UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Senior Design Project Description

Company Name	*The Polymers Center of Excellence, Inc.*	**Date Submitted**	*03/08/2020*
Project Title	*Design and Build of an Injection Mold Exchange and Transport Device* **(PCE_MOLD)**	**Planned Starting Semester**	Fall 2020

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	4	Electrical	
Computer		Systems	
Other ( )			

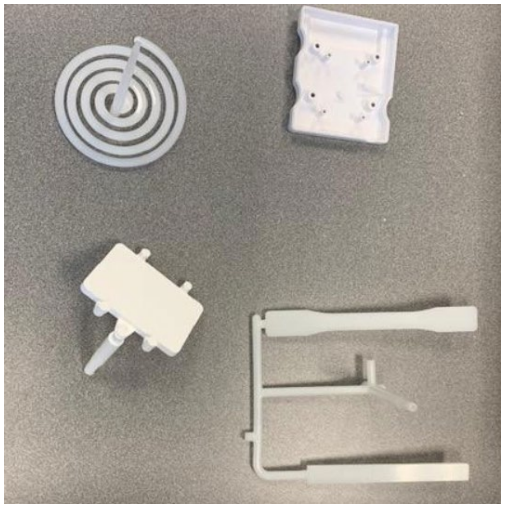
Company and Project Overview:

The Polymer Center was founded in 1972 when the State of North Carolina funded plastics specialists in the Industrial Extension Service program at UNCC. The center, located at that time on the UNCC campus, expanded in 1994 when a joint venture was entered into with NCSU to form PEP (Polymers Extension Program). By 1999, PEP moved off of the UNCC campus (to the close by University Research Park) and became today's Polymers Center of Excellence (PCE). In 2012, Polymers Technology Center (PTC) was added for small scale production for plastic injection molding and compounding plastics. Since then, the Polymers Center has continued to impact economic development through education, research and development, and trial production.

The Polymer Center offers training courses incorporating real world experience with the latest in the science of polymers. These classes take place in the Polymer Center which has three plastic injection molding machines. See photo below:

The Polymers Center has three molding machines, two of which are of state-of-the-art hydraulic/electric design, with the third being an older hybrid-electric.

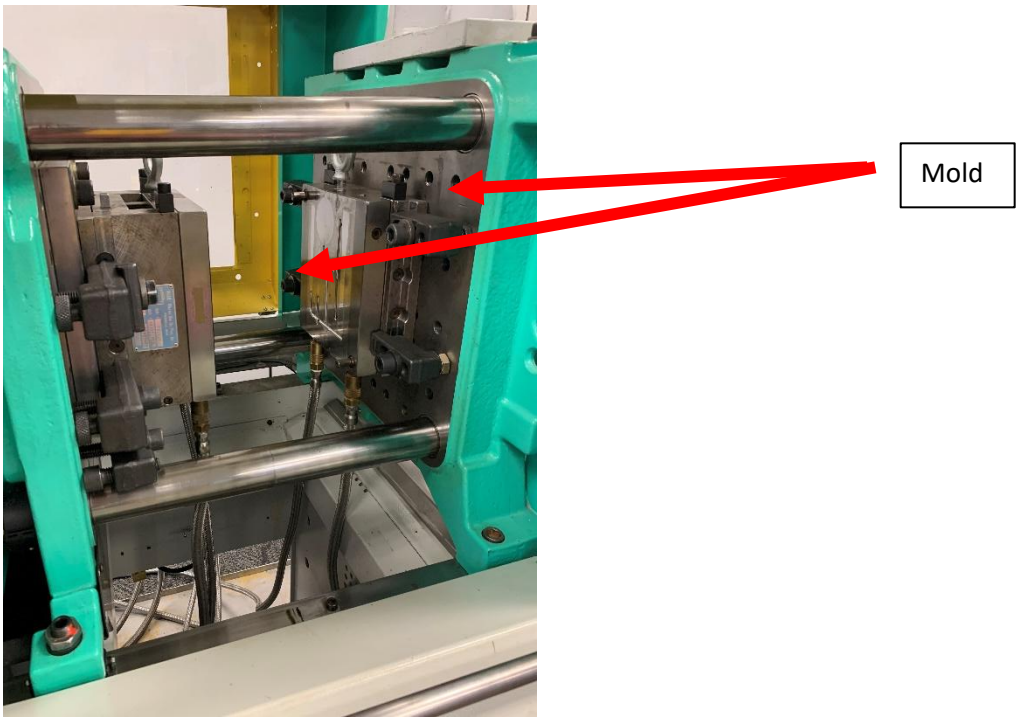
Examples of parts made:



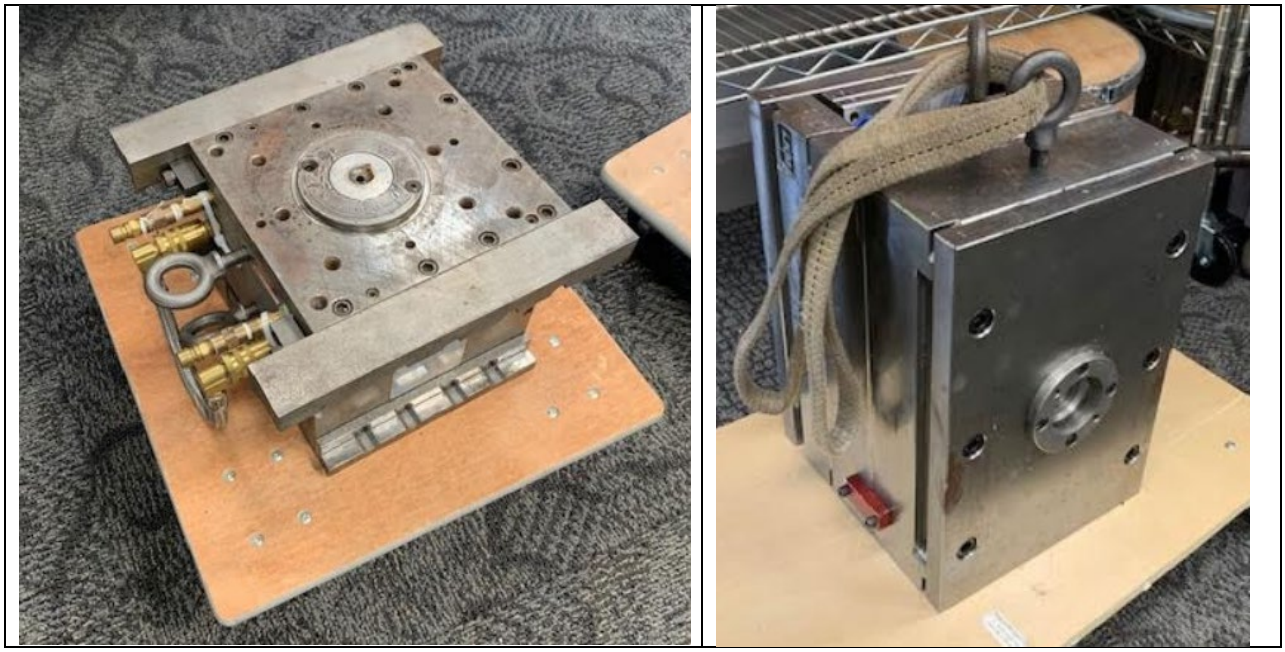
The Polymer Center molds weekly and teach classes on molding with these machines. This project will design and build a device to improve the mold handling process for the machines.

Project Requirements:

The photo below shows an example of mold that is used in an injection molding machine:

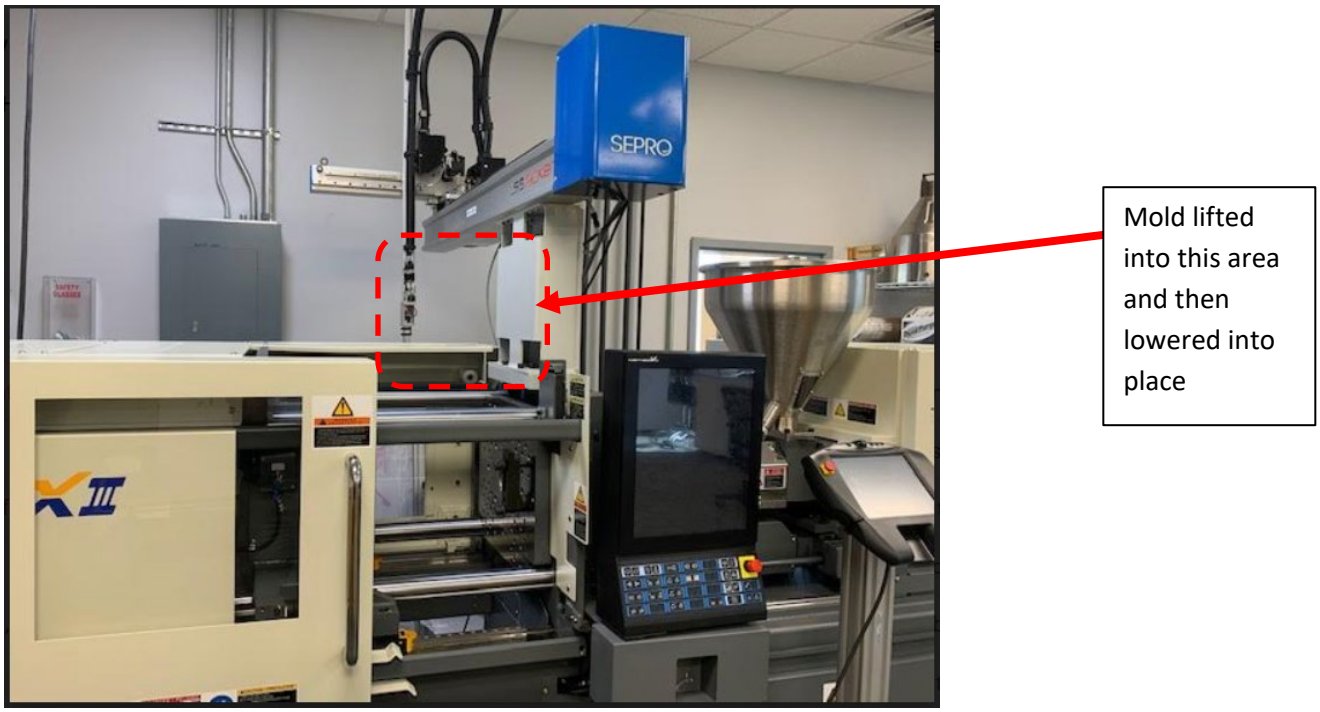


This is what a mold looks like out of the injection molding machine:



These molds can weigh up to 500 lbs. They all have lifting eyes as shown in the photos. The

current method is to put a sling through the lifting eyes and lift up with a forklift. The forklift then manuvers over to the the injection molding machine (See one of the three machines in the photo below):



It is difficult and inconvenient to bring a forklift into this room to do this job. In addition, there is sensitive equipment in the area where the mold is lifted and it is easy to do damage with a forklift. The molds must be exchanged by removing the mold already mounted in the machine, connecting it to a lifting device, unbolting it from the platen, pulling it from between the tie bars up and out of the molding machine, and then dropping in the exchange mold into the same space and bolting it to the platen. This process is called a mold exchange.

The Polymer Center would like the project team to design a new lifting apparatus that can be dedicated to the lab for the purpose of lifting molds, carrying them to the machine and lifting them into and out of place without damaging any of the surrounding equipment.

The device must meet the following specifications:

- Safe to be operated by one person
- Lift and maneuver 500 lbs
- Move the device from mold storage to the particular molding machine. (<100ft)
- Not damage injection molding machine
- Be capable of working with all three machines
- Not damage the molds (note molds have brass fittings that cannot be damaged)
- Accommodate various mold sizes
- Safely mount the mold in the molding machine. This will require good control over position and slow speed.

Expected Deliverables/Results:

- Design and build a device that meets the specifications
- Drawing package and Bill of material for the design
- Tested and verified in the Polymer Center lab.
- Operation and maintenance manual
- Training video for Operator

Disposition of Deliverables at the End of the Project:

The Polymers Center would use this device on a weekly basis and it would become part of the state-of-the-art molding center. Team to arrange to get this to PCE lab after the conclusion of the Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

Good mechanical design skills.