Industrial Automation
Position and Temperature

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Abstract

This document will go through the process of automating an industrial process using industrial equipment in the form of PLCs.
This will entail the tools used for development, the design of the application and breakdown of the problem in states, using matlab to generate values for the PID system used in the program and binding it together using the Structured Text programming language.

Version Management		
Version	Changes	Reason
v0.1	All	First Draft

Contents

1 Introduction

For this project, a company assigned us to automate the process of a movable tank. The tank will be used to contain and mix liquids(chemicals) in a temperature controlled environment.

The general tasks that the system should be able to fulfill are:

1. Fill liquid A into the tank.
2. Fill liquid B into the tank.
3. Stir liquids A&B while heated to a temperature setpoint.
4. Move the tank to a position setpoint.
5. Empty the tank.
6. Return the tank to the default position.

To fulfill these functionalities the following hardware is installed and can be manipulated by our program:

- Value A, B & C
- Stirrer
- Level Switch S1, S2 & S3
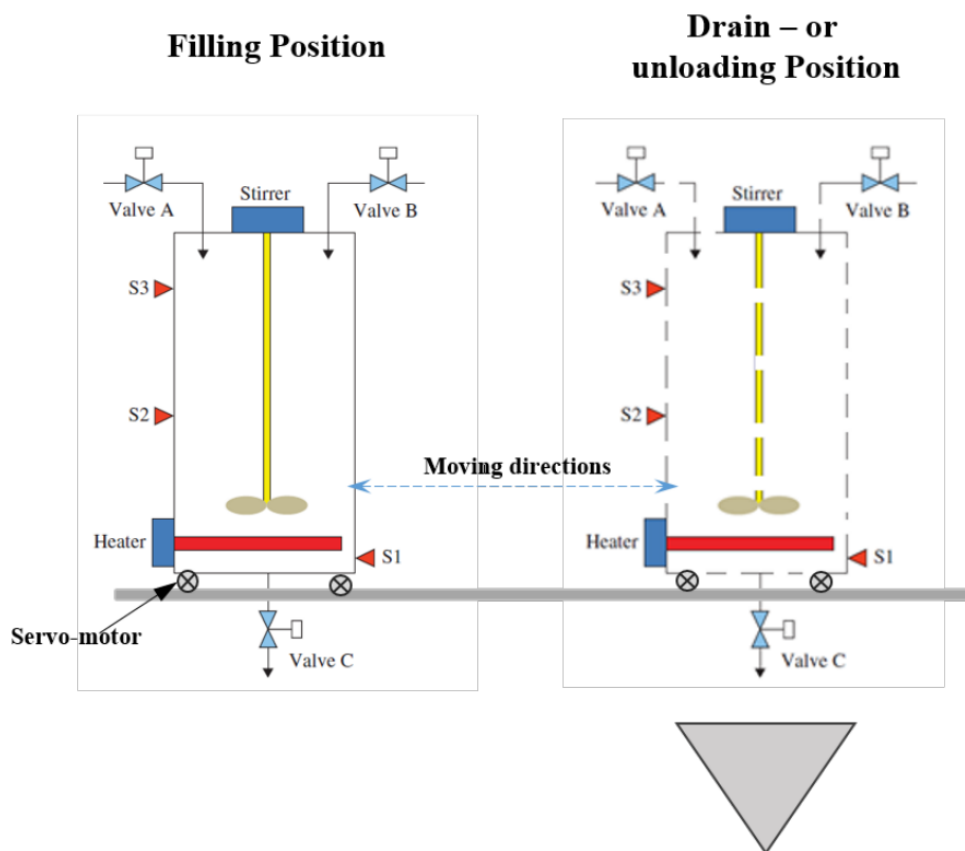- Heater
- Temperature Sensor
- Servo Motor

Figure 1: Production set-up

2 Tools & Equipment

For the development of our program, Twincat 3.0 will be used as the work that is provided will be in the form of a Twincat 3.0 archived project. Extracting this project shows that the basics like I/O and a base program has already been implemented. However this implementation is very crude and can use more refinement. In this manner, the first thing to be improved will be the visualization.
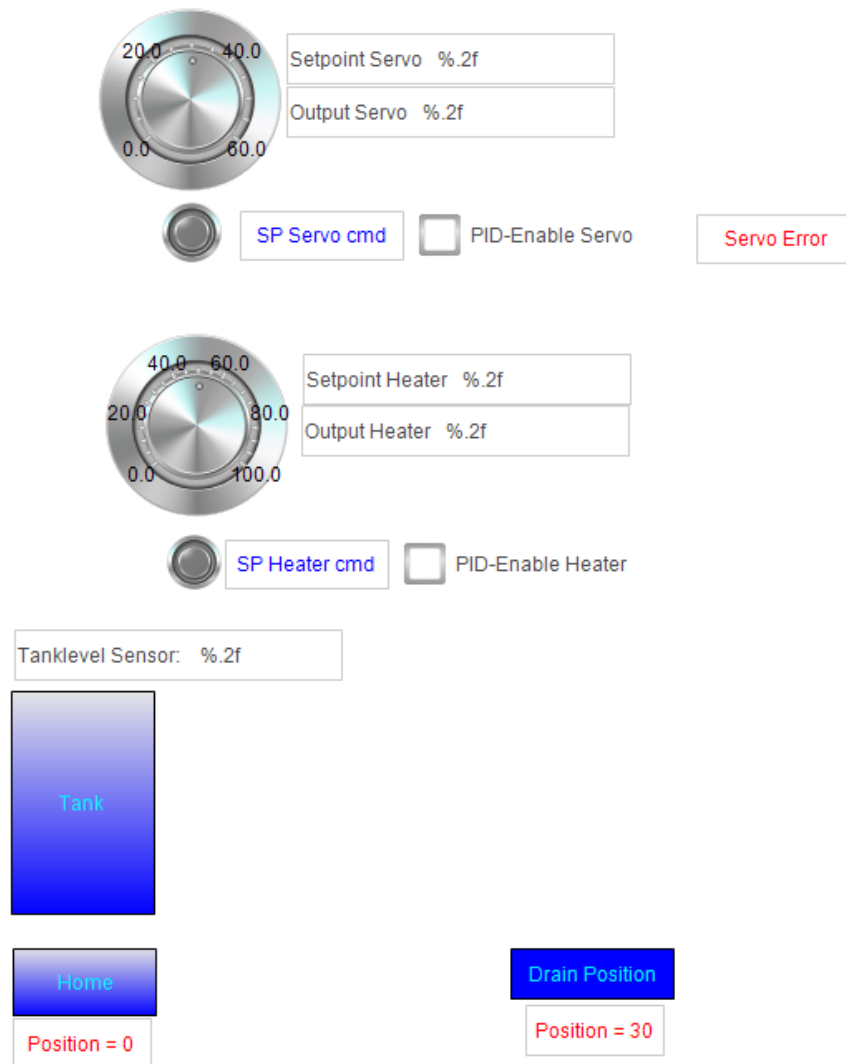

Figure 2: Old Visualization

Currently the UI is rather cluttered and not all information like the valves and stirrer are displayed.

As such a new visualization has been created to show all input information and the states of the outputs.
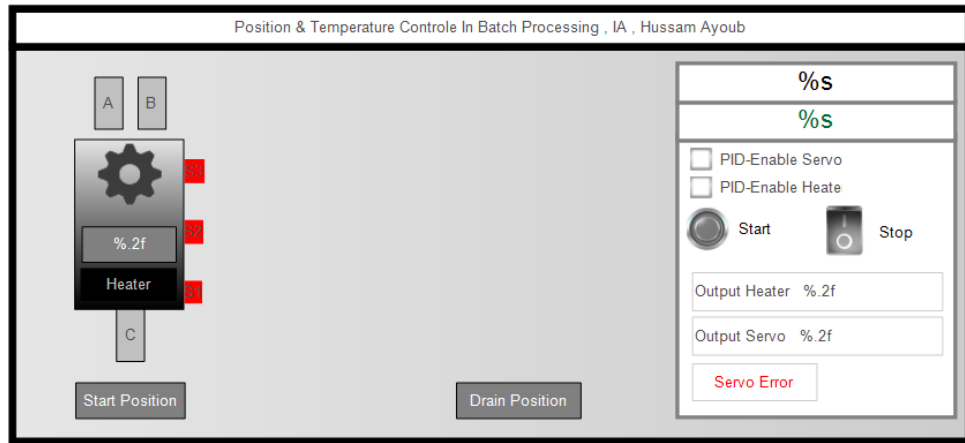
Figure 3: State Diagram of the process

3 Program Design

Having set the parameters of the project and a way to visualize the result, the process is the next thing in line. To start of has a state diagram been made to show the manner at which the program should operate given the criteria.
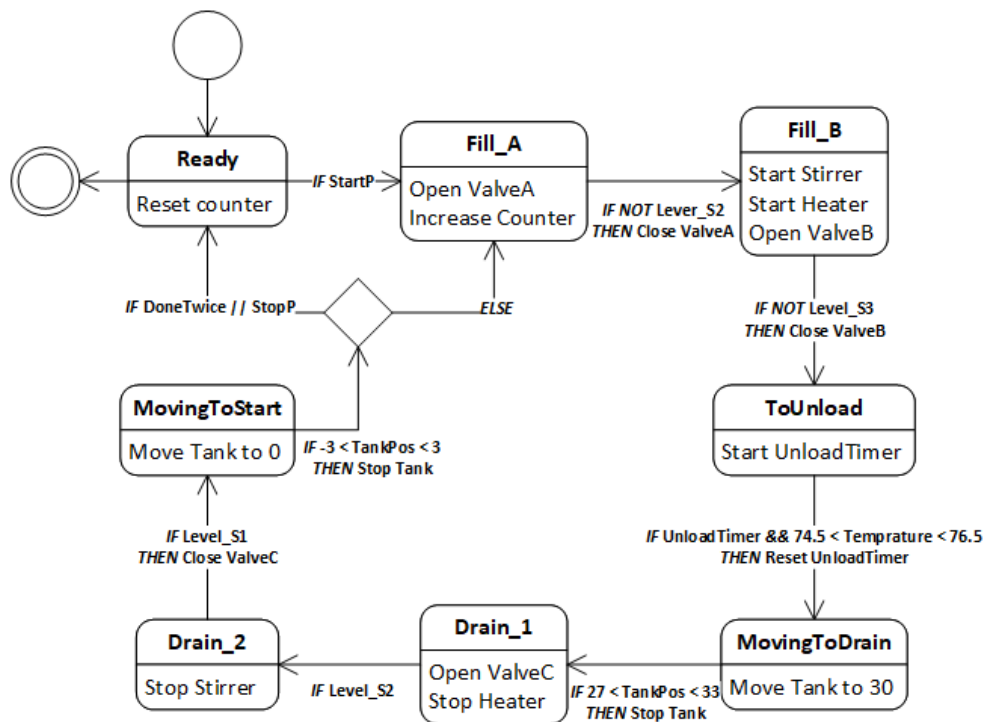

Figure 4: New Visualization

Most of this code has already been implemented, the main section that needed to be filled in was the MAIN section which holds the state of the program, and the PID controller (fBDISCRETE_PID) that needs to be completed.

4   PID & Matlab

Starting with the PID controller needed for the movement of the tank to go fluently, the first part is to understand PID.

5   Implementation

6   Conclusion

References