Advanced CAD Week 6: CAD Analysis Part 2: Elevator

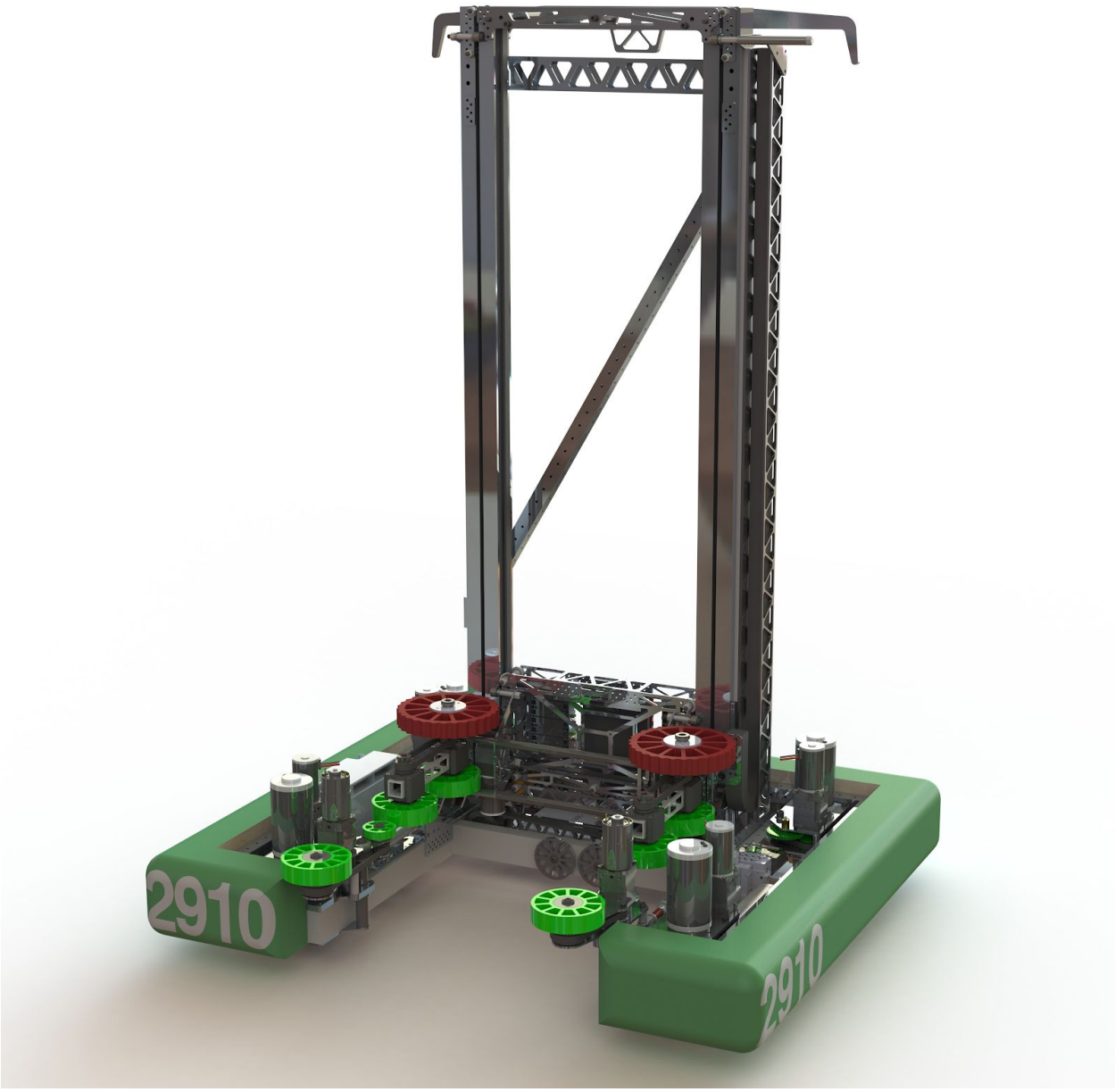
Rohawks 3419 -- Celina, Nathan, Lili -- 2019-2020

Lesson Goals

- Point out minor details that improve the safety or efficacy of the design.
- Highlight the procedure the CADders used to create the CAD and discuss how this was the most efficient process.

Lesson Plan

- Lesson Format
    - For the previous lesson, most of the team is already familiar with swerve drives. However, no one knows much about elevators, so we should provide some pre-lesson background.
    - This video provides an easy-to-understand view of how a continuous elevator lift (the type 2910 used in 2018) operates - should send out an email a few days before that links to it (details under Walkthrough/Discussion).
    - Like the previous lesson, there should be one computer connected to the SmartBoard so that everyone can see what the teacher is talking about. However, students should also be able to download the model onto their own computers to explore themselves.
- CAD Walkthrough/Discussion
    - 2910's 2018 elevator (same import procedure as last week's lesson)
        - Note that in this design, a chain with sprockets is not the only solution - a belt or string pulley system would work just as well.
        - This concept isn't limited to just 2 stages - 3 have also been used. Doing so adds complexity but allows one to have a shorter elevator, lower center of gravity, and overall more stable robot.



- The belt that connects the motors to the carriage and intermediate stage actually runs *within* the box tubing that makes up the elevator rails.
    - What could some advantages of this setup be? Some disadvantages?
    - Tradeoff of better ~~aesthetics~~ packaging/compactness versus it being harder to assess the condition of the belts & rollers and repair them if something goes wrong.
- The large red and green wheels are attached to the box tubing that makes up the lift arms by 3D-printed material - probably similar to the carbon-infused plastic that we use.

- The hook on top for the climber is filleted - for sure necessary to pass a safety inspection.
- The crossbar on top, probably there to stabilize the elevator in case it catches on something, is filled with filleted lightening holes, as is the top of the carriage.

Supplementary Materials

- 254's 2018 and 2019 technical binders: examples of two fantastic elevators with descriptions of the mechanical and computer control systems of each.
- An animation of a cascade lift, an elevator design that uses a rigging system different from a continuous lift.