

# Formula Hybrid Design Judging

## A Student Guide for Understanding the Process

At the competition your team will be interviewed. The design judges have already seen your resume in the form of a design report. This has allowed the judges to think about the strengths and weaknesses of your design. More importantly, it has provided some insight into your design approaches, decision making ability, organization, test and development programs, and vehicle features that you consider worthy of notice. With this information the judges will tailor questions specific to your design goals as well as cover the basics.

The vehicle is the most visual end result of your efforts. You must have one in order to be judged. However, it is only a part of what will be judged.

Knowledge and understanding are not-so-visual results of your efforts and the judges will be asking questions to determine your depth of each. A team that appears with a competitive vehicle will score low if they cannot answer the judges' questions. Those who do demonstrate a thorough knowledge and understanding and present an impressive car will receive high scores.

The judges want to know how you developed your vehicle. What were the goals? Do they make sense? Was there a consistent design philosophy or methodology? Do the students understand the functional requirements of their components and systems? Do they understand the laws of physics behind their operation, the materials from which they were constructed, and the manufacturing processes? Do they understand the environmental consequences of their choice of materials and their manufacturing methods? Why was this system chosen over others? What was the test program? How did theory compare to actual results? What changes were required after testing?

If it is on the car, be prepared for in-depth questioning. That the person who designed something graduated or is otherwise not at the event does not excuse the team from fully understanding that item. Nor does "it worked well last year" demonstrate much knowledge on the subject.

There is no specific "perfect vehicle" that the judges wish to see. The answer depends on how the students define the problem through their goals, as long as those goals make sense within the framework of the rules. The event is set up to encourage new ideas and to prevent everyone from trying to design the same car.

### **FSAE First Round Design Judging – “The Fundamentals Round”**

During the first round of design judging the judges will concentrate on the fundamentals that apply to *all* vehicles. Fundamentals are things that make that design area absolutely required to make the car accelerate, decelerate, corner, and adhere to the rules. Features found on a minority of cars, such as traction control, wings, and other more advanced items, will be analyzed very briefly in the first round but will be looked at in depth in the following rounds. The team must have the aforementioned

fundamentals mastered, as demonstrated by their presentation and responses to the judges, before they are considered for advancement to the next round. The students should still bring all of their documentation, on all aspects of their design, to the first round just in case a judge finds time to ask more detailed questions.

First round design judging (interview) time will be utilized as follows. (**Note:** the Chief Design Judge has the right to adjust first round judging times based on the number of entries and availability of judges, however "Questioning" time will not drop below 20 minutes.)

### **Setup (3 minutes)**

Keep an eye on the judges and set up as soon as directed. The car must first be presented on the ground with all body panels and wheels in place allowing the judges a view of the complete vehicle. Story boards are strongly encouraged. Bring notebooks and/or computers for when additional backup information is required. If you made a calculation, you should be able to present it within 60 seconds. Display parts of failures, alternate designs, and tested pieces are very useful and demonstrate your development process. Be prepared to put the car on stands, remove a front and rear wheel, remove body panels, and adjust the pedal positions allowing a judge to sit in the car upon request. Setup should take three minutes or less. Additional time here reduces your effective judging time. Be quick.

### **Introduction (1-4 minutes, team's discretion)**

You will have a short amount of time to present your vehicle to the judges. This is your opportunity to list your goals, point out features of which you are particularly proud, emphasize your testing and development efforts, and cover what makes your vehicle, your vehicle. You will not go into details here. It may be a good idea to introduce who designed which major systems if these people are not otherwise easily identifiable.

### **Questioning (25-28 minutes)**

Your team will break up and meet with judges inspecting different areas. These judges will determine which teams advance to the next round. In doing so they will cover many areas and each to the depth allowed with the time available. Do your best to see that exceptional features are not missed. Also, be understanding if the judge needs to switch to another subject.

You need to have at least one "expert" for every vehicle system that you consider to be important. FSAE is an educational process and we like to see that knowledge spread over many students. It greatly hinders the judging process if the same person has to answer questions for all of the major systems. Having more people who can properly answer questions helps your score.

You may be asked at any time to show calculations, photos, or other documentation to back up your claims. Be able to present those quickly to keep the process flowing. The design process often starts with hand-written calculations and sketches. Do not be afraid to show them. One must be able to answer basic questions without reference material.

If you are not the proper person for answering a question, it is perfectly acceptable to point the judge in the right direction. It is also better to say "I do not know" than to try to fool an expert.

Specific areas into which the judges will be questioning are not provided in advance since the judges are there to cover the entire car and will adjust their questions, to some extent, to the areas that you believe are important. This is why they need to know your design goals. You may still be asked questions that you do not want to hear. However, you can minimize that and help the judges to understand your vehicle by stating these goals.

Only team members are allowed in the judging area. Advisors may stand nearby outside the area. Allow room for the judges to move freely about the car and visual aids. Those who will be answering questions need to be immediately accessible. Those on the team who will not be answering questions can be in the area but you may consider having them a step behind. Anyone on the team can be asked a question. Advisors and mentors may listen in but cannot answer questions from the judges or from the students during judging. Video and audio recording of the design judging are not allowed. It is the team's responsibility to protect the area.

In the second round more judges will look at your car with the ability and time to go deeper into more focused areas. The first round is more about making sure that this team has covered all of the basics.

### **Scoring and Display Removal (13 minutes)**

Leave the vehicle in place while the judges meet, decide scores, and put together their written comments for the teams. They sometimes need to refer back to the car or other work when discussing details. Leave the judges alone during this time and remove everything once instructed. Like setting up, removal must be quick so that the next team can get started.

## **Feedback**

For more information we *strongly* encourage the students to bring their car and team back to the judging area for verbal feedback. You will usually be able to speak with different judges who are experts in different areas. Of the entire design judging process, the students find this the most educational. Teams may receive feedback *after* they have completed all of their rounds of design judging. One reason that this feedback is so good is that it can be a two-way discussion between the team and a judge or with several judges. Video and audio recording of the feedback is up to the discretion of the individual judge. Please, ask before recording.

Feedback will not be provided during the judging rounds. Time is limited and the judges are there to ask questions, not to provide answers, especially when a team may be advancing to the next judging round.