# Plastic Hose Forming System

## Transfer Flow Inc

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## PROJECT OVERVIEW

The purpose of this project was to build a machine to form plastic hoses which would make Transfer Flow Inc.'s product less costly to manufacture, could be used in more applications, and would provide a better product to their customers.

The parameters for the Plastic Hose Forming System are:

- Safe
- Efficient
- Cost effective
- Versatile
- Easy setup/ maintenance
- Take up small space

The objectives of the project included:

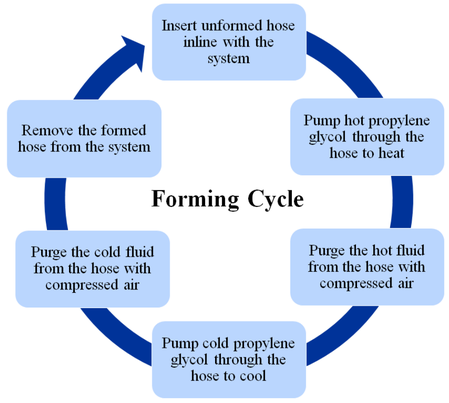
- Verify a  thermoforming process
- Form hose into unique geometries
- Partial automation by a computer
- Be cost effective

## PROJECT OUTLOOK

The plastic hose forming system will reduce the cost of fuel lines used in Transfer Flow Inc.'s fuel systems. A single piece of plastic line is more cost effective than an assembly of straight pieces and corners pieces. The versatile design will allow for many unique geometries to be formed using a standard format.

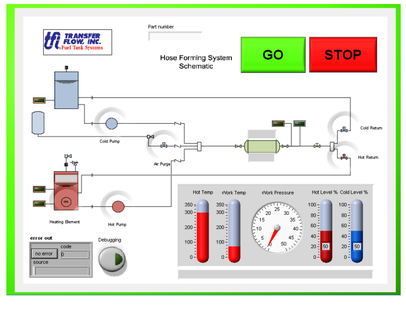
## HOW IT WORKS

The plastic hose forming system consists of a heating loop, a cooling loop, a work table, and a fixturing system. The first step in forming hoses is orienting the fixturing system. An operator will use an example shape to properly locate the fixtures. Once the fixtures are in place the operator will connect an unformed hose inline with the system. Hot propylene glycol is then cycled through the system until the hose becomes malleable. The hose is then placed into the configured fixture pattern, and then purged of the hot glycol with compressed air. Cold propylene glycol is then cycled through the system until the hose becomes rigid, and is then purged once again. Any remaining air pressure is released from the hose and the forming cycle is complete.



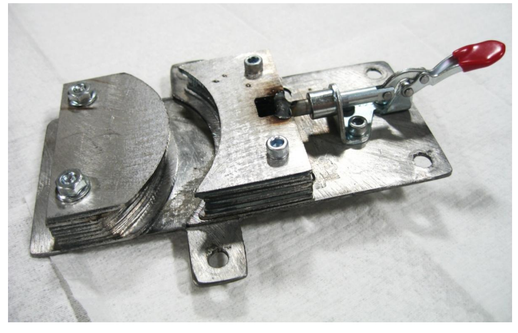

## CONTROL SYSYTEM

The computer controls all the major processes in the operation of the plastic hose forming system. This includes the solenoid valves, ac motors, and the heating element. The computer receives inputs from the thermocouples, level sensors, and pressure transducer. The control system allows for communication with the plastic hose forming system through software designed in Labview®. This software allows for an interactive display of the operations, control of the part parameters, as well as, provides a fail safe protocol that will help protect the operator.




## FIXTURING

The fixturing system is comprised of two main components, the positioning arms and the corner fixtures. The positioning arms consist of a magnetic base, steel arms, shaft collars, and a mounting plate. The fixtures are mounted to the positioning arms, and securely hold the hose during forming. The fixtures utilize the availability of sheet metal and tooling resources at Transfer Flow Inc.



## PROOF OF CONCEPT

A Differential Scanning Calorimetry Machine was used to find the phase change temperatures of the three types hoses considered for forming. The data was used to estimate the required temperature to form that type of hose.