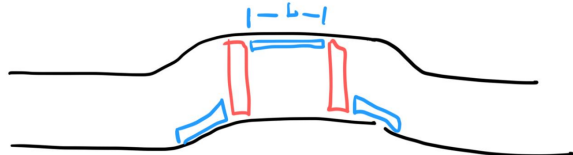# FW Structures 25-26

	Aditya (Insert design)	Daniel (Bolt Sizing (struts + inserts)	Konstantin (Insert materials + Ansys)	Mantra	Sai	Phase
10/5/2025	- Use Creo to model inserts. - See how they were done last year and mimic for some practice **Have 1 completed insert design in Creo / relay what can be improved with insert designs for the 25-26 year from 24-25**	- Understand shear loads on bolts. - List and evaluate possible bolting techniques for a) struts and b) inserts **Relay evaluated bolting techniques / justify why technique should be used.**	- Insert materials. Pros and cons on plastics and possible manufacturing methods. - Trade study on Kevlar / Carbon fiber as layer on front wing - Mess around with Ansys (ACP, Workbench, Discovery). **Relay evaluated insert materials to use / justify why. Have ran simulation for Ansys /ACP /Workbench.**	- Look at Ansys (ACP /Workbench /Discovery). - A comprehensive list of the possible loading situations (not values but situations) - Look at Tate's cone strike and see how it works /makes sense - Think about cone strike situations that are most likely to actually happen and not just values at which it hits.	- Possible locating features to place inserts well inside the main plane. Work on ideas being explored the other day. - Where the blue stuff are referencing features and the red stuff is the insert.	Research / Familiarization with software
10/7/2025	TBA post-research	TBA post-research	Run Ansys Sim based on 23-24 insert study. Element-Element mounting design via Creo	TBA post-research	TBA post-research	Design 1
10/9/2025						Design 2

10/11/2025					Final Design / 'ADR-ready'.
10/16/2025	AERO ADR				

To-do for FMR

- Submit Pressure fields Konstantin Maslov | Wednesday 11 pm
- Internal Structures Advait Chordia Aditya Prabhu Jashanjeet Gill | Wednesday 5 pm
- FEA setup Konstantin Maslov Advait Chordia
  - Cone strike numbers
  - Pressure field *(This might not even be necessary since George is running both fw designs on 95pmh, which gives us our pressure field for fea regardless of which design gets the better result - Konstantin)*
- Bolt sizing
- Cable tensioning
- Mounting possibilities to trim elements with ease
-

Introduction to Aero manufacturing, based on 25-26 tech talk, as requested

Aero Manufacturing notepad edition

Shop / ESPL: Undertray layups
Mold prep
Post Pro

Annex: Home of Shopbot AHHHH
Dyno Room LuMEB 1212/1214: most layups happen there. Wet layups are new this year. Backdoor of the dyno room is typically unlocked but BAD for using it normally. typically dyno keys are in first aid cabinet.

Flying S: Where we cure our carbon. About a 2 hour drive from espl.
Shopbot: Our router that we use for that.

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Foam molds: Shopbot prepreg layups.
3D Printed: Wet layups. Printed from PLA or PETG.
Composite molds: There's ale and female mold. Male is object, female is negative space.
Top 2 molds are negative molds and the mold is laid up onto it.

Mold Prep
- Sanding
- Chemicals - mold sealer, gelcoat, bondo, smth else I forgot

Prepreg: Carbon fiber that has resin in it.
Wet layups: We put epoxy ONTO the dry carbon. These are new this year.

Prepreg weave is 90 degrees - Prepreg uni is 0 degrees

Prepreg: - Final mold prep (iso/acetone, Teflon, etc.)
- Lay sheets of prepreg on the mold

-- Ply schedule = what sheets, angles, etc. No wax layups (just use Teflon)
---- Weave vs.Uni
---- 0, 45
---- Core, Film Adhesive (FA)

Bag it
-- Release (green), Breather (white), Bag (pink)
-- Bag Tape, Flash Tape
-- Puck/Port

Pull vacuum
-- Should hold well and NOT collapse. VERY IMPORTANT THAT IT DOES NOT COLLAPSE INWARD.

Sandwich panel: 2c2, 3c3, etc.

Part -> Polyester / Breather -> Bag it -> Seal w/bag tape -> Puck (isopropanol has to be applied to make stronger seal) + Port w/ flash tape -> Seal ->
Make sure bag does not have any holes in it.

Bag tape -> Silly putty consistency.

Wet Carbon: Final Mold Prep: Release agent (frekote,release wax). Here, we start with dry carbon. This works much better or complex curvature. We start
by putting on mold. Atm, we use something called 'freecoat' that is wiped on w/ paper towel 4-5 coats.

Dry carbon has to be cut. Epoxy is mixed w/ hardener w/ activation. Put down plies before epoxy hardens.

Initial layer of epoxy goes on. We go on for however many layers we have. Add one extra coat of peel ply- a nylon 'clot' that goes onto the carbon. This
stuff stops from going into the breather, but lets some resin go out.
Pull vacuum on the bag and hold under vacuum. 6-8 hours depending on what has to be cured. Once its cured we can turn it off.

THINGS TO KNOW FOR LAYUPS.IMPORTANT.

- Wear gloves. Carbon splinters are tiny, invisible, can get into ur eyes, and are very real.
-- also epoxy is dangerous to touch
- Change gloves ASAP if they tear / get punctured. Do not wear watches or rings when bagging. Again, do not get epoxy on skin.
- Keep dyno room clean bc we share the space w/ other teams.

@ Flying S; Curing.
We schedule these trips within a week of a layup. We store the carbon in the freezer if its prepreg and has epoxy bc it starts to heat up. DO NOT PUT IT
BACK INTO THE FRIDGE BC IT WILL MESS UP THE OTHER STUFF IN THE FRIDGE.

Leaving a part out within a week is not an issue, but should be conventionally avoided.

Trips go out to flying S w/ prepreg. (@George you got a shoutout for your presentation round of applause)

We have a bonding jig; just some aluminum extrusions. Unfortunately might be dissembled rn. Sad. We normally use e-120hp to bond stuff but it is just
VERY expensive to run through.

Mounting jigs; will start after-break. Not much time before finals :/. Not many photos of jigs; just stuff for when we put it together.