Optimization of UnisBrands 3D Printed Shoe Production

Overview
The main purpose of this project was to optimize the printing of the line of customizable 3D printed shoes that UnisBrands is developing. This was done in order to improve the printing time, improve the quality of each shoe, and improve & enhance the overall quality and customizability of each rubber shoe sole.

Objectives
1) To create production equipment in order to increase quality and minimize waste.
2) To create new sandal straps that optimize the print time and quality of the shoe.
3) To create new printing parameters that optimize the print time and quality of the shoe.

Approach
• For the production equipment, we redesigned the sole tray using CAD.
• The design of the tray came from discussions had with our sponsor.
• We decided to do one standard tray with interchangeable designs and moveable walls.
• This tray would be milled from 6061 Al.
• For the new straps, we created a new model using CAD.
• For the adjusted printing parameters, we raised the printing temperature and material extruded by trial and error with our sponsor's 3D printer.
• We also suggested new printing angles for the support material in order to reduce the stresses on the sandal.

Outcomes
• Reduced the print time by 75%, improved the durability by 65%, and reduced material waste by 51%.
• Reduced the overall cost of created one shoe without reducing either the comfort, durability, or customizability.
• Improved overall quality, according to our sponsor.
• Assisted UnisBrands in preparing and refining shoe design and process.