

IPRO 312 - APPLYING RAPID PROTOTYPING TECHNIQUES TO PRODUCTION TOOLING



Problem

For over a century, industrial casters have been manufactured using the same rigid technology – hard tooling. “Customization is a fact of life”. It is disruptive and delays deliveries. The current caster manufacturing methods create lead times of as long as eight weeks for custom orders! Customers want their orders fulfilled NOW!!!

Small, Flexible, Fast = Happy Customers

Big, Rigid, Slow = Dissatisfied Customers

With this in mind, our solution was to design a caster and manufacturing process that would reduce the lead times on custom orders to two to three days.

Goals & Tasks

- Establish / refine caster component designs capable of being produced from flexible technologies (such as lasers and water jets) that meet sponsor’s performance and responsiveness requirements.
- Determine the equipment required to produce caster components that meet quality, economic and flexibility requirements.
- Develop representative prototypes and ensure they meet International Caster and Wheel Manufacturers’ (ICWM) requirements.
- Determine the economics involved as compared to traditional caster manufacturing methods: equipment cost, cost per part, floor space, staff and return on investment.

Organization

The team was divided, based on need, into four sub-teams: equipment, caster design, factory design and business with their names suggesting their function. The equipment team was responsible for finding out all the information on any equipment that would be required in the process. The caster design team was responsible for selecting a design that would comply with Colson’s design requirements and also exceed the International Caster and Wheel Manufacturers’ (ICWM) requirements. The factory design team was responsible for locating and selecting possible sites for the facility, designing the facility layout and ensuring that building and environmental codes were met. The business team was responsible for all costing and predictive financial calculations. During the course of this project, what became critically important was to share information on a timely basis in order to reflect current progress. This made us dependent on one another. The findings and conclusions of each team were combined and scrutinized, allowing the IPRO team to draw final conclusions and make recommendations.

Barriers / Obstacles Encountered

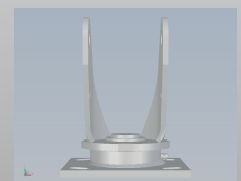
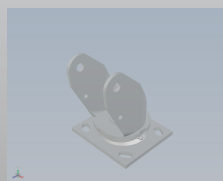
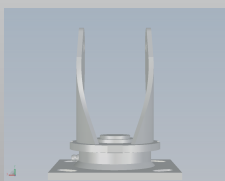
- The amount of time to fully understand the requirements of the IPRO and to differentiate between last semester’s and this semester’s objectives.
- The amount of time to finalize the caster design, which consequently delayed virtually all other aspects of the project.
- Gathering up-to date information (capabilities, costs) on equipment required for the process.

Accomplishments

- Conceived and refined caster designs approved by Colson.
- Created prototypes based on original and refined caster concepts.
- Designed a flexible process that eliminates the need for hard tooling thus significantly reducing inventory and other costs.
- Created appropriate cost model based on new business model, with accommodations for direct costs.
- Identified two possible locations for the proposed factory site (compared Illinois to present site in Arkansas)
- Drafted designs for the facility with accommodations for expansion.

Future Work

- Find ways of reducing equipment cost in order to reduce cost of production per caster.
- Find possible ways of incorporating new caster families into the production line.
- Liaise with the marketing department at Colson to get a better picture about customer expectations.



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Student Team

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