PSU NASA- Capture Methods for NASA’s Asteroid Redirect Mission

Overview
Asteroids are made up of valuable minerals like platinum, titanium and other metals. Therefore, NASA has been working on different techniques to mine asteroids and bring their contents back to Earth. The challenge for our team was to generate designs that will successfully capture asteroids for the purpose of mining and further develop concepts that will work under the limitations of the space.

Objectives
The team focused on generating and developing capturing mechanisms that were feasible and creative.

Approach
The team came across several hiccups during the entire semester but the team used the following steps to resolve problems:
- 5-Why Problem Solving
- Contacted subject matter experts to guide us through the problems
- Brainstorming

The team gathered customer needs by interviewing our sponsors and one of the team members took notes during the meeting. In order to come up with concepts, all team members conducted individual research about existing technologies, ideas and brainstormed possible way to approach asteroids. The team picked the ideas that closely matched to needs of the sponsors by using a selection matrix. Once the concepts were generated and selected, the team researched associated patents and existing intellectual properties on products and processes. However, there were no patents that the team was infringing with the chosen concepts. Our sponsor, Charles Camarda, was available through video conferencing and telephone. The team often reached out to him for any questions about the environment and the feasibility of the concepts. However, our other sponsor, Dr Sven Belin, was located on campus and readily available to meet. Since our project was conceptual, the team made several CAD designs to facilitate the understanding of each concept. No tangible prototypes were made but the team took testing videos with lasers. To validate the team’s ideas, the members analysed existing papers written by professionals in the field.

Outcomes
- Valuable materials are extracted from asteroids for human consumption
- Out of the box approach to the asteroid capture challenge