Overview
The High Concrete Group manufactures pre-stressed concrete members called “double-tees” that are sued for the load bearing driving surface of parking structures. These double-tees can weigh up to 75,000 lbs. and are stored in stacks 20 ft. high. This project focuses on simplifying the handling and storage operations. At times workers need to climb the stacks to manually engage/disengage crane hooks to the lifting devices. This process has room for improvement with regards to safety and productivity.

Objectives
- Improve worker safety.
- Engage/disengage the crane-hooks on the double-tee lifting-devices remotely and without physical interaction.
- Eliminate the need of climbing high stacks of double-tees.

Approach
- Visited the High Concrete Group’s work site at Denver, PA, and gathered useful data.
- Identified our sponsor’s needs, prioritized them, and translated them into measurable metrics and specifications.
- Performed extensive patent research and product benchmarking.
- Generated several different concepts, compared them, and chose one concepts.
- Performed system level design using CAD software for our H-Beam.
- Collaborated with Elebia engineers to use their remotely-controlled crane-hook in our design.
- Performed kinematic performance analysis for the crane-hook actuation using CAD software.
- Used 3D printing to fabricate a real sized Elebia crane hook, attached a stepper motor to it, built a real-sized recess hole, and assembled them all to perform real life kinematic analysis that achieved desirable results.

Outcomes
- High Concrete can save up to $3.25 million dollars over a 20 year period.
- Manual engagement/disengagement of crane hooks has been eliminated by remote handling thus improving safety.
- The results of the designed solution will increase productivity from 20 minutes per double tee movement to 10 minutes.