

Formula SAE-A 2019 Cost Event Supplement

COST - MATERIALS TABLE

The following clarifications to the Materials Table will apply for the 2019 SAE-A Event.

Battery Costs

EVs must use the following cost for Motor Batteries: Battery, Tractive Lithium; \$600/kWh.

Note that Battery, Advanced Chemistry at \$65/kg only applies for IC vehicle batteries and non-tractive applications.

2.7 Motor, Tractive AC & 2.8 Motor, Tractive DC

"Cost per kW continuous power rating by manufacturer. Use manufacturer peak power * 0.5 if this figure is not available."

2.5.10 Chassis Control Module + Motor Controller AC

Inverter for one DC drive motor. Use one for each individually-controllable motor. Include the cost for low capacity HV capacitors. The cost is per kW continuous power of the inverter, as rated by manufacturer. If this figure is not available, use (peak power*0.5)."

2.5.11 Chassis Control Module + Motor Controller AC

"Controller for one AC drive motor. You will need one for every motor. Include the cost for low capacity HV capacitors. The cost is per kW continuous power of the controller, as rated by manufacturer. If this figure is not available, use (peak power*0.5). "

Teams should ensure they are using the very latest versions of the download tables from the US site for Materials, Processes and Tooling

Engine Cost

Includes transmission (whether integral or not by design), components used to transfer power between engine and transmission and all components necessary to run including spark plugs, coils, wires, oil filter, etc. with the exception of the air induction and fuel system components. Any driveline component downstream of the transmission output gear/shaft is not included.

Cost includes engine as received by manufacturer, but not custom parts such as dry sump pans, PCV changes, etc. Fully internal engine changes are free. If covers or other parts are removed, disassembly labour must be included in labour cost.

COST REPORT

The following general clarifications / requirements apply.

For consistency of costing by all teams, the material multipliers for machining must be applied for all processes involving the removal of material by powered equipment, whether this be by turning, grinding, milling, laser or water jet cutting, etc.

Likewise, Chain costs are {\$0.05 per cm per row x Length of chain}, so a double row chain will be \$0.10 per cm.

- 1) Material sizes, masses and densities are to be provided in a standard unit. For example, in terms of length dimensions, teams need to stipulate the unit being used for each size listed, whether it is mm, cm, m, in., ft., etc. (in short, a number on its own is not good enough).

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- 2) Composite layups must be made clear; listing the final weight is insufficient, especially if different areas vary in layup. It should be possible for judges to readily identify the number and type of layers and processes used as well as the relevant surface area(s).
- 3) **The boxes are there to show dimensions on blank sizes and billets and should be filled in.** Without this data, judges cannot check weight and usage numbers claimed in the cost calculations.
- 4) Parts which are 3D machined must use the rapid prototyping material costs.

Format

The electronic copies of the cost report must be submitted as eBOM with 1 x MS Excel File and 1 x PDF and Excel formats per DR-1. The Excel spreadsheet must be submitted as a single file to facilitate review and analysis.

The Excel cost detail sheets must be submitted under a single file name. Teams may be penalised for lack of report clarity, should the above not be adhered to.

BOM For Electric Vehicles

This is now included in the US Rules so the separate local EV BOM of prior years is no longer required.

Make versus Buy

Wheels: Within the cost tables there is no entry for team-made wheel rims (shells) fabricated from metal. Accordingly, to ensure rational cost data, if wheel rims are team made (Al; Mg; Steel) the reported cost must be at least equal to or greater than the lowest cost "bought" rims (or total wheel if single piece) of equivalent type/design to the team made pieces.

This clause does not apply to student made wheel centres.

Cost Addendum

Teams are reminded that any Cost Addendum must be submitted at the time of registration and its receipt will be recorded by the registering officials. This will be strictly enforced at the 2019 SAE-A event.

Scenario Presentation at the Competition

Date and content for the scenario presentation will be posted to the event website by September 30 2019.