Advanced CAD Week 7: CAD Analysis Part 3: Intake

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Lesson Goals

- To transition between analyzing CAD to figuring out how to go from a concept to designing and CADing a mechanism.
- Practically laying out the steps of the design process.

Lesson Plan

- Step one: Figure out what you want to accomplish.
    - THIS STEP SHOULD ALWAYS TAKE UP THE MOST AMOUNT OF TIME.
    - In the case of our preseason project, we had a couple of different goals.
        - To patch up our team's weaknesses (like with height).
        - To provide mechanical and more importantly, programming experience.
        - To build something potentially applicable in this year's game.
    - In the case of deciding what to build for a game, it might be able which game pieces we want to manipulate and where we want to get our points.
    - In the end, you may not be able to accomplish all your goals. We only have a limited amount of time and effort. So figure out how much you can do and what goals are most important, and go for those.
    - In the case of our preseason project, we ended up going for something mechanically and programmatically challenging and potentially applicable in this year's game. It also wasn't something we hadn't built before, which does expand our team's capabilities. However, we ultimately decided that building something that seemed like it could help in this year's game was a better idea over patching up weaknesses we may not encounter for a year or two down the line.
- Step two: Figure out what conceptual mechanisms could achieve your goals.
    - Weigh the pros and cons of different mechanism types from a high level perspective. For example, if you're goal is to reach something high up, would an elevator or an arm be better for your purposes? Why?
    - This can be difficult to do without a year or so of experience looking at all the different mechanism that pop up in FRC, but Chief Delphi is a great place to see what kinds of mechanisms have appeared before!
    - Don't get caught up in the details just yet. This entire process is about starting up high and descending down into the details later.
- Step three: Figure out the high-level details of the mechanism that best fits your goals.

- Once you have an idea of what you want to build (or you've narrowed it down a lot), figure out the variations that appear in this mechanism. For example, if you're building a turret, what kind of bearings do you want to use? What do you want to mount to it? How do you want it to be driven?
- Again, this is more difficult without some experience, but when in doubt, research on Chief Delphi! There's a lot of great stuff on there.
- A lot of this is about research. *Know* what it is that you're building — if you're not really sure what a turret is, look it up!
- Keep narrowing down the details and weighing what works best for your goals. (This is why Step one is the most important! What you decide there should drive all of your design decisions.)