

# Design of a Toggle Clamping System for Vacuum Forming

**Emad Tanbour, Cameron Lacourt**  
Central Michigan University  
Mt Pleasant, MI

## **Abstract**

The thermoforming machine has a clamp to hold the piece of plastic in place. Currently there is a mechanism that wastes a lot of material and is too large. We aim to reduce clamp area by increasing force on clamp with a slider crank toggle mechanism. The force used on the mechanism will be pneumatic. By the end of the semester we will be able to present the industry sponsor with a standalone toggle mechanism design for their thermoforming machine. We will come up with multiple working scenarios of possible toggle mechanism designs and calculate how many pistons would be required and the distribution between the pistons for the clamping area.

Our objectives are: Research different toggle mechanism link designs, calculate the piston locations and the number of pistons required for clamping and develop design concepts with sketches, mechanical analysis, and mathematical modeling.

Our goals are: Create a standalone toggle mechanism prototype, develop a conceptual 3D CAD model, develop a working prototypes from concepts, test prototype at industry sponsor, and redesign concept based on testing of prototypes.

*Project Sponsor: Vantage Plastics, Standish, MI*