

# Front Wing Ply-Scheduling 2025-26

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## DCR

Requirement	Description	Design Implementation	Validation Method
<b>1. Rule Compliance</b>			
T.7.1.3	All aerodynamic devices must be rigidly mounted to ensure they remain stable and do not oscillate or flex excessively while the vehicle is in motion.	Rule	Pre-comp testing
IN.6.6.2	If any deflection is significant, then a force of approximately 200 N may be applied. In this situation, loaded deflection should be no more than 25 mm and permanent deflection should be less than 5 mm.	Rule	Mock Tech
<b>2. Structural Requirements</b>			
SR.1	The front wing struts <b>shall</b> maintain a positive margin of safety against yielding under all specified loading conditions (aero loads + cone strike + inertial loads)	FEA	Proof Load
SR.2	Reduce any negative (almost) on the aerodynamic purposes of the front wing	CFD	Wind Tunnel
SR.3	Natural frequency shall be 3x that of the road	FEA	Pre-comp testing
SR.4	Deflection under static loads shall be less than 0.125"	FEA/ Hand calc	Assembly
<b>3. Mass</b>			
M.1	Front wing assembly shall be within 7.5 lbs	CAD	Weigh final product
<b>3. Serviceability</b>			
SV.3	Front wing system shall be assembled and mounted by 2 trained people in 15 minutes	Thought out fastener placement	Test time
<b>4. Manufacturability</b>			
MF.1	Should be optimized for manufacturing in (x) weeks while maintaining other objectives such as mass and strength.	DFM and detailed production outline	Time
MF.2	No significant assembly stress should be present when the aero package is fully assembled	DFM	Assembly check

## Analysis

### Manufacturing

### Testing

Carbon Testing:

This test will be following D3039 standard. This test helps determine the following properties of the Carbon:

1. Ultimate Tensile Strength
2. Ultimate Tensile Strain
3. Modulus of Elasticity
4. Poisson's Ratio
5. Transition Strain (possibly idk the importance of this)

The laminate must be symmetric and balanced for this test. Essentially for every  $+\theta$  ply, there is another  $-\theta$  ply and a symmetric test has the same stacking sequence mirrored along the neutral axis of the laminate.

Dimensioning:

Recommended width (mm)	Recommended Overall Length (mm)	Recommended Thickness (mm)
25	250	2.5

For woven fabric, the structural laminates are usually quasi-isotropic which means they've got the same properties along a plane. Need to figure the exact layout we need to test for.

For tabs: Either we use friction tabs (emery cloth) or stick to the good old acrylic)

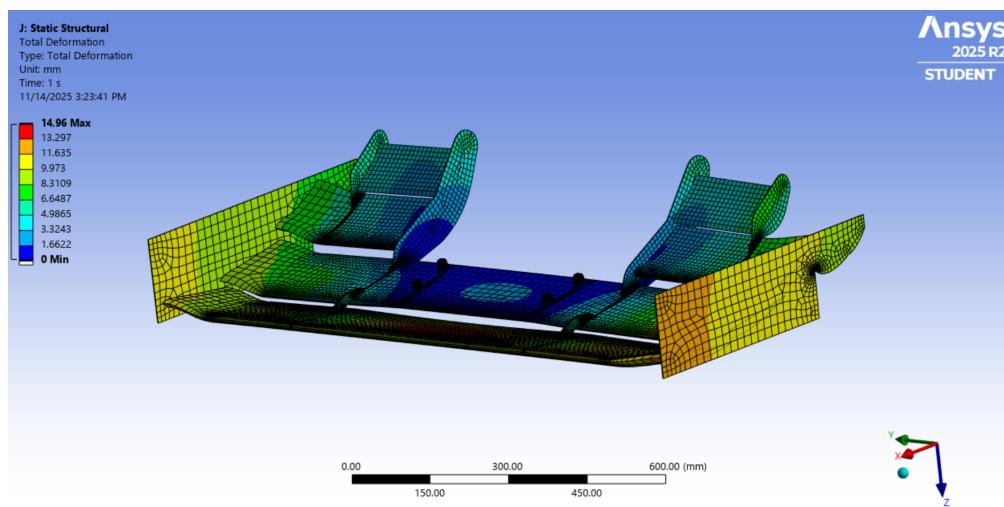
## Deflection Targets

Yay hooray

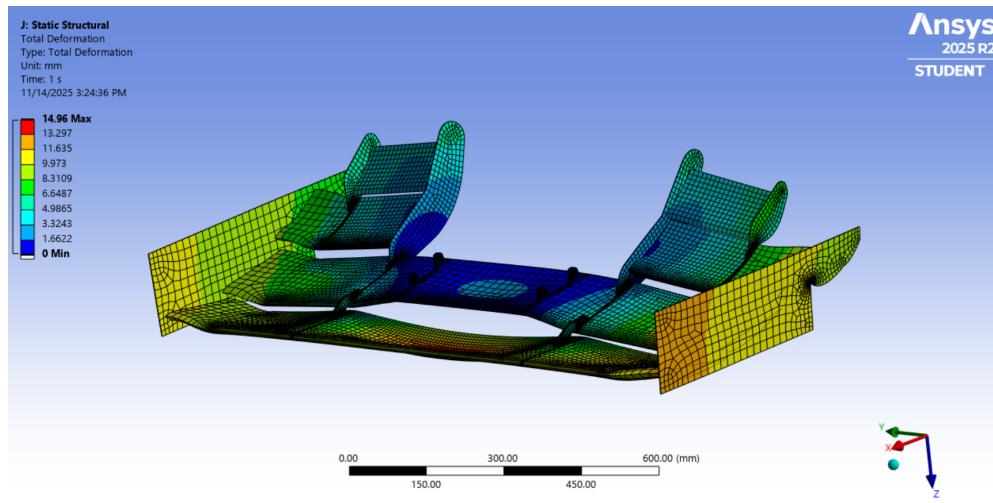
Documentation:

The FEA setup presently represents the first FW5 iteration. This uses a Pressure field from a halfcar 95mph run, as well as two identical remote forces at the endplates to replicate the endplate moment. Units are in mm.

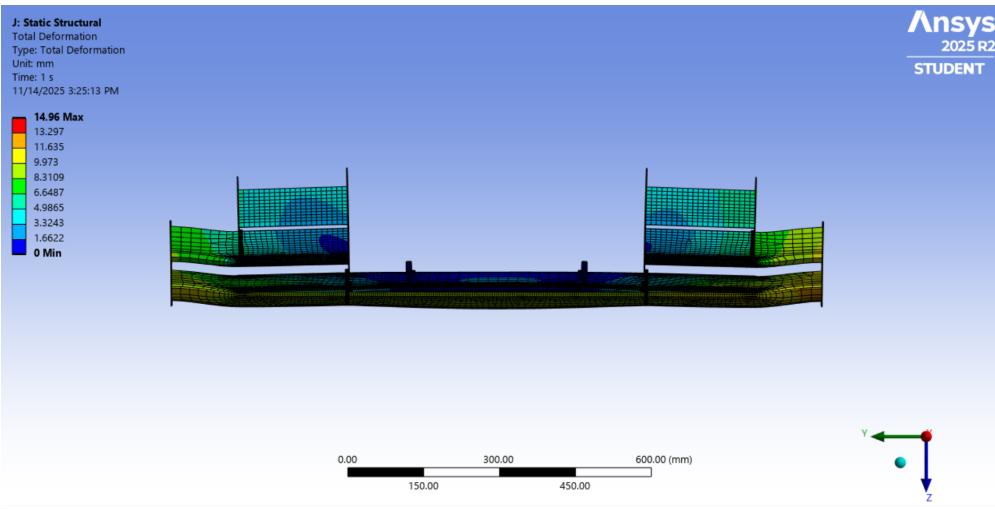
True Scale



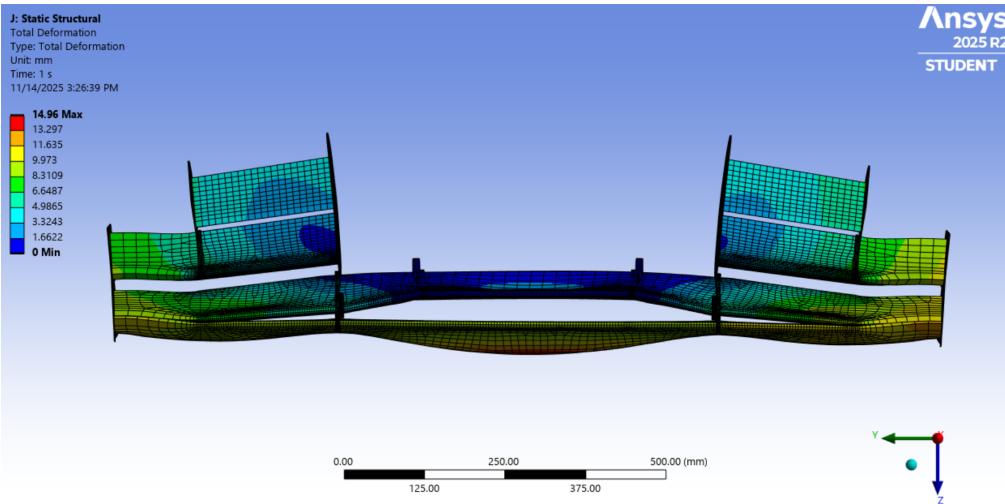
Auto Scale (4.8x)



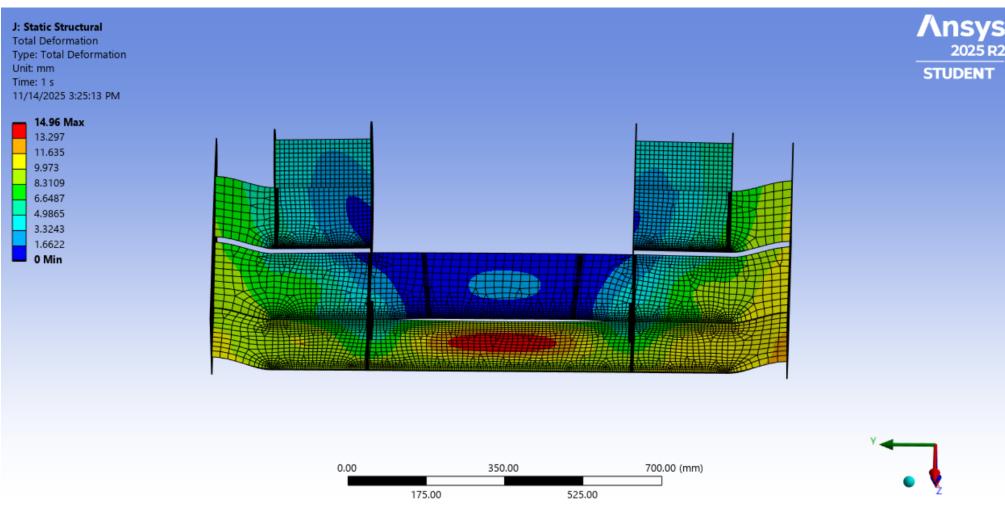
Front view True Scale



Front view Auto Scale (frog)



Top View True Scale



## Deadlines

## Timeline and Tasks

Deadline	Date	Deliverables