NON-STICK COATINGS UTILIZED ON VARIOUS METAL SURFACES DURING INJECTION MOLDING PROCESS

Overview
Injection molding is used by TE Connectivity to produce fiber optic connectors that are utilized in cable networks. During their injection molding process residual polymer is sticking to the mold on 3-4% of the runs which causes defects to following fiber optic connectors. These defects interrupt the light path of the connectors and slow the transmittance of data. TE Connectivity is looking for a solution to minimize how often the polymer remains on the mold via non-stick coatings.

Objectives
The secondary goal of the project is to research and suggest non-stick coatings that can prevent the adhesion of polymer in TE’s mold. Because TE’s process is impossible to replicate with every potential coating, the primary goal of the project is to create an experiment that can sufficiently mimic TE’s process so that the recommended coatings can be tested properly.

Approach
- Visited TE Connectivity facility in Harrisburg, PA to investigate the process and possible reasons for failure
- Narrowed the scope of the project to investigating potential non-stick coatings on the mold
- Spoke to many professors and experts on non-stick coatings
- Researched recommended non-stick coatings to determine if they fulfil the requirements of TE’s process (i.e. degradation temperature, uniformity, etc.)
- Received Ultem 1010 resin from TE Connectivity
- Contacted Silcotek®, a local coatings company, for a donation of coated steel coupons
- Researched and discussed how to replicate the TE’s injection molding process at similar temperatures and pressures
- Ran the experiment using a Carver heat press (Carver Heated Press Model #2699)
- Completed Fourier Transform Infrared Spectroscopy (Vertex 70 FTIR) to determine if residual polymer remained on the tested coated steel coupons
- Analysed the spectroscopy data and concluded that there was no residual polymer left on the coated heat pressed samples and therefore showed that this could be a potential coating however it must be further investigated

Outcomes
- The sponsor and future teams will be able to investigate more recommended coatings using the procedure created
- The innovative coating donated by Silcotek® has potential to be a viable coating however must be further studied for durability

Figure: FTIR results for Ultem 1010 (red) and heat pressed, coated samples (blue)