

## DESIGN JUDGING

SCHOOL \_\_\_\_\_ CAR NUMBER \_\_\_\_\_

**DESIGN PROCESS** – The most common question to the students from the design judges is “Why?” For each subsystem of the car the team should be able to clearly and quickly state:

- a. the design objectives,
- b. what the design must do to achieve the objectives (functions),
- c. the performance requirements (design specifications) that quantify how well the design must perform the required functions,
- d. how well the final design meets the requirements based on both engineering analyses and testing.

No points are directly associated with this item, but the judges will expect the students to demonstrate their understanding of the design process as they address each of the items below.

The judges will consider the following factors when assigning scores to each of the scored items.

- a. SAFETY
- b. reliability – the winner is usually found among the finishers
- c. manufacturing and assembly - Were manufacturing and ease of assembly considered during design?
- d. serviceability – Are items that require frequent inspection, service, or adjustment easily accessible?
- e. innovation – Does the car include innovative features?

**NOTE TO JUDGES:** Judges with limited expertise in any area may insert an ‘X’ in that sections score. We will scale the remaining scores such that the omitted score will not penalize the team.

## **CHASSIS & SUSPENSION**

### \_\_\_\_\_ CHASSIS (0-30)

What are the requirements for the chassis design? Are load paths direct and short? Are components sized properly for the loads? Were weight distribution and C.G. height optimized?

### \_\_\_\_\_ COCKPIT & HUMAN FACTORS (0-10)

Is the vehicle designed to accommodate & function with a wide variety of body sizes? Are controls and instruments easy to use? Are electrical systems well isolated? Does the design consider occupant safety beyond the requirements?

### \_\_\_\_\_ SUSPENSION (0-30)

What were the requirements for suspension design? How were kinematics, lateral load transfer, adjustability, etc. addressed? How was vehicle handling developed?

### \_\_\_\_\_ BRAKES (0-10)

How was the brake system designed?

### \_\_\_\_\_ STEERING (0-10)

How was the steering system designed?

## **POWERTRAIN**

### \_\_\_\_\_ POWERTRAIN SYSTEM ARCHITECTURE (0-30)

Was the balance between I.C. engine and electric drive well thought out. What were the resulting requirements? How does the system architecture relate to scoring points in the FH competition?

### \_\_\_\_\_ POWERTRAIN ELECTRICAL (0-30)

Are the accumulator, power electronics, and electrical machine well matched? What were the requirements for the accumulator/power electronics/electrical machine? Why was this accumulator/power electronics/electrical machine chosen? How well does the accumulator/power electronics/electrical machine meet the requirements?

### \_\_\_\_\_ POWERTRAIN / MECHANICAL (0-20)

What were the requirements for the IC engine? Was the engine modified (optimized) for the hybrid application?

\_\_\_\_\_ ELECTRONICS & CONTROLS (0-25) What are the requirements on the electronics and controls system and what determined these requirements? Did the students design the electronic systems? Is there closed loop control of the engine? Data acquisition?

## **GENERAL**

### \_\_\_\_\_ AESTHETICS & CRAFTSMANSHIP (0-5)

Fit and finish, use of appropriate materials, professional quality fabrication (e.g., wiring routed, loomed, and labeled; quality of fabrication, welding, machine work), detail work completed. Does the vehicle look attractive? Does it have a high performance appearance?

### \_\_\_\_\_ MISCELLANEOUS (0 to -50)

If the team does not exhibit a good understanding of the car a penalty may be applied.

### \_\_\_\_\_ **TOTAL DESIGN POINTS** (200 points maximum)

COMMENTS: