S 2.10.3 The top teams will be chosen to participate in the cost and manufacturing finals to determine the cost and manufacturing event winner. The cost and manufacturing finals will be held separately from the initial judging and teams will be informed about their participation during the event.

S 2.10.4 The scoring for the non-finalist is calculated as followed:

$$COSTSCORE = 95\left(\frac{Pteam}{Pmax}\right)$$

P_{team} is the score awarded to the team
P_{max} is the highest score awarded to any team not participating in the finals

S 2.10.5 The scoring of the cost and manufacturing finalists will vary from 100 to 96 points.

S 3 ENGINEERING DESIGN EVENT

S 3.1 Engineering Design Objective

S 3.1.1 The concept of the design event is to evaluate the student's engineering process and effort that went into the design of a vehicle, meeting the intent of the competition.

S 3.1.2 Proprietary components and systems that are incorporated into the vehicle design as finished items are not evaluated as a student designed unit, but are only assessed on the team's selection and application of that unit.

S 3.1.3 [DV ONLY] For DV teams an evaluation concerning the capability of the vehicle to drive autonomously will also be part of this event. Therefore, all systems that are required to drive autonomously will be investigated. This also includes a discussion about the hardware and the software used in the AS.

S 3.2 Engineering Design Report (EDR)

S 3.2.1 The EDR should contain a brief description of the overall vehicle with a review and derivation of the team's design objectives. Any information to scope, explain or highlight design features, concepts, methods or objectives to express the value and performance of the vehicle to the judges shall be included at the teams' discretion.

S 3.2.2 The EDR must not exceed eight pages, consisting of not more than five pages of content (text, which may include pictures and graphs) and three pages of drawings.

S 3.2.3 The three EDR drawings (no renderings) must show the vehicle from the front, the top and the side. Each drawing must appear on a separate page.

S 3.2.4 Any measures to facilitate reviewing the drawings (e.g. measurements, details, colors) may be utilized at the teams' discretion.

S 3.2.5 Any portions of the EDR that exceed five pages of content and/or three pages of drawings will not be evaluated.

S 3.2.6 If included, cover sheets and tables of contents will count as text pages.

S 3.2.7 The EDR will be used to sort the teams into appropriate design queues based on the quality of its review.

S 3.2.8 Evidence of information mentioned in the EDR should be brought to the competition and be available, on request, for review by the judges.

S 3.3 Design Spec Sheet (DSS)

S 3.3.1 A completed DSS must be submitted online on the competition website.

S 3.4 [DV ONLY] Autonomous Design Report (ADR)

S 3.4.1 The ADR will be used to sort the teams into appropriate design queues, based on the quality of its review.

S 3.4.2 The ADR should contain a description of the autonomous system with a review and derivation of the team's design objectives. Any information to scope, explain or highlight design features, concepts, methods or objectives to express the value and performance of the autonomous system to the judges shall be included at the team's discretion.

S 3.4.3 Evidence of information mentioned in the ADR should be brought to the competition and be available, on request, for review by the judges.

S 3.4.4 The ADR must not exceed five pages of content (text, which may include pictures and graphs).

S 3.4.5 Any portions of the ADR that exceed five pages of content will not be evaluated.

S 3.4.6 The ADR must be written as a scientific paper.

S 3.5 Engineering Design Procedure

S 3.5.1 The design event starts with the submission of the DSS, the EDR, and [DV ONLY] the ADR and their review respectively.

S 3.5.2 At the competition, teams will present their knowledge and their vehicle to the judges, which will evaluate the teams' performance following the design objectives stated in chapter S 3.1.

S 3.5.3 Some teams may be chosen to participate in the design finals to determine the engineering design event winner. The design finals will be held separately from the initial judging and teams will be informed about their participation during the event.

S 3.5.4 Teams may bring any photographs, drawings, charts, spare parts or other material that they believe are supportive to the design event, but the space provided for design judging may be limited.

S 3.5.5 [EV ONLY] Only sealed accumulator containers which passed the accumulator inspection may be presented or mounted in the vehicle. They must not be opened.

S 3.5.6 [EV ONLY] Only fully discharged and electrically shortened spare accumulator cells or spare stacks may be presented.

S 3.5.7 [DV ONLY] Teams need to show some simulation test data, where the judges can see how the algorithms work. During the final, there might be videos and data from the dynamic events. Based on the data, the movements and decisions of the vehicle are discussed. Therefore, the software and the algorithms of the vehicle are investigated in detail.

S 3.6 Engineering Design Vehicle Condition

S 3.6.1 Vehicles must be presented for design judging in finished condition, fully assembled, complete and ready-to-race.

S 3.6.2 The judges will not evaluate any vehicle that is presented at the design event in what they consider to be an unfinished state and will award zero points for the entire design event.

S 3.6.3 Vehicles may be presented for design judging without having passed technical inspection, even if final tuning and setup is in progress.

S 3.6.4 Covers and/or parts may be removed during the design judging to facilitate access and presentation of components or concepts.

S 3.7 Engineering Design Judging Criteria

S 3.7.1 The judges will evaluate the engineering effort based upon the team's DSS, EDR, and [DV ONLY] ADR, responses to questions and an inspection of the vehicle.

S 3.7.2 The judges will inspect the vehicle to determine if the design concepts are adequate and appropriate for the application (relative to the objectives set forth in the rules).

S 3.7.3 The judges may deduct points if the team cannot adequately explain the engineering and construction of the vehicle.

S 3.8 Engineering Design Scoring

S 3.8.1 The overall engineering design event maximum scoring is 150 points for CV/EV and 300 points for DV.

S 3.8.2 The maximum scores listed in table 6 apply for the engineering design event.

Category	Points	Total
Overall Vehicle Concept	25	
Vehicle Performance	35	
Mechanical / Structural Engineering	25	
Drivetrain	35	150
LV-Electrics / Electronic	10	
Driver Interface / [DV ONLY] AS Actuators	15	
Engineering Design Report (EDR)	5	
Hardware Development	10	
Software Development	10	
Planning	20	
Localization & Mapping	20	
Sensor Data Interpretation	20	150
Safety & Security	10	
Vehicle Networking / Data Processing	15	
Validation, Simulation & Testing	15	
Autonomous Design Report (ADR)	15	
Data Visualization / Usage of Tools	15	

Table 6: Maximum scores in engineering design event (including DV)