructor Signature _____	Date _____								
<table border="1"> <thead> <tr> <th>Classroom Training Completion Checklist</th> <th>QC Signature</th> </tr> </thead> <tbody> <tr> <td>Stamp & Traveler Training</td> <td></td> </tr> <tr> <td>TPS Module 1 Training</td> <td></td> </tr> <tr> <td>TPS Module 2 Training</td> <td></td> </tr> </tbody> </table>		Classroom Training Completion Checklist	QC Signature	Stamp & Traveler Training		TPS Module 1 Training		TPS Module 2 Training	
Classroom Training Completion Checklist	QC Signature								
Stamp & Traveler Training									
TPS Module 1 Training									
TPS Module 2 Training									
Employee Name (print) _____	Employee Verification (sign or stamp) _____								
Employee Signature _____									

Applied Composites Training Record	
Attachment 1 - Training record Log	
The information below to be completed by Lead:	
Job Number: _____	Additional Comments: _____
Technician Name: _____	
Step 1	
Job Number: _____	Comments: _____
Technician Name: _____	
Step 2	
Was part verified by QC? (Yes/No): _____	
Any non-conformances found? (Y/N/No): _____	
Images sent to responsible ME? (Yes/No): _____	
Step 3	
Job Number: _____	Comments: _____
Technician Name: _____	
Which Step was completed? (1, 2, 3, 4): _____	
Was part verified by QC? (Yes/No): _____	
Any non-conformances found? (Y/N/No): _____	
Images sent to responsible ME? (Yes/No): _____	
Step 4	
Job Number: _____	Comments: _____
Technician Name: _____	
Which Step was completed? (1, 2, 3, 4): _____	
Was part verified by QC? (Yes/No): _____	
Any non-conformances found? (Y/N/No): _____	
Images sent to responsible ME? (Yes/No): _____	



New Process Production Part

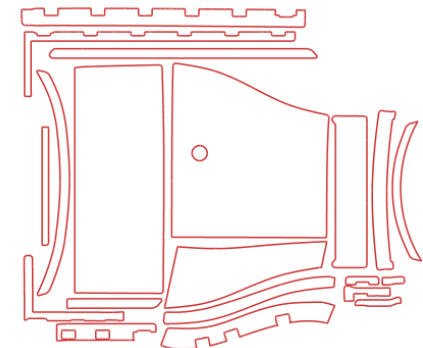
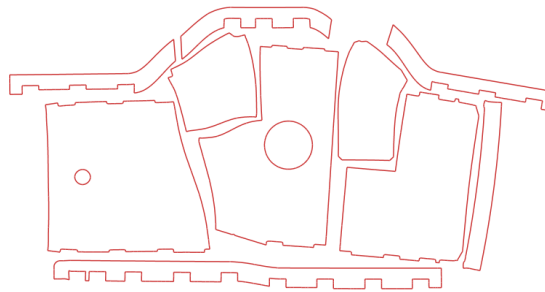
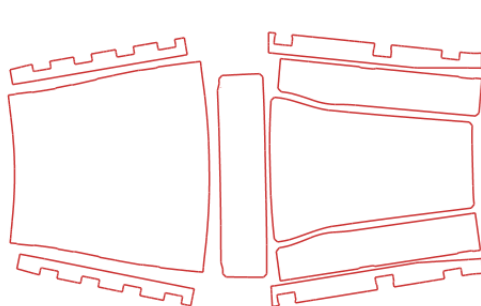
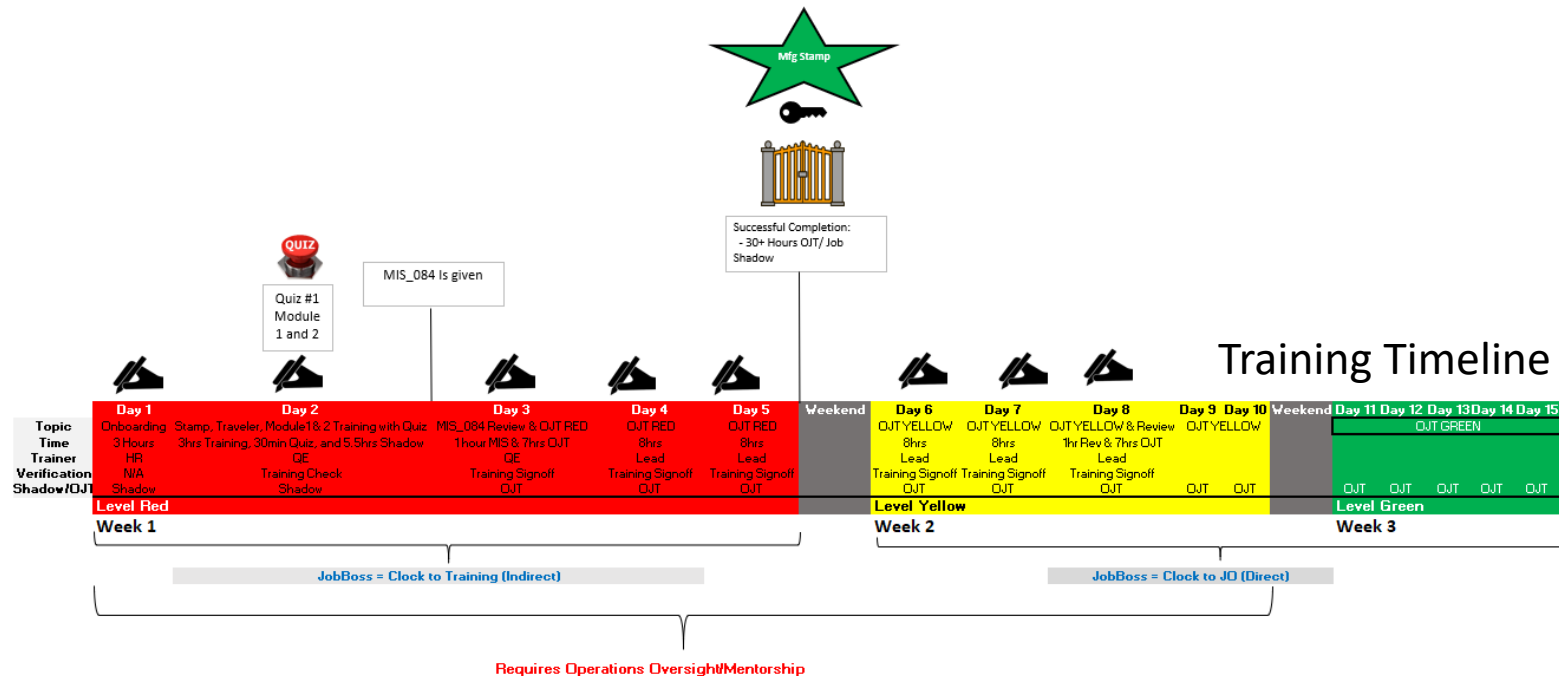
Cutting Table Research

Practical Training Attempt 1

Week 9: More Training Development

- Continued to make jigs for more complex TPS parts, as well as start to make Nests for these parts while consulting with the TPS lead
- Performed first attempt at using new process on a production part
- Continuously reworked nest for separation cover, while consulting with technicians for feedback.
- Started doing research on finding replacement cutting table for pre-preg
- Made several phone calls to generate quotes for new cutting table
- Created training timeline to document the full new process for new TPS hires
- Developed new Jig maps for parts with new Jigs
- Used the TPS full parts data sheet I made to continuously track completion on TPS nests, Jigs, and releases.
- Looking into creating a practical training worksheet inline with the lamination practical training worksheet

Week 9: More Training Development




New Complex Nests

Week 10: Training Role out Prep

- Training schedule completion and training materials near completion
- Slight remodeling of Jigs based on measurements obtained from calibration cube print
- Several unique Jig sets sent for printing
- Received and connected with all remaining cutting machine vendors and received quotes regarding their prices
- Compiled all that information into a Slide deck
- After checking Job Boss data newly released production process resulted in a 33 percent increase in manufacturing efficiency. This will be stretched over all 32 TPS parts as more of the Jigs/Nests I made are validated and released

Week 10: Training Role out Prep

		On-the-Job Training Assessment		Rev: 001
RED				
Employee Name:		Trainer Name:		
SAFETY				
Topic	Criteria	Verification		
CCA/EMA/Site PPE	Introduction to CCA/EMA and Site PPE requirements	<input type="checkbox"/>		
QUALITY				
Topic	Criteria	Verification		
Documentation	Completed Training for Stamp usage and Traveler usage	<input type="checkbox"/>		
Documentation	Completed TPS Module 162 and has passed Quiz #1	<input type="checkbox"/>		
Documentation	Has been given MIS_084	<input type="checkbox"/>		
Documentation	Completed MIS_084 review	<input type="checkbox"/>		
FOD	Review FOD control - films, contamination, approved cleaning technique	<input type="checkbox"/>		
SYSTEMS				
Topic	Criteria	Verification		
ADP	Shows how to dock-in and out	<input type="checkbox"/>		
Onboarding	Has completed entire onboarding process	<input type="checkbox"/>		
DCA	Employee attends & understands intent of DCA	<input type="checkbox"/>		
OPERATIONS				
Topic	Criteria	Verification		
Production	Employee has begun shadowing TPS lead	<input type="checkbox"/>		
Safety	Has been shown safety requirements when in TPS area	<input type="checkbox"/>		
Traveler	Shows how travelers are adhered to in TPS	<input type="checkbox"/>		
Practical Training Step	Has been shown how to apply Pyron, perform debulking, and make bagging	<input type="checkbox"/>		
PTS 1 Job Number:	Additional Comments:	<input type="checkbox"/>		
Practical Training Step	Hands on training with the TPS lead. The training will focus on the Pyron finishing (slot cleaning) following cure. The training record will be filled out and objective evidence (i.e. pictures) will be provided.	<input type="checkbox"/>		
PTS 2 Job Number:	Additional Comments:	<input type="checkbox"/>		
Part verified by GC:	Additional Comments:	<input type="checkbox"/>		
Images Sent to ME:	Additional Comments:	<input type="checkbox"/>		
<hr/>				
Employee Signature:		Date:		
Trainer Signature:		Date:		

<div style="display: inline-block; vertical-align: middle;"> On-the-Job Training Assessment YELLOW </div>		<div style="border: 1px solid black; padding: 2px;"> Rev: 001 </div>
Employee Name: _____		Trainer Name: _____
SAFETY		
Topic	Criteria	Verification
COA/EHA/5th PPE	Adherence to COA/EHA and 5th PPE requirements	<input type="checkbox"/>
COA/EHA	Review of Cleaning 5th shoe & Respirator utilization	<input type="checkbox"/>
Topic	Criteria	Verification
Documentation	Demonstrator has to accurately complete quality records, such as to	<input type="checkbox"/>
Documentation	Demonstrator has to find & review Bulb/Bulbstruction	<input type="checkbox"/>
Traceability	Demonstrator understands and material traceability	<input type="checkbox"/>
Material Outline	Demonstrator understands and multiple tracking process	<input type="checkbox"/>
FOD	Review FOD control- film, contamination, approved cleaning to the	<input type="checkbox"/>
SYSTEMS		
Topic	Criteria	Verification
ADP	Employee accurately punch time & record lunch violations	<input type="checkbox"/>
Time Reporting	Employee accurately report time to AD within 48 hrs	<input type="checkbox"/>
DOA	Employee attends & understands status of DOA	<input type="checkbox"/>
OPERATIONS		
Topic	Criteria	Verification
Tool Kit	Employee introduced to tools used for FR prep work	<input type="checkbox"/>
Tool Kit	Demonstrator proper use of tools as cutting, grinding, heat gun, heat	<input type="checkbox"/>
Tool Kit	Employee identify and show how they are used in most of setting	<input type="checkbox"/>
Application	Employee understands and cleans requirement	<input type="checkbox"/>
Safety	Relious	<input type="checkbox"/>
Travel	Employee able to retrieve travel pass card solo	<input type="checkbox"/>
Material	Employee understands how to retrieve appropriate and handle use as	<input type="checkbox"/>
Material	Employee has to handle & protect material (from & cured) and show to	<input type="checkbox"/>
Product	Demonstrator has to use FR prep application to change build up not with utilizing or non-compliance	<input type="checkbox"/>
Practical Training Step	Technician to perform Step Two 2-2 along with any additional steps	<input type="checkbox"/>
PTS Job Number:	2 in manual starting their own under supervision. Validate with GO and send picture to responsible ME	<input type="checkbox"/>
Additional Comments:		
Part verified by GO:	Additional Comments:	<input type="checkbox"/>
Inspec Sent to ME:	Additional Comments:	<input type="checkbox"/>
Practical Training Step	Repeat at Step 3. If this part is also complete with no further technician is qualified to work on the TPS process.	<input type="checkbox"/>
PTS Job Number:	Additional Comments:	<input type="checkbox"/>
Part verified by GO:	Additional Comments:	<input type="checkbox"/>
Inspec Sent to ME:	Additional Comments:	<input type="checkbox"/>
Practical Training Completion Comments and Review: <div style="height: 40px;"></div>		
Employee Signature: _____		Date: _____
Trainer Signature: _____		Date: _____

ULTEM JIG QUANTITIES FOR PRINTING FOR JOB 149805:

PRINTING PRIORTIY IN LISTED ORDER

```
✓[Complete] 00250250-533 A: 1 [30mins]
✓[Complete] 00250250-533 A MIRROR: 1 [30mins]
✓[Complete] 00250250-533 B: 3 [30mins*3=90mins]
✓[Complete] 00250250-533 B MIRROR: 3 [30mins*3=90mins]
✓[Complete] 00250250-533 C: 1 [30mins]
✓[Complete] 00250250-533 C MIRROR: 1 [30mins]
✓[Complete] 00250250-533 D: 1 [30mins]
✓[Complete] 00250250-533 D MIRROR: 1 [30mins]
✓[Complete] 00250250-533 E: 1 [30mins]
✓[Complete] 00250250-533 E MIRROR: 1 [30mins]
```

Total approx for 1st batch: ~8hrs

```
[Complete] 00250255-551 A: 7 [30mins*7=210mins]
[Complete] 00250255-551 B: 1 [30mins]
[Complete] 00250255-551 C: 1 [30mins]
[Complete] 00250255-551 D: 1 [30mins]
[Complete] 00250255-551 E: 6 [30mins*6=180mins]
[Complete] 00250255-551 F: 1 [30mins]
[Complete] 00250255-551 H: 1 [30mins]
[Complete] 00250255-551 I: 1 [30mins]
```

Total approx for 2nd batch: ~10hrs

```
00250256-551 A: 30 [30mins*30=900mins]
00250256-551 B: 6  [30mins*6=180mins]
```

Total approx for 3rd batch: ~18hrs

```
[Complete] 00250252-551 A: 1 [30mins]
[Complete] 00250252-551 B: 1 [30mins]
[Complete] 00250252-551 C: 1 [30mins]
[Complete] 00250252-551 D: 2 [30mins*2=60mins]
[Complete] 00250252-551 E: 1 [30mins]
[Complete] 00250252-551 F: 1 [30mins]
[Complete] 00250252-551 G: 1 [30mins]
00250252-551 H: 1 [30mins]
00250252-551 I: 1 [30mins]
00250252-551 J: 1 [30mins]
00250252-551 K: 2 [30mins*2=60mins]
00250252-551 L: 1 [30mins]
```

Total approx for 4th batch: ~7hrs

```
00250256-573 A: 10 [30mins*10=300mins]
00250256-573 B: 2 [30mins*2=60mins]
```

Total approx for 5th batch: ~6hrs

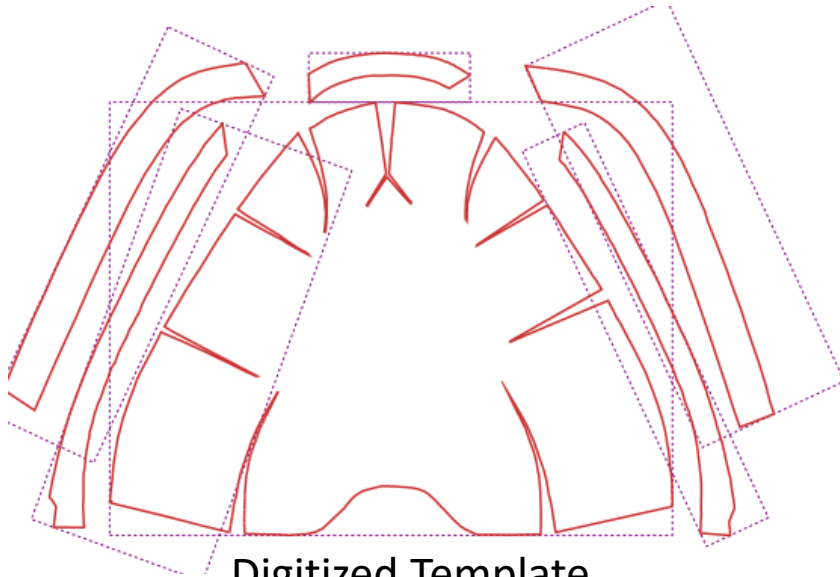
New On the Job Training Forms

Production Jigs Print List

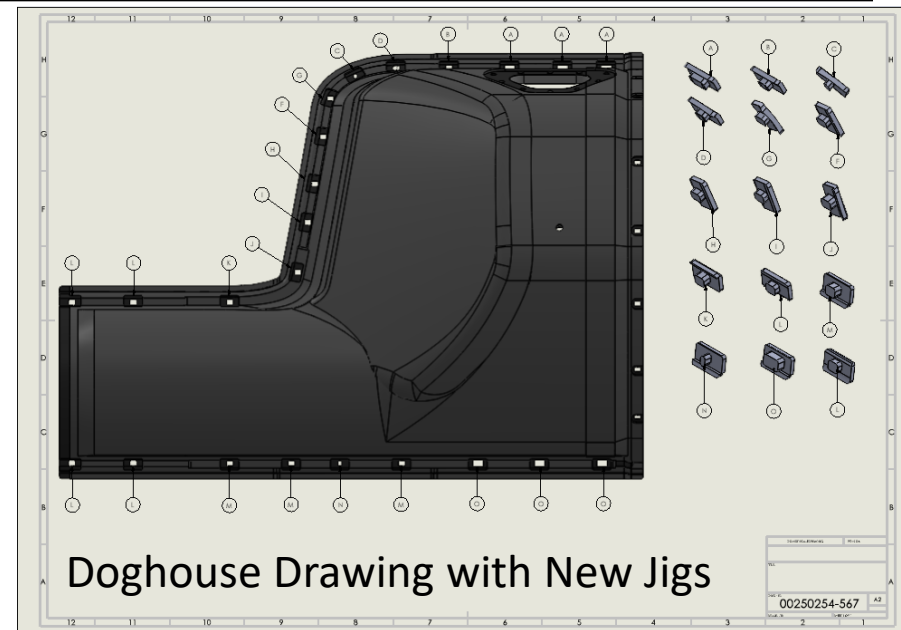
Week 11: Final Week

- Modified lamination training quiz for TPS
- Slight remodeling of Jigs based on measurements obtained from calibration cube print
- Compiled all that information into a Slide deck for presentation to general manger
- Received first printed set of Jigs for production
- Completing the design of Jigs for Doghouse production
- Worked with Oscar the Supervisor to push digitizing the Separation Cover template that was made by hand
- Performed a poly test of new template, which fit perfectly

Week 11: Final Week



Digitized Template



Doghouse Drawing with New Jigs

TPS Training Quiz

Applied Composites

Module 1 Quiz
Passion Level 100
Release Date: 07/20/2021

Name (Print) _____ Date _____

Answer the questions by circling a single answer.

- When cutting Pyron or Cork one should:
 - Cut towards your body using a dull blade without wearing gloves.
 - Cut away from your body using a dull blade without wearing gloves.
 - Cut away from your body using a sharp blade while wearing gloves.
 - Cut towards your body using a sharp blade while wearing gloves.
- Clean-up-as-you-work is an important practice. Some examples include:
 - Clean up the area when work is complete.
 - Clean up debris that has the potential to cause damage to the parts and/or would give the appearance of poor workmanship or housekeeping.
 - Clean up the area and cover up the part with bagging film when departing from the direct working area.
 - All of the above.
- The department supervisors are responsible of making sure FOD Prevention Containers are emptied:
 - On a daily basis.
 - On a weekly basis.
 - We don't empty FOD containers.
 - That is not part of my responsibilities.
- It is the department supervisor's responsibility to report repeating or significant FOD and its sources to the manufacturing manager or quality function to initiate formal corrective actions.
 - True
 - False
- I don't need to check the expiration date of the material because that is an inventory function.
 - True
 - False
- Out-life traceability must be maintained for the following, except:
 - Pre-preg
 - Film Adhesive
 - Pyron
 - Mixed Epoxy