Lessons from Euroc 2022

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Presentation is *huge*.

- BE DONE WITH THE ROCKET BEFORE YOU COME TO THE COMPETITION
  - When in doubt, be like EPFL, not CranSEDS.
- Make flashy stands that are soft on the rocket (rotating is really cool)
  - 3D printing, LEDs, laser cutting, rubber - the world is yours.
  - Make these early in the manufacturing process. Working with tubes on nice, solid rotating stands is SO much better.
- Make *lots and lots of posters* showing off the different parts of the rocket.
  - Pretty renders are more important than nice words.
  - TODO: Figure out good rendering software now that we no longer have Solidworks visualize. There's gotta be something from Autodesk.
- Have more than enough stuff to fill a tent where you show off rocket parts.

You can *always* make the rocket easier to assemble

- The less time it takes to assemble, the more time you have to avoid fuckups getting ready to launch
- Better bolt organization:
  - Use fewer screws, always
  - Color-coordinate the screws you use to make it easier to find the right tool
- Write better procedures and *follow the procedure*
  - CAD should match the assembly, start by writing the procedure relative to the CAD and verify against real world
  - Use generous tolerances wherever possible.
- PRACTICE assembling the rocket in a real-world scenario before launching, ideally many times
- Interfaces: twist-lock fits, screw fits, external couplings. Anything to reduce your time spent pushing bulkheads together.
- When something only fits in a particular direction, make it very clear

  - Ideally design so that things only go together a single way (the right way)
  - In lieu of that, put permanent marks. *Sharpie is not permanent.*

Don't do large sliding fits.

- Whenever possible, avoid inserting long concentric coupling tubes to assemble rocket.
- Tapers and interfaces are your friends.

Recovery is hard

- MORE TESTING
- If something seems shady, it probably is shady. *Recovery should not be shady.*
- Redundant systems help
- Pressurizing large chambers to break shear pins is hard
  - Use something else: pistons, interfaces that break apart (see Swiss / Italian sexy sexy designs)
- Putting both parachutes on a single line introduces a lot of complexity
  - Two recovery bays is the way to go

Verify your designs against CAD *before* you manufacture

- ESPECIALLY for steel parts.
- Don't just make sure they fit, know how you're going to assemble it.

Tolerances are hard

- Be (extremely) generous wherever you can be generous

What's cool?

- Cheap rockets
- Small factors of safety
- Testing
  - Graphs of testing
- Math
  - Graphs of math
- Good presentation
- Doing more with less (but really well)

- Including teammates whenever possible. If someone wants something to do, figure out something for them to do. There should always be something. *Design and plan for this beforehand.*

What's not cool?

- Composite materials (jesus christ those are a pain in the ass)
- Aluminum
- Honestly, engineering materials in general. All of them except for plywood.
- Cursing on livestream (sorry neil).