

FORMULA STUDENT RUSSIA 2016

RULES

1 Important Dates

Note, that for the penalties regarding late submission of documentation, 1 day exactly equals 24h. For further details see "3.4 Official Time".

1.1 Competition Dates and Place

FS Russia 2016 will be held from the 24th until the 28th of August 2016 in Moscow.

2 General

2.1 FSR 2016 Rules

Additionally, all guidelines and clarifications posted in the 'Rules & Important Documents' sections on the FS Russia website for the current season are considered as official documents and therefore are applicable to the teams competing at FS Russia 2016.

2.2 Official Language

The FS Russia official language is **English**.

2.3 Official Time

The FSR official time:

From	Till	Time
24.08.2016	28.08.2016	MSK

For all deadlines and decisions only the FSR server time is authoritative.

1 day equals 24 hours. One day later is 24 hours after the defined deadline time or reply time of an official.

3 Vehicle Requirements and Restrictions

3.1 Alternative Frame Rules

These alternative structural requirements are intended to provide teams an alternative approach to the existing rules. The goal of these alternative rules is to provide a simpler alternative for monocoque designs and provide expanded design freedom for space frames and monocoques alike. The intent is not to alter allowable structures but to change the requirement process for showing compliance with the rules.

NOTE: Generally SI units are used in these alternative frame rules with some dual references

3.2 Drivers Cell

Specific clarification of FSAE 2016 Rule T 3.5.5

FSAE 2016 Rule T3.5.5 is valid for the primary structure (defined in FSAE 2016 Rule 3.3) in

general, as long as the drivers cell is constructed following the Minimum Material Requirements (defined in FSAE 2016 Rule T3.4) rules or the Alternative Tubing and Material rules (defined in T3.5, T3.6 and T3.7 of FSAE 2016 Rule).

3.3 Impact Attenuator

3.3.1 Impact Attenuator Design

Specific FSR change of FSAE 2016 Rule T3.20.2

Additional to the FSAE 2016 Rule T3.20.2 requirements Impact Attenuators must have a closed front section.

3.3.2 Impact Attenuator Testing

Specific FSR change of FSAE 2016 Rule T3.21.2

Quasi-static testing is not allowed. Only dynamic tests (drop down, sledge or pendulum test) are allowed.

3.3.3 Anti Intrusion Plate (AIP) Testing

Specific FSR change of FSAE 2016 Rule T3.38

Equivalence of composite AIP to the baseline material (T3.20.3) must be shown by a physical test (T3.38.3). Results must be included in the SES

The composite AIP must be included the dynamic test of Impact Attenuator and must not fail.

A failure is defined if the IA plate is damaged in any way (e.g. broken) or the attachment points of AIP are destroyed.

3.4 Driver Egress

Specific FSR change of FSAE 2016 Rule T4.8

The driver egress, required by FSAE 2016 Rule T4.8 must be possible in all steering wheel positions.

3.5 Vehicle Identification

3.5.1 School Name

Specific FSR addition to FSAE 2016 Rule T13.2

Following school type abbreviations are accepted. The city name must be written fully.

Technical University - TU + City

University of Applied Sciences – UAS + City

University - Uni + City

Berufsakademie - BA + City

If the university uses a shortcut in their proper name, this shortcut is acceptable + city

Examples

real name: Oregon State University Corvallis

proper name: OSU Corvallis

real name: Rochester Institute of Technology

proper name: Rochester IT

3.5.2 Technical Inspection Sticker Space

Specific FSR change of FSAE 2016 T13.4

The FSR technical inspection sticker will be placed on the nose of the car directly in front of the cockpit opening. A space 75 mm tall x 150 mm wide (3" tall x 6" wide) must be made available for this sticker.

Vehicles that are being entered into multiple competitions in the FSAE series must allow sufficient space along the nose centre line for all inspection stickers

4.6 Driver's Underclothing

All drivers have to wear underwear (long pants and long sleeve t-shirt) certified to SFI 3.3 or FIA 8856-2000

4.7 Tire and Rim Combination

Specific FSG change of FSAE 2016 Rule T6.4.1

During technical inspection each team needs to present one set of tires for dry conditions and one set of tires for wet conditions.

Tires on the same axle must have the same manufacturer, size and compound.

The tire type/rim type combination presented during Scrutineering must be the same for all dynamic events. The rims for dry tires and wet tires can be different.

NOTE: Teams can use unmarked tires for the non-dynamic events.

NOTE: A defective tire can be replaced with an approved tire of the same manufacturer, size and compound.

4.8 Tires

Specific FSR change of FSAE 2016 Rule T6.4.2

Any treatment with any kind of traction enhancers is not allowed. Using a modified tire for any dynamic event will result in a DNF.

ing System

Specific FSR change of FSAE 2016 Rule T6.5.8

Steering systems using cables or belts for actuation are prohibited.

4.9 Minimum Radii of edges

Specific FSR change of FSAE 2016 Rule T3.23. and T9.5

All other edges as named in T3.23. and T9.5 that could contact a pedestrian must have a minimal edge with a radii of at least 1 mm.

4.10 First Year Vehicles

Only first year vehicles may enter the FSR competition.

To be classified as a "first year vehicle", as a minimum, the car must have a completely new frame or monocoque (whichever is applicable). Photographic or other evidence will be used to determine if the frame or monocoque is new.

If there is any question about whether or not the car is in fact a first year vehicle, it will be the sole responsibility of the team to produce such evidence as the organisers or judges may require.

4.11 Second Year and Old Vehicles

Second Year Vehicles that have competed during any previous “Formula SAE Year” as defined in A6.5 of FSAE 2016 Rule are excluded from participating in FSR.

It's car “Class-1”.

Old Vehicles that have competed during more than 2 years. This car can be FSR participant in “Class-2”.

Car “Class-1” and “Class-2” have a different scoring.

4.12 Inspection Holes

To allow the verification of tubing wall thickness, 4.5 mm (0.18 inch) inspection holes must be drilled in a non-critical location of both the Main Hoop and the Front Hoop **before technical inspection begins**. In addition, the Technical Inspectors may check the compliance of other tubes that have minimum dimensions specified. This may be done by the use of ultra sonic testing or by the drilling of additional inspection holes at the inspector's request. Inspection holes must be located so that the outside diameter can be measured **ACROSS** the inspection hole with a vernier calliper, i.e. there must be access for the vernier calliper to the inspection hole and to the outside of the tube one hundred eighty degrees (180°) from the inspection hole.

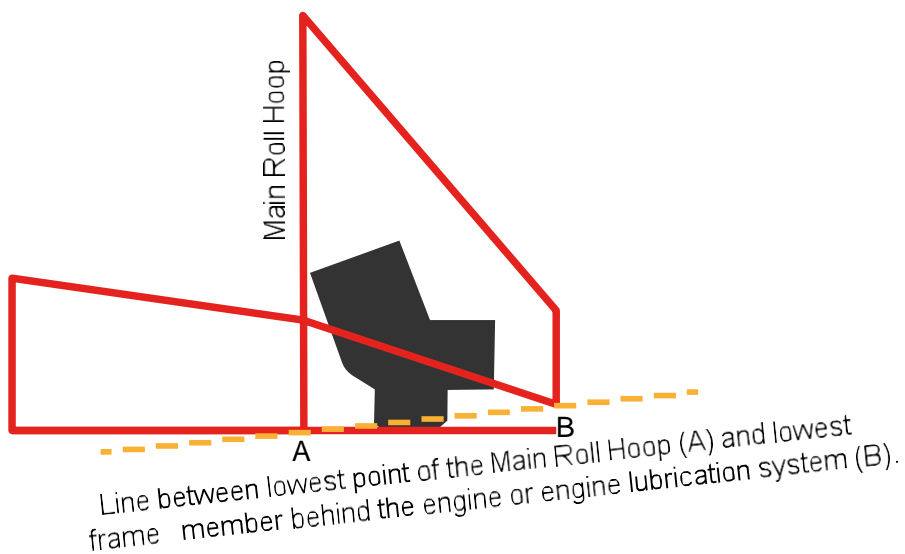
4.13 External batteries

The use of external batteries (e.g. for an external jump start) inside the dynamic area is not permitted.

4.14 Engine Lubrication System

The lowest point of the engine lubrication system must be no lower as the line between the lowest point of the main roll hoop and the lowest frame rail behind the engine and/or lubrication system. If the engine oil sump or any other part of the lubrication system is lower than this line, it must be protected by a sufficient skid plate, or frame tubes installed longitudinally under affected part of the engine lubrication system.

The engine lubrication system must be protected from surface contact in any situation while in operation on track, especially in the event of a suspension failure. The skid plate itself can not be mounted to parts of the engine.



4.15 Fuel Rails

Specific FSR change of FSAE 2016 Rule IC1.9

The use of fuel rails made from plastic, carbon fibre or rapid prototyping flammable materials is prohibited. The use of OEM Fuel Rails is acceptable.

4.16 Electronic Throttle Control (ETC)

Specific FSR change of FSAE 2016 Rule IC1.11.3

In case of using an unmodified OEM Throttle Control System, a second spring is not necessary. The requirement is that the part is not modified in any way and is used as “provided by the manufacturer” status.

5 Pit Rules

5.1 Electrical Power during pushing

It must be possible to push the car around with all electrical systems deactivated.

5.2 Engine running in the pits

Running of engines is not allowed in the pits or the garage areas. There is a designated, supervised, engine running area for this purpose. All engine running is to be conducted in the designated engine running area only. Engine running is allowed only during the active hours of competition. No engines are to be run under any circumstances between the hours of 2000 to 0800.

5.3 Quick Jack

Each team must present a quick jack to lift up the car by using the jacking point during Technical Inspection.

The quick jack must be able to lift up the car, so that the driven wheels are at least 10.2 cm (4 in) off the ground. All-wheel driven cars must be able to lift up both axles at least 10.2 cm (4 in) off the ground.

6. Technical Inspection

6.1 Inspection & Testing Requirement

The Technical Inspection will be divided in a mechanical inspection for cars.

Scrutineers will mark or seal various different approved parts (i.e. restrictor, insulation monitoring device, accumulator containers, energy meter, tires, rims etc.). The car can be disqualified from any dynamic event by using unmarked parts or substituting marked parts. Parts with broken seals are equivalent to being unmarked.

Broken seals may only be replaced by a scrutineer.

6.2 Car weighing

All cars will be weighed prior to Engineering Design Judging. All cars are to be weighed in ready to race condition. All fluids and coolant must be in the car. This weight will be the car's Official Technical Inspection weight. There will be a penalty if the car weight changes during Dynamic Competition. The allowable weight tolerance is ± 5.0 kg. In the case of overweight or underweight in comparison to the Technical Inspection weight, the team will be penalised -20 (twenty) points for each kg (or portion of a kg) of additional or missing weight. This point penalty will be deducted from the Engineering Design Event score. (Each 0.1 to 1.0 kg = -20 points)

Example:

If the car is 5.3 kg underweight: 5.3 kg minus the 5.0 kg tolerance = 0.3 kg equals -20 Points
If the car is 7.8 kg overweight: 7.8 kg minus the 5.0 kg tolerance = 2.8 kg equals -60 Points

If the car weight changes due to replacement of broken parts, the car must be presented for tech inspection and then re-weighed. It is the team's responsibility to have the car re-weighed before entering a dynamic event after changing parts.

7 Static Events

7.1 Business Logic Case

Specific FSR change of FSAE 2016 Rule S3

The Business Logic Case is not part of the FSR event - submitting is not needed.

7.2 Business Plan Presentation (75 Points)

7.2.1 Executive Summary

Judging will start with an Executive Summary before the FSR competition. The principal document submitted prior to the Business Plan Presentation is an Executive Summary. The Executive Summary must not exceed one (1) page, team name and car number must be written on the Executive Summary. The Executive Summary should contain a brief description of the team's Business Plan. In the Summary the two most outstanding technical features and the anticipated production costs of the car have to be listed.

The Executive Summary must relate to the specific prototype car entered in the FSR competition.

Even though the Executive Summary is only judged by the presentation judges, all Engineering Design and Cost judges will have access to the file and may refer to it.

The Executive Summary must be send on this email: *какой?*

Penalties:

- > Up to five (5) penalty points will be deducted from your final Business Plan Presentation Score.
- > Late submission: up to -2 point
- > Team name and/or Car number missing: -1 point
- > Two (2) technical highlights missing: -1 point
- > Vehicle costs missing: -1 point

NOTE: Consider your Executive Summary to be the first impression of your Business. Plan to the Executive Board of a major auto manufacturing company.

7.2.2 Deep dive topic

After sent of the Executive Summary the teams will receive a specific Deep Dive Topic from the presentation judges prior the competition. The task will be sent via email to the team's responsible person's email address.

Every team must present this special Deep Dive Topic as a part of the team's business plan presentation to the judges.

NOTE: A team should not describe only this Deep Dive Topic in the business plan presentation. It's important that a team presents a good business plan as well.

7.3 Engineering Design Event (150 Points)

5.3.1 Design Event Objective

The concept of the design event is to evaluate the engineering effort that went into the design of the car and how the engineering meets the intent of the market both in terms of vehicle performance and overall value.

The car that illustrates the best use of engineering to meet the design goals, a cost effective high performance autocross car, and the best understanding of the design by the team members will win the design event.

5.3.2 Design Report – Required Submission

Design Report - Judging will start with a Design Review before the event. The principal document submitted for Design Judging is a Design Report.

The Design Report must not exceed eight (8) pages, consisting of not more than four (4) pages of text, three (3) pages of drawings and one (1) optional page containing content to be defined by the team (photo's, graphs, etc...).

These documents will be used by the judges to sort teams into the appropriate design groups based on the quality of their review.

Comment: Consider your Design Report to be the “resume of your car”

5.3.3 Design Event – Vehicle Condition

Cars must be presented for design judging in finished condition, i.e. fully assembled, complete and ready-to-run.

Unfinished cars that are refused judging will receive zero (0) points for design.

NOTE: Cars can be presented for design judging without having passed technical inspection, and even if final tuning and setup is in progress.

7.4 Cost Event (100 Points)

5.4.1 Event Objective

The objectives of the Cost and Manufacturing Event are:

- a. To teach the participants that cost and budget are significant factors that must be considered in any engineering exercise.
- b. For teams to make trade off decisions between content and cost based on the performance advantage of each part and assembly.
- c. To gain experience with creating and maintaining a Bill of Material (BOM).
- d. For the participants to learn and understand the principles of Design for Manufacture and Assembly, lean manufacturing and Minimum Constraint Design.

5.4.2 Event Requirements

This event is comprised of three (3) parts:

- a. Part 1 “Cost Report” - The preparation and submission of a report (the “Cost Report”), which is to be sent to the Cost Judges prior to the competition.
- b. Part 2 “Discussion” - A discussion at the Competition with the Cost Judges around the team’s vehicle. This evaluates not only the cost of the car, but also the team’s ability to prepare accurate engineering and manufacturing cost estimates.
- c. Part 3 “Real Case” - A “real case” scenario where students will have to respond to a challenge related to cost or manufacturing of the student vehicle.

5.4.3 General Requirements

The Cost Report must:

- a. Use the standardized Cost Tables. The tables are designed to reflect a hypothetical car built for production at the annual volume of 1000 units per year.
- b. List and cost every part on the prototype vehicle. This includes any equipment fitted on the vehicle at any time during the competition. The only exceptions are that, per “Cost Report Exempt Items” of the Rules, the cost of any finish, on-board fire suppression system, rain tires, video or radio system, does not need to be included in the Cost Report.
- c. Be based on the estimated costs of materials, fabrication, purchased parts, and assembly of the car. The costs shall be calculated as defined in these rules.
- d. Be based on the actual manufacturing technique used on the prototype, e.g. cast parts on the prototype must be cost as cast, and fabricated parts as fabricated, etc.
- e. Include tooling (e.g. welding jigs, molds, patterns and dies) for processes requiring it.
- f. Exclude R & D and capital expenditures (e.g. plant, machinery, hand tools and power tools).

NOTE: There is no maximum cost. Receipts are not required for any items

7.4.1 Cost Event Scoring

Specific FSR change of FSAE 2016 Rule S4.8

The points for the Cost and Manufacturing Event will be broken down as follows

7.4.2 Late submission of Cost Report

Specific FSR change of FSAE 2016 Rule S4.16

Teams that submit reports later than the specified date will be penalized -10 (ten) points per day, up to a maximum penalty of -80 points. Teams that do not submit a Cost Report will receive 0 (zero) points for the Cost & Manufacturing Analysis score. Minimum Event score is 0 (zero) points.

5.4.3. Addenda

Specific FSR change of FSAE 2016 Rule S4.17

For all changes made after the submission of the Cost Report a cost addendum must be submitted via the FSG website tool. The cost addendum must be uploaded to the ‘My Team’ Area on the FSG website not later than the specified date in chapter 2.8.4 Cost Addendum. For all new parts, which are manufactured, drawings must be presented during the judging of the cost event. It is not necessary to hand over a hard copy of the cost addendum to the officials.

5.4.4 Cost Report Penalties Process

Specific FSR change of FSAE 2016 Rule S4.18

Only penalty method A will be used for FSG, described in Rule S4.19 “Penalty Method A- Fixed Point Deductions” of the FSAE 2016 Rules. The FSAE 2016 Rule S4.20 “Penalty Method B – Adjusted Cost Deductions” is not valid for the FSG competition

6 Dynamic Events

8.1 Dynamic Events and Maximum score

Skid Pad	75
Acceleration	75
Autocross	100
Efficiency	100
Endurance	325
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Total	675

8.2 Acceleration

The acceleration event evaluates the car's acceleration in a straight line on flat pavement.

8.2.1 Acceleration Procedure

Course Layout – The acceleration course length will be 75 m (82 yards) from starting line to finish line. The course will be at least 4.9 m (16 ft.) wide as measured between the inner edges of the bases of the course edge cones. Cones are placed along the course edges at intervals of about 5 paces (roughly 20 feet). Cone locations are not marked on the pavement.

Staging - The foremost part of the car will be staged at 0.30 m (11.8 inches) behind the starting line. Cars will accelerate from a standing start.

Starting - A green flag will be used to indicate the approval to begin, however, timing starts only when the vehicle crosses the starting line as measured by the timing system.

Second Run Option - A driver has the option to make a second run immediately after his/her first run.

8.2.2 Acceleration Heats

There will be two (2) heats. Each heat must have a different driver and each driver can have two (2) runs.

Starting order will be based upon time of arrival to the staging area.

Heat one (1) and heat two (2) will not be run sequentially, but simultaneously. Heat 1 drivers will have starting priority over heat 2 drivers.

8.3 Skid-Pad

The objective of the skid-pad event is to measure the car's cornering ability on a flat surface while making a constant-radius turn.

8.3.1 Skid-Pad Heats

Each car may compete in two heats. Each heat must have a different driver, and each driver may have two (2) runs.

Two separate skid-pad locations may exist. If there are two (2) skid-pads, one driver must make both his runs on one skid-pad (Skid-Pad 1) and the other driver must make both his runs on the other skidpad (Skid-Pad 2).

If there is only one skid-pad location then both Heat one (1) and Heat two (2) will be run on the same skid-pad.

8.4 Autocross

The objective of the autocross event is to evaluate the car's maneuverability and handling qualities on a tight course without the hindrance of competing cars. The autocross course will combine the performance features of acceleration, braking, and cornering into one event.

8.4.1 Autocross Procedure

There will be two (2) Autocross-style heats, with each heat having a different driver. Two (2) timed laps will be run (weather and time permitting) by each driver and the best lap time will stand as the time for that heat.

Starting order will be based upon time of arrival to the staging area.

Heat one (1) and heat two (2) will not be run sequentially, but simultaneously. Heat 1 drivers will have starting priority over heat 2 drivers. A driver has the option to take a second run immediately after the first run.

The car will be staged such that the front wheels are 6 m (19.7 feet) behind the starting line. The timer starts only after the car crosses the start line.

The organizer will determine the allowable windows for each heat and retains the right to adjust for weather or technical delays. Cars that have not run by the end of the heat will be disqualified for that heat.

8.5 Endurance

Endurance Objective—300 points The Endurance Event is designed to evaluate the overall performance of the car and to test the car's durability and reliability.

8.5.1 Endurance General Procedure

The event will be run as a single heat approximately 22 km (13.66 miles) long.

Teams are not allowed to work on their vehicles during the heat.

A driver change must be made during a three (3) minute period at the midpoint of the heat.

Wheel-to-wheel racing is prohibited.

Vehicles must not be driven in reverse

Passing another vehicle may only be done in an established passing zone or under control of a course marshal.

8.5.2 Endurance Driver Change Procedure

Three (3) minutes are allowed for the team to change drivers.

Only three (3) team members, including the driver or drivers, will be allowed in the driver change area, and only the tools necessary adjust the car to accommodate the second driver and/or change tires will be carried into this area (no tool chests etc.).

Extra people entering the driver change area will result in a twenty point (20 pt) penalty to the final endurance score for each extra person entering the area.

8.6 Fuel Efficiency Scoring

The car's efficiency will be measured in conjunction with the Endurance Event. The efficiency under competition conditions is important in most vehicle competitions and also shows how well the car has been tuned for the competition. This is a compromise event because the efficiency score and endurance score will be calculated from the same heat. No refueling will be allowed during an endurance heat.

8.5 Ground Clearance

The minimum static ground clearance of any portion of the car, other than the tires, including a driver must be a minimum of 30 mm. Any ground contact which increases the (aerodynamic) performance of the car is prohibited

