Armstrong Ceiling Tile Perimeter Mapping and Cutting System

Overview
Our team, along with another design team, was tasked by Armstrong World Industries Inc. to design and build a system that would easily scan, dimension and cut ceiling tiles to a desired shape and size. After the project was split into two categories; the cutting and measurement systems, our team (Team 2) took on the cutting system. Our main goal was to create a program that would convert the measurement data given to us by Team 1 to G-code for a CNC cutter to process.

Objectives
Our team created a program that will convert dimensional data given to us via a phone app to G-code. Along with this we created a vacuum table and vacuum system to aid in clamping the ceiling tiles without harming them and collecting the dust created by the cutting process.

Approach
- The entire project was split into the scanning and cutting systems.
- We gathered the customer needs directly from the sponsor and from ceiling tile installers from a site visit.
- The cutting system was divided into multiple sub-sections; the clamping and the fixture system, vacuum and shroud system and the computer system.
- The computer engineers were tasked to create a program to convert the dimensional data given to us by Team 1 into G-code.
- The mechanical engineers worked on designing and building the vacuum table and vacuuming head for the cutter interface.
- Once all parts were operable testing began.
- Optimization of feed rate and debris collection were processed.
- Testing of the dimensional data from Team 1 to G-code to physical tiles were tested.
- The program created by our team succeeded in creating correctly sized ceiling tiles.
- An optimal feed rate was found that cut ceiling tiles quickly and safely, leaving virtually no debris left in the cut.
- Both teams combined and the transfer of data from Team 1 to Team 2 worked effectively to cut specifically sized ceiling tiles from scans of ceiling tile grid.

Outcomes
Finally, this device, if further improved upon, could procure incredible benefits to not only Armstrong but contractors and possibly homeowners looking to install drop down ceiling systems. This improves ceiling tile installations by:
- Eliminating the need for multiple workers.
- Reducing lead time of the ceiling tile cutting process.
- Improving on the safety of ceiling tile cutting operations.
- Eliminating the demand of skilled ceiling tile installation workers.