



Welcome to FS4A



Formula Student Austria & Alpe-Adria Academy,
November 23rd, 2024 - TU Graz & online





FS4A 2025 – Session 1

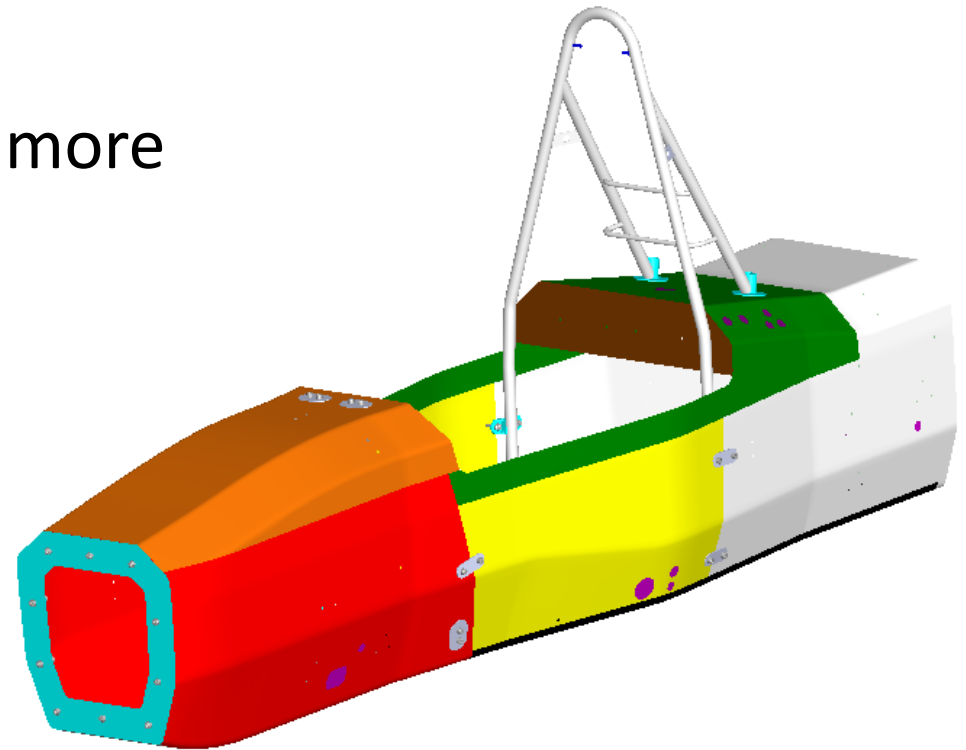
Mechanical Rules, Scrutineering & Best Practises

Presented by Paul Mayr-Harting,
Head of Rules & Scrutineering for FSA,
Responsible for FS Rules chapter CV



Rules– First Year Vehicles

- New Chassis has to be manufactured
- But no significant changes needed any more
- In some cases, you don't even need to manufacture a new chassis:
 - Changing the powertrain (any change except for EV to CV)
 - Initial implementation of autonomous system



Rules – T 1.1.12 AIP = primary structure

- AIP has to be part of SES documentation
- T 3.2.1. Table 4 shows the minimum requirements for the members of the primary structure if made from steel tubing. **Minimum AIP requirements see T3.16.3**
- General requirements from T3.4 & T3.6 are applied to the AIP as well
- Only difference: alternative AIPs have their own testing requirements, see T3.16.4

Rules – T 2.1.1 Good Engineering Practice

The vehicle must be designed and fabricated in accordance with good engineering practices

What does that mean? – you will not pass Tech Inspection if:

- Primary structure components have bad manufacturing quality
- Excessive flex or bad load path of safety-critical components
- Steering, braking, and suspension systems parts “unfit for service”

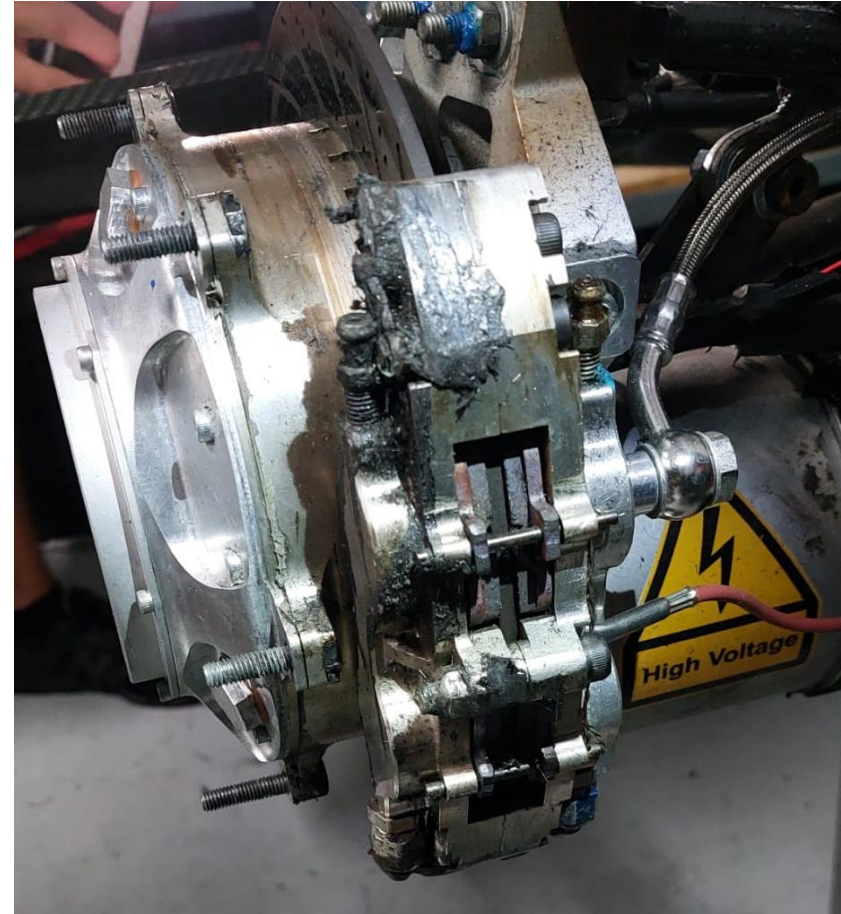
Rules – T 2.6.4 Rim Clearance

- In 2024 we had many teams with deep scratches in their rims
- New rule: minimum 5mm radial clearance in static condition
 - at any steering angle
 - at any ride height



Deep scratches in rim base

Rules – T 2.6.4 Rim Clearance



Rules - Chassis

- Steel with yield strength < 305 Mpa \rightarrow must increase wall thickness
- Extended requirements for the SE3D file
- Stricter Rules for asymmetric and non-isotropic laminates
- Restriction on usage of „actual geometry“ EI calculations
- „Crackdown“ on 3-point bending test rig compliance

Rules – Mechanically Attached Bracing

- Such designs are still allowed!
- Design was just not widely used any more
- Saves a full page from the rules
- Still covered by T 3.15.1

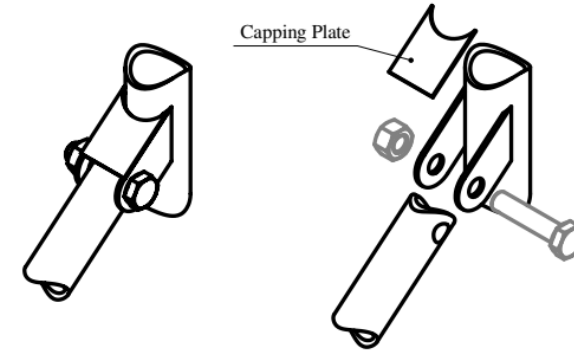


Figure 7: Double lug joint

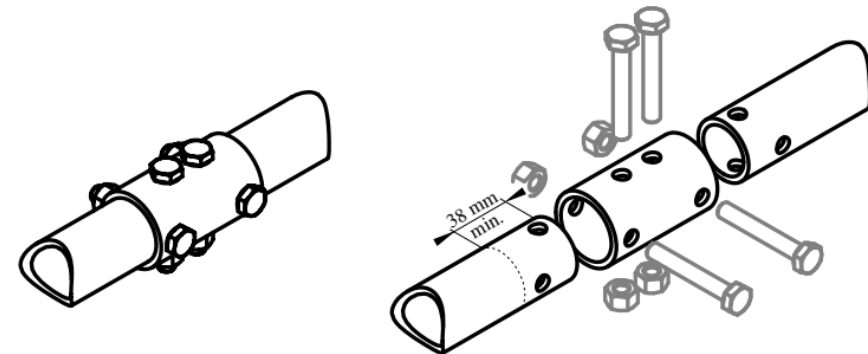
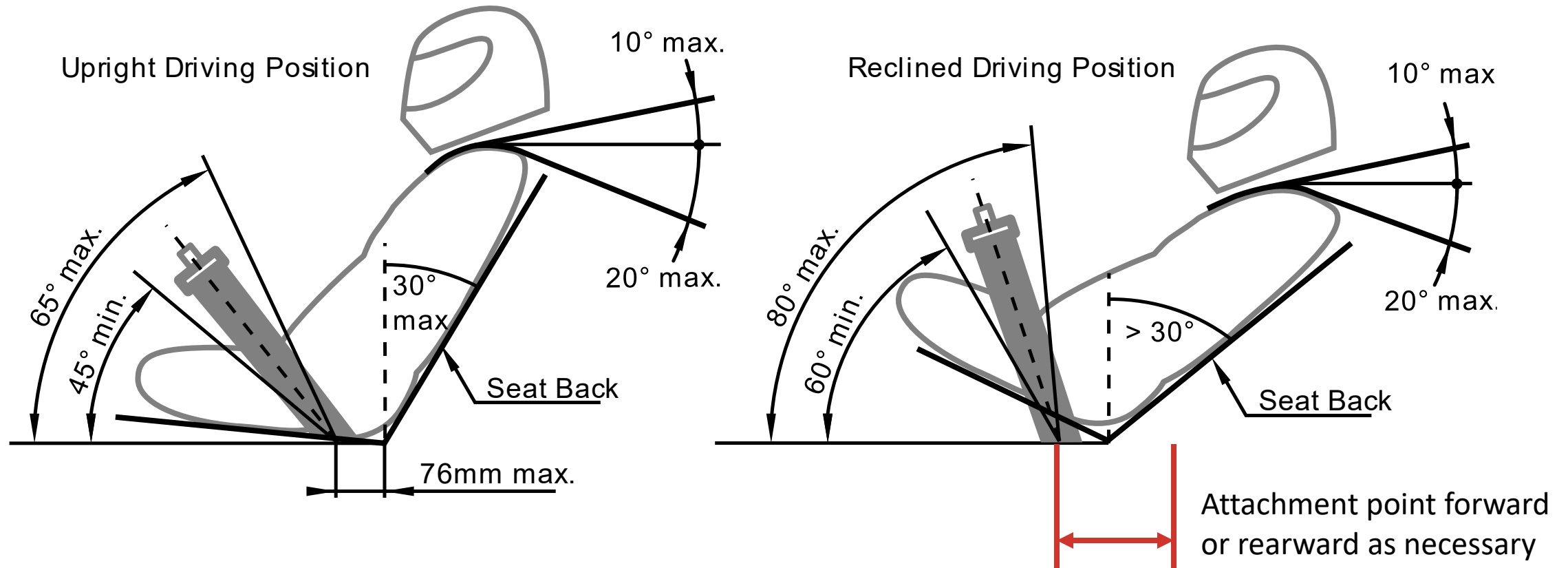


Figure 8: Sleeved joint

Rules - T 5.4.6 Lap belt attachment



Rules – Miscellaneous Technical Rules

- T3.15.7 Exceptions for „blind inserts“ might be given
→ to be clarified in FS Rules version 1.1
- T 10.2.3 Snap rings now allowed for any type of brake disc floater
- T 13.2 Lifting and jacking of the car has to be possible in a safe way by the team – this means by 4 team members
- T 13.4 Change to foam-type fire extinguishers

Rules – T 11.11 Ban of Active Aero Devices

- Power ground effect (PGE) devices have become too loud
- Large LV batteries were an issue
- General safety concerns with high-speed fans and flying debris



- Active aero devices are now (again) completely banned
- while not restricting normal cooling fans: up to 500W at any position
- FSA will additionally have a noise limit for fans: 106 dB(C)

Rules – Changes in CV Chapter

- CV 1.3.4 Air intake systems can now be „rigidly“ attached to chassis
- CV 5.2.1 Hybrid Storage Container mounting clarified
- CV 5.2.1 Holes in the Hybrid Storage Container restricted

Best Practices - Overall

- In order to win the race, you first have to finish!
 - Focus on key areas to improve
 - Do not change *everything*, especially if it worked well
 - Get the car running at least 2 months before the competition
- Vehicle Status Video deadline
 - Strict deadline! Your car has to drive!
 - As soon as your car drives, make a rules compliant VSV!
You never know what might happen in testing
- TESTING, TESTING, TESTING!



Best Practices – Design Process

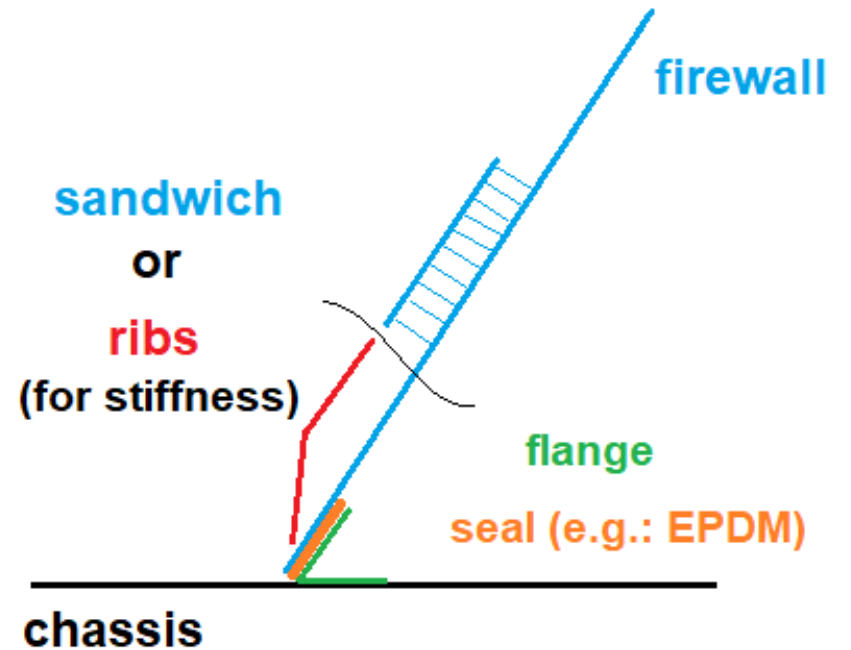
- Use the SES template as soon as possible
(last year's template works fine for the design phase)
- FSG Rules Question tool is not intended for general design questions
 - Instead you can write our FSA Specialists: [contact the FSA team](#)
- Alloyed steel has additional requirements! (T3.3.3)
- Welding aluminium (front hoop) has additional requirements!
- Be careful with asymmetric and non-isotropic laminates!

Best Practices – Brakes & Wheels

- Please keep it conservative!
- A flying wheel or disintegrating brake is no recipe for winning!
- Consider fatigue strength because every rotation is a load cycle!
- Brake pedal face (area that touches sole) must be metal
- It is called “brake pedal” not “break pedal” ;)
 - The brake pedal will be tested by Scrutineers!
 - Beware of “stramme Wadln!”

Best Practices – Firewall

- Requirements
 - Fire resistant
→ you can test UL 94-V0 yourself!
 - Rigid
→ use sandwich plate or ribs
 - must seal against the passage of fluids
→ use flanges & seals



Best Practices – Cooling System

- All components must be rated for at least 120°C
- plain water requirement only for combustion engine
- Keep it cool! Climate change is real ;)
Radiator and fans better one size larger



Tips for Mechanical Inspection

- Our goal:
 - Guarantee adequate safety
 - Get as many cars on track as possible
 - Keeping it fair for everybody
- How we do it:
 - Inspection Sheet (see homepage)
 - Checking Rules if necessary
- You might not get points in Scrutineering, but without stickers you don't get any dynamic points!



Tips for Mechanical Inspection

- How you can prepare:
 - If you are not sure – ask a Rules Question
 - If in doubt, keep it conservative
 - Ask yourself: does it look right?
 - Do a “dry run” with your alumni
 - Participate in pre-events if possible
- Bring everything to the event:
 - Documents, date sheets, Rules Questions
 - Test samples
 - Spare parts and equipment
 - Material and tools for fixing things





Q&A Session

The text 'FS4A' is displayed in a bold, white, sans-serif font. The number '4' is colored red. The text is centered on a black, horizontal brushstroke background that has a rough, textured edge.

If you have further questions,
please write us at rules@fsaustria.at



Q&A for Session 1

Question	Answer
Tech inspections are very different between events, why is that? It gives the impression that there might be preferential treatment of some teams, what could be done to minimize this?	We use the same technical inspection sheet as other competitions and we are sharing some officials as well, so we try to make it even. But of course each competition is different and this will also show during tech inspection. At FSA, we try to be "strict but fair" and we will always help the team in order to get them on the track.
Electronic Throttle: are actually two sensors needed or can we use the "inverted" sensor signal as the second one?	You need to have two dedicated sensor signals which are not parallel and they must not intersect. In a typical application where you take the signal and its inverse, there will be an intersection at 50% of the sensor range, so this would not be allowed. There are automotive sensors which fulfill the requirement in one single housing, we encourage you to use them.
Why switch to foam-type fire extinguishers? According to our information, those are not rated for electrical fires?	There has been an ongoing discussion in the past years, but the main points are: <ul style="list-style-type: none">• powder-type is useless for battery fires, whereas foam will at least buy some time• foam extinguishers are not rated for "electrical" fires, true, but in this context this means above 1000V, so they can be used in our case with max. 600V• powder-type extinguishers are very corrosive for your car and bad for your health
Why is the HANS device still not mandated by the rules? Why focus only on the car's structural strength in a crash situation and not to the injuries a driver without HANS might get.	This has been thoroughly debated for the 2025 Rules, we definitely encourage you to use HANS / FHR device if you have the resources to do so. BUT: we do not want to burden all teams to take this cost, especially since many teams will have to pay for new racing suits and helmets because some older certifications are no longer valid. Also, a HANS / FHR device is only helping in a high-speed crash into a rather solid barrier, this kind of crash is very uncommon in FS. We will keep an eye on this

Q&A for Session 1

Question	Answer
Can securing fasteners be made in-house and use market-positive locking, as there is no rule forbidding it? If so, should equivalency be shown, and how? (exp. if a lock nut is made in-house and cotter pin bought)	As mandated by T10.1.5, fasteners for steering and suspension can be made in-house, so for example you can manufacture a special bolt on a lathe and then use a normal locking nut or cotter pin in order to be rules compliant. You have to give a material datasheet to prove at least 640 MPa yield / 800 MPa ultimate strength (=grade 8.8 strength) and you have to show good engineering practice with regards to the design and manufacturing of the bolt: thread has to be well-made and the bolt head must have an adequate loadpath (i.e.: the bolt head must not be a weak point)
On SES calculations, should we take the thickness of the plies before curing, or the real thickness of the laminate? (e.g: our twill fiber change from 0.2 mm to 0.24 mm after curing)	You can take either one measurement, but it has to be consistent throughout the whole SES document. It makes more sense to use the "cured" thickness because then this can be checked at tech inspection with the test panels. Also, it is just generally easier to measure a complete, cured lay-up instead of single uncured pre-pregs.
How to understand the general name of TAB washer? This is a rather broad group of security washer, some of which, depending of the FS competition, are accepted and others are not. Maybe clarified, for example, in the handbook or FSG rules?	These kind of washers cover a wide range of designs, so it is impossible to write down a specification in the Rules. You have to apply "good engineering practise", so very flimsy aluminium tab washers will be an issue for example.
How are you going to check the wheel rim clearance at scruti?	We will use a 5mm thick steel cable and pass it around the inside of the rim. if necessary, we will measure at any steering angle and at different suspension levels (lifted off the ground, static and with driver in the car).

Q&A for Session 1

Question	Answer
how will the flex of a wing will be tested for a drs system?	<p>Most wings will be checked by just pushing on them by hand and checking if it feels sturdy and well made. If necessary, we will use spring scales or weights and measure the deflection.</p> <p>As a rule of thumb: if your wings feel flimsy and you have doubts about it, it is probably not good enough.</p>
Is the 500 W rule per fan or 500 W for all fans combined?	There is a FS Rules version 1.1 update - of course the COMBINED total power of fans is limited to 500W
About the rule T 11.11.1, you mentioned the noise limit of 106 dB in FSA, how will this be enforced? From what distance will it be measured?	This rule is mostly a safeguard against very particular designs, normal off-the-shelf cooling fans are normally quiet enough that we will not even find it necessary to measure it. If however your design seems to be subjectively loud, we will measure it in the same way as CV noise test, we will clarify in the next version of the FSA competition handbook
The attachment point of the rear wing to the main hoop bracing is not allowed without additional support. In a presentation it says an attachment next to the main hoop bracing attachment (no more than 50mm) is allowed. Is that correct?	This was in the FSG Academy presentation, not FS4A. but yes, their explanation is also valid for Austria and Alpe-Adria.
How are you planing to inspect the chassis in case of the newly manufactured one? What will restrict the tubular frame teams to just paint the old ones again?	Generally, you will be required to prove that you have actually manufactured a new chassis, for example by providing a picture of the new chassis next to the old car. Alternatively you can implement substantial changes to the design, then it will be obvious as well that it is a new chassis.