

Design Challenge National Final 2023

Get ready for the finals

What are some simple steps to ensure our team does their best to be ready for the finals? Here a short how-to guide from the IMechE Design Challenge team.

How can we successfully structure our project?

Some quick tips on how to organise your time, manage the team's effort and plan the device design, development and testing.

Suggestion of time split:

- 1) 5% - Team together to read carefully all the documentation, internet and highlight key steps: the device is an answer to a question, don't risk giving an incorrect – not applicable answer!
- 2) 5% - Team members role and tasks allocation: work on the strengths of everyone to maximise the output.
- 3) 15% - concept and risk analysis: trial your ideas, challenge it against the mission (what is described in the specification documents) and try to list how many risks you need to consider in the design and development phase. A risk that takes too much effort to be "designed out", may be the one(s) you should focus the testing and development phase on.
- 4) 30% design time: anything that can be calculated, simulated based on first principles, trialled on CAD, is worth it. The more comprehensive the model is, the better your BoM will be, and the less effort you will have to put into managing it.
- 5) 20% initial build and testing: if a design takes too long to be built or too long to start the testing, it was too complex, or the design was not sufficiently detailed. Step "d" above was not done properly! In this phase the main goal is to execute what was detailed in CAD and focus on the risks with some specific tests where the design and engineering activity was considered too time consuming or not sufficient to assess the output.
- 6) 10% refinement and final testing: focus on the items that didn't work. If needed, go around the loop of redesign – from basic principle, implement and build the modification, iterate the test.
- 7) 15% wrap up and presentation time: time to wrap up what has been done, put together the presentation, complete the CAD and the associated BoM check all the costing. Practice the presentation, refine the poster, record the presentation, and watch it. Check that all the files are in the expected format, collate them for the final submission. Ensure the submission is done on time!

Important note: safety first! Ensure your device has been scrutineered by a competent person and a risk assessment is in place and it has been signed. Ensure that all the joints are robust and reliable, and any electrical junction is carefully insulated or protected from any shorting. It doesn't matter if you believe a very low current may flow through that joint, or very little load will pass in that fastener: show respect and appreciation from the basic principles. If you want to remove a protection, work backwards instead: first add the protection, then demonstrate and provide information on why such protection shall not be added. Only after this loop, you could simplify your design or assembly.

How do I win?

There are a few key steps that are required to gain valid points in all the steps required, and as consequence, increase your chances of becoming the winning team

- I. Register your team – university with the IMechE - on time (email communication)
- I. Check the rules and understand how each session is scored. Focus on the easy wins: target first the entries that gives you more points!
 - i. Ref "a" – Appendix "B" and "C"; Ref "c" – Sect. 6 & Appendix 2; Ref "d" – Sect. 6 & Appendix 3
- II. Submit on time the 4 files required:
 - i. poster 1 page in .PDF format, A1, portrait - Ref. "a" 3.2
 - ii. presentation in .MP4 format, max 5 minutes - Ref. "a" 3.3
 - iii. CAD assembly of the device in .STEP or .X_T (Parasolid) format
 - iv. BoM tabulated, preferably in .PDF format; minimum content ref. - Ref. "a" 3.4 – 3.11
 - v. All of the above aligned to the same level of maturity – revision of what presented with the physical device
- III. Build and debug a physical device in line with the regulations, aligned with the files submitted and get it ready at the finals
 - i. Get the safety sign off – risk assessment available - Ref. "a" – 3.12

Reference documents:

- a) DESIGN CHALLENGE GENERAL SPECIFICATION AND RULES - Version 1.3 Issued September 2019
- b) DESIGN CHALLENGE BOM TEMPLATE USER MANUAL 2023 - IMechE 1st & 2nd Year Design Challenge - BoM Template 2023 - V1.0
- c) 1st YEAR DESIGN CHALLENGE PROJECT SPECIFICATION AND RULES 2023 - IMechE 1st Year Design Challenge - Project Specification 2023 - V1.1
- d) 2nd YEAR DESIGN CHALLENGE PROJECT SPECIFICATION AND RULES 2023 - IMechE 2nd Year Design Challenge - Project Specification 2023 - V1.1