Small Batch Control Using IEC 61499

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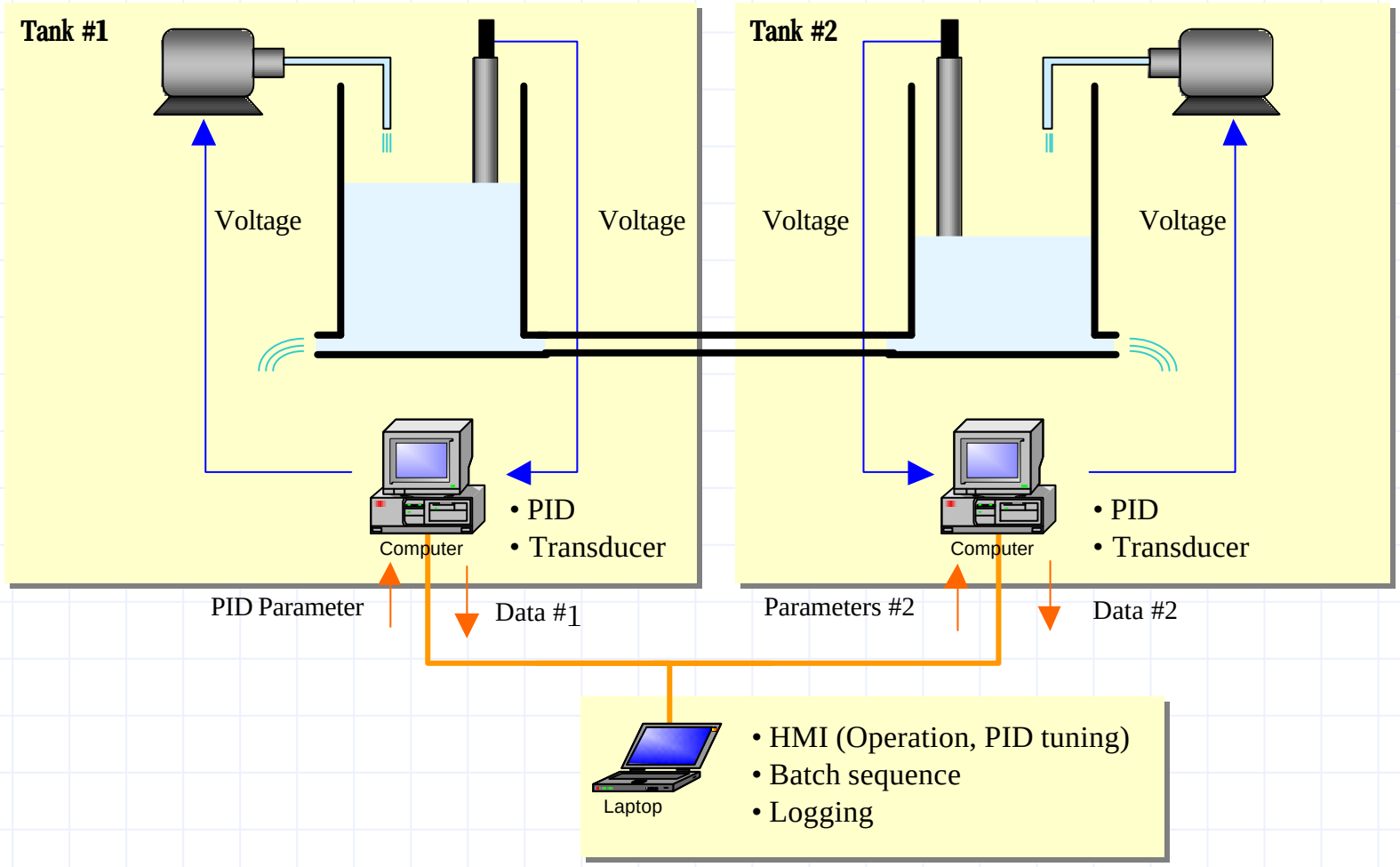
Purpose of This Project

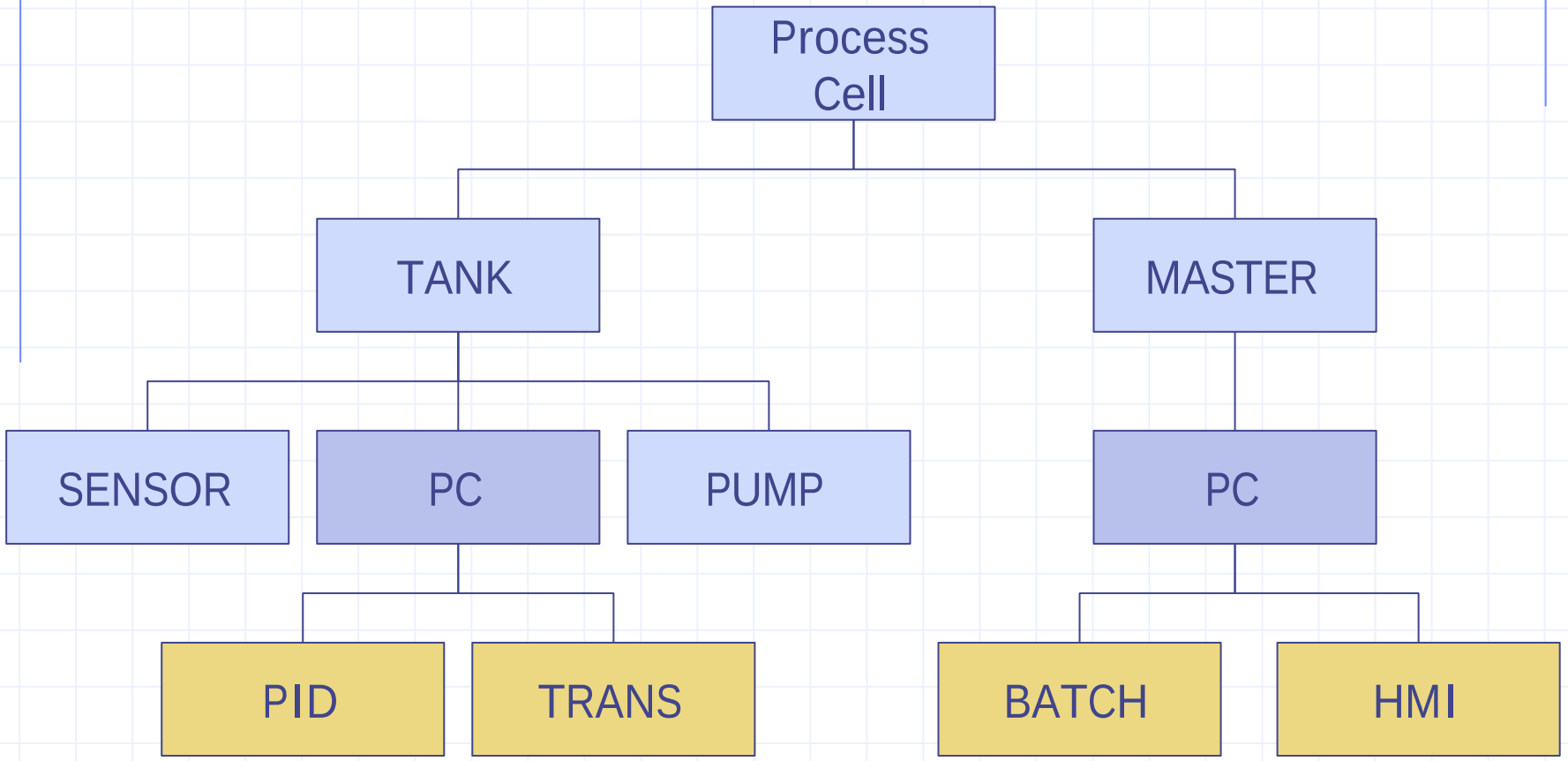
- Experimental study of batch control using IEC 61499
- Discuss system design and design methodologies

System Over View



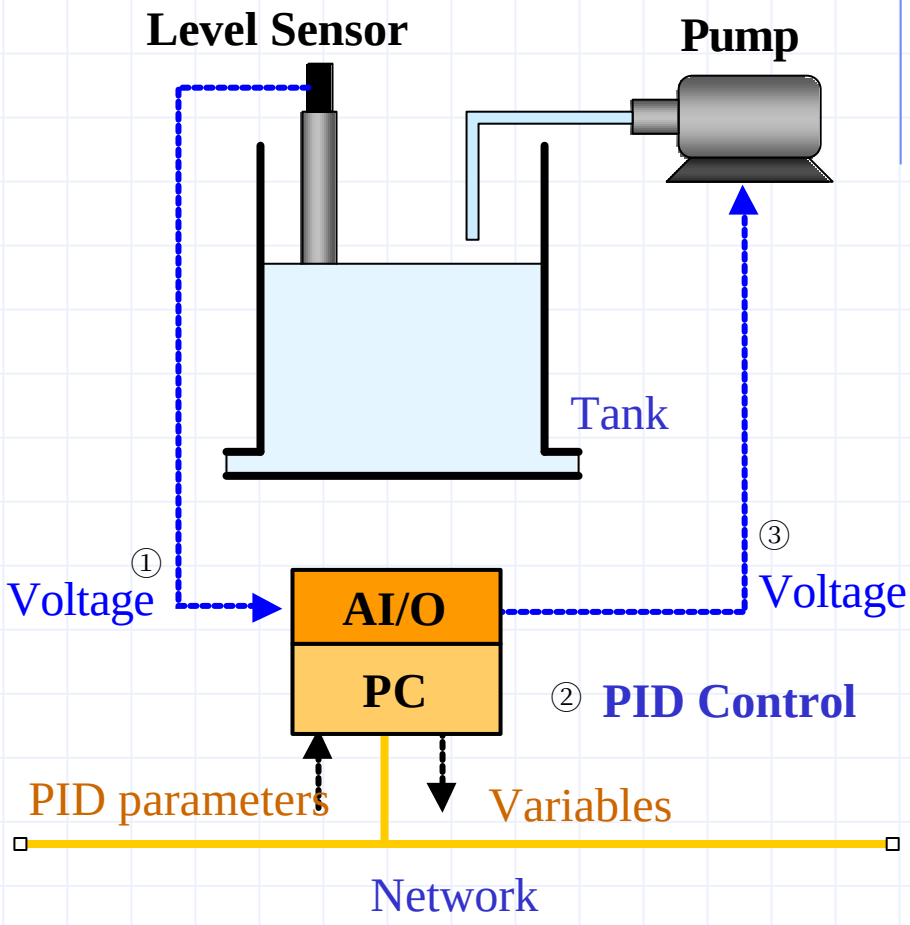
Coupled Tank

Physical Model

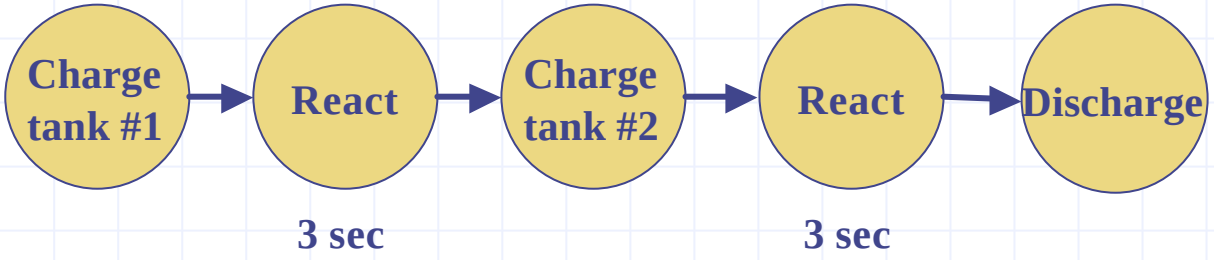


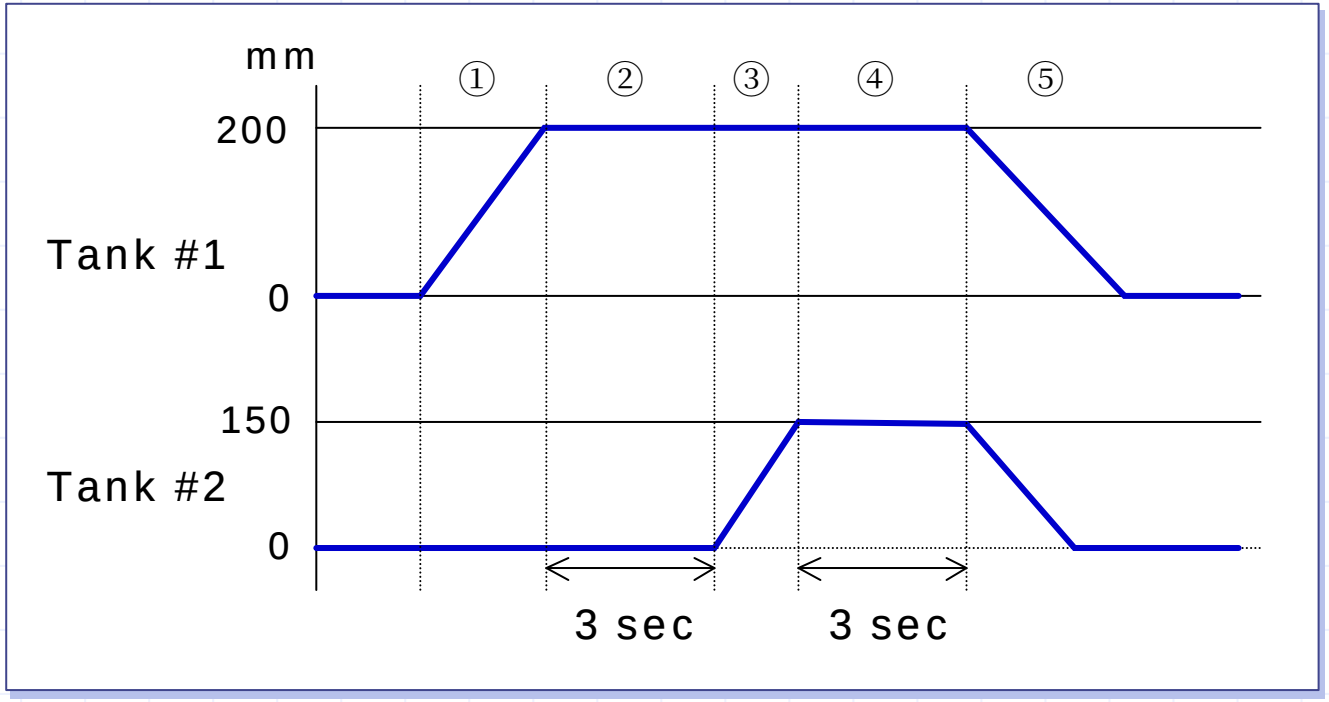
Tank

- Instruments
  - Tank
  - Level sensor
  - Pump
- Function
  - Level control
- PID
  - Auto/manual
  - Remote operation

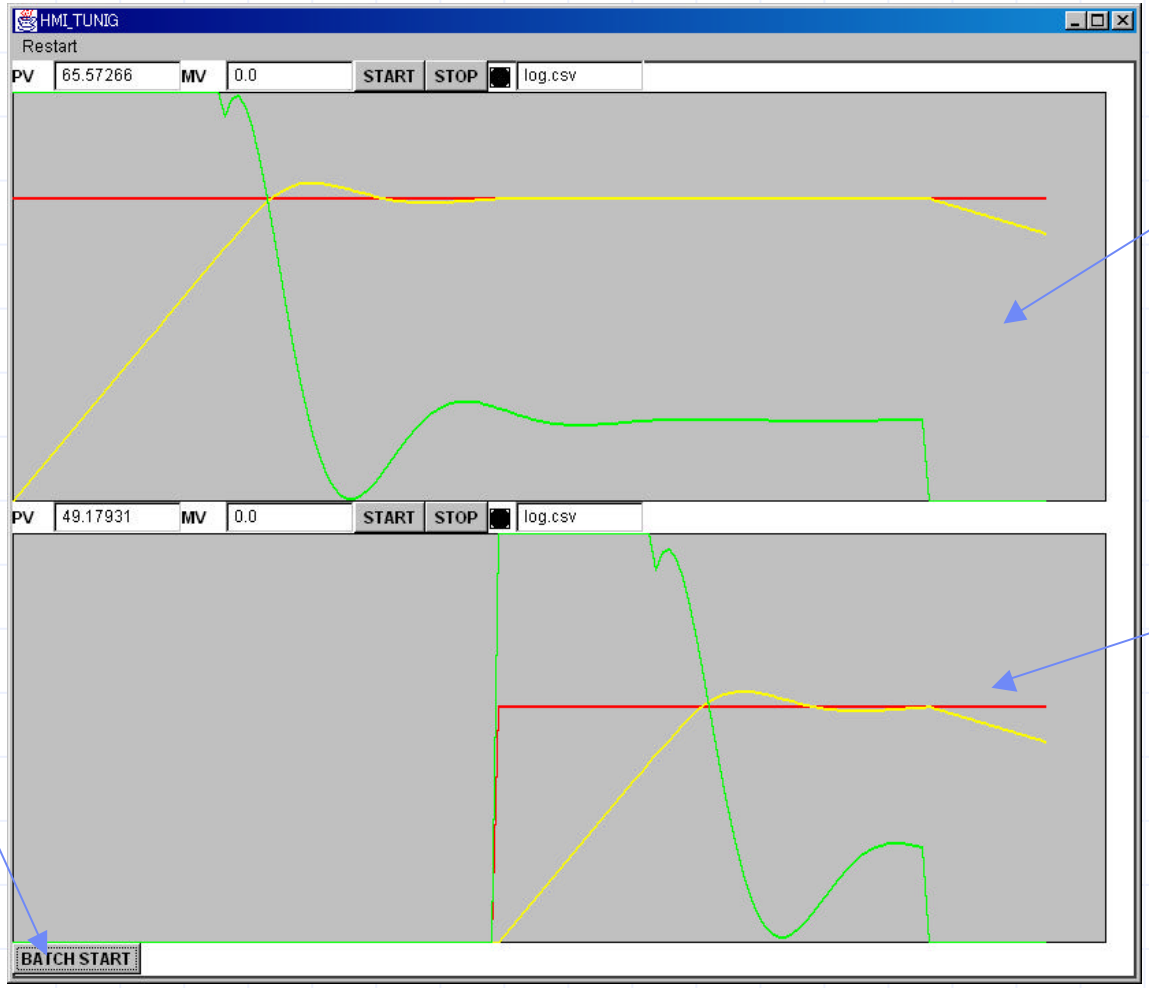


Batch Procedure





HMI



Tank #1

Tank #2

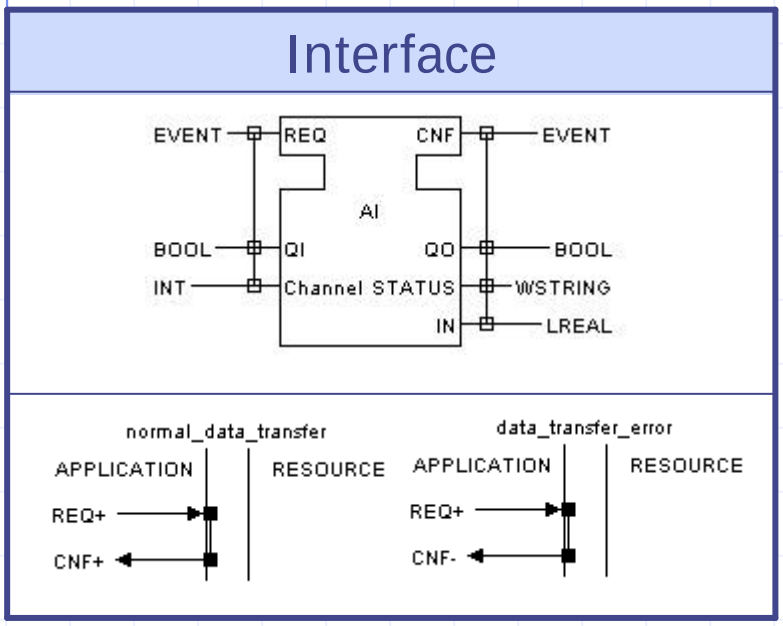
Batch Start Button

Application

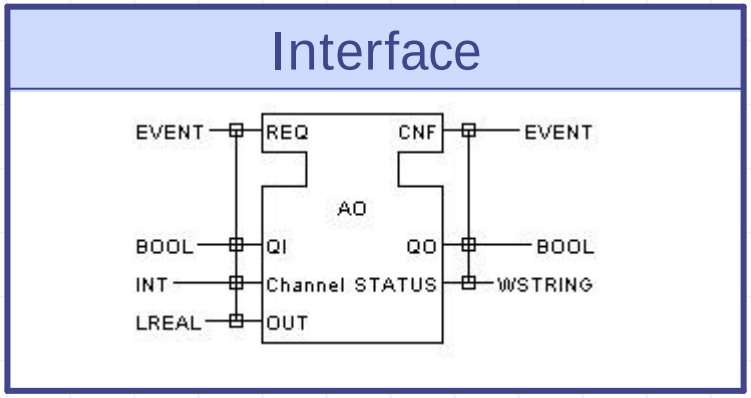
1. Components
2. Tank Control
3. PID Tuning
4. Batch Process
5. Results

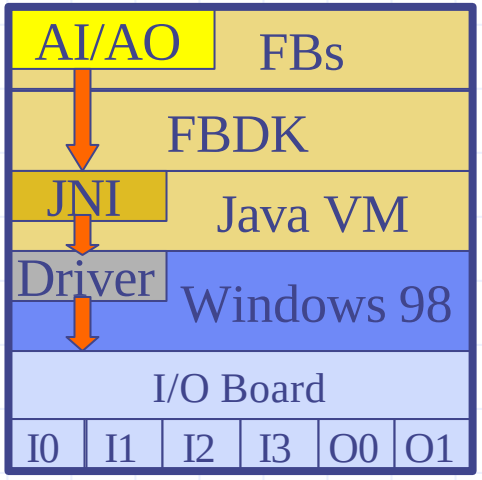
Process Interface

Analog Input

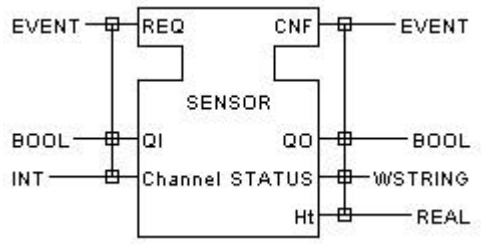
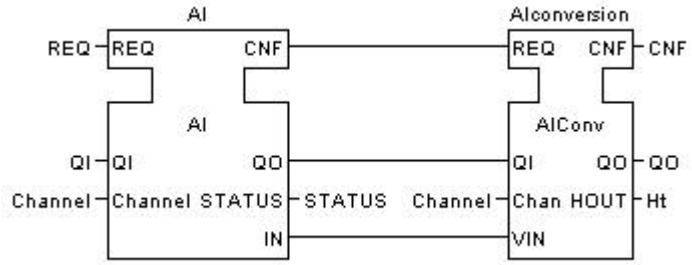


Analog Output





Level Sensor

Interface	Body
	

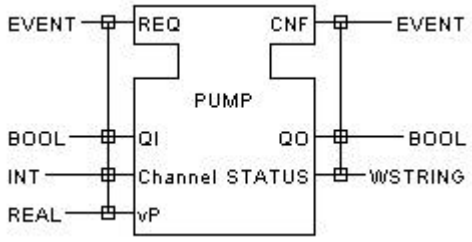
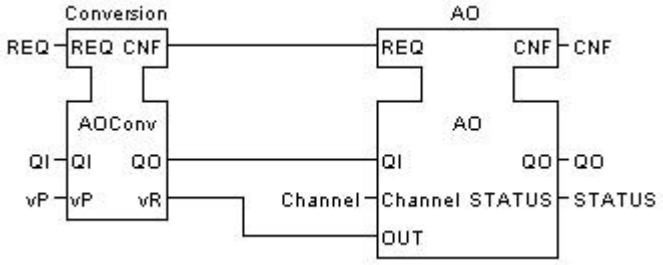
AIConv:

Linearize **voltage** from sensor and the **actual height**

VIN : (voltage)

HOUT : (% of 0-300mm)

Pump

Interface	Body
	

AOConv:

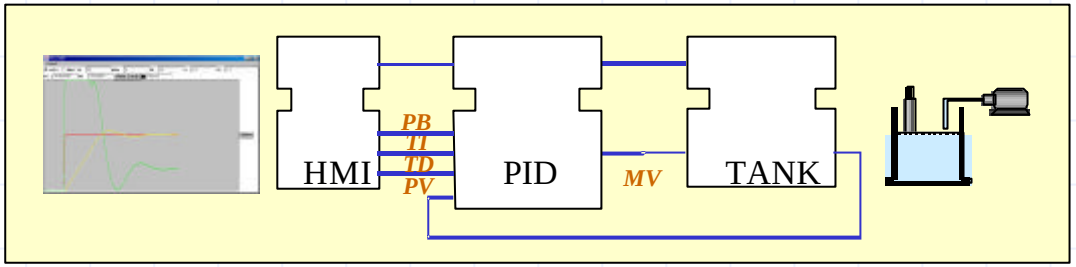
vP : (%)

vR : (voltage)

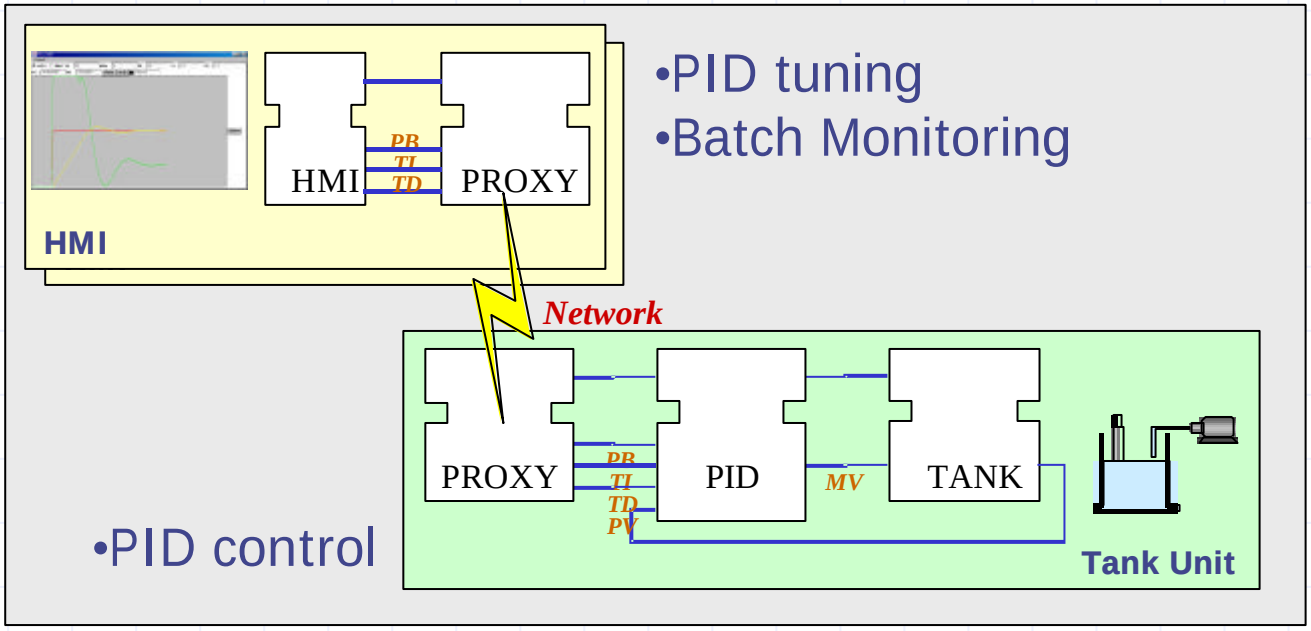
Application

1. Components
2. Tank Control
3. PID Tuning
4. Batch Process
5. Results

HMI and Control

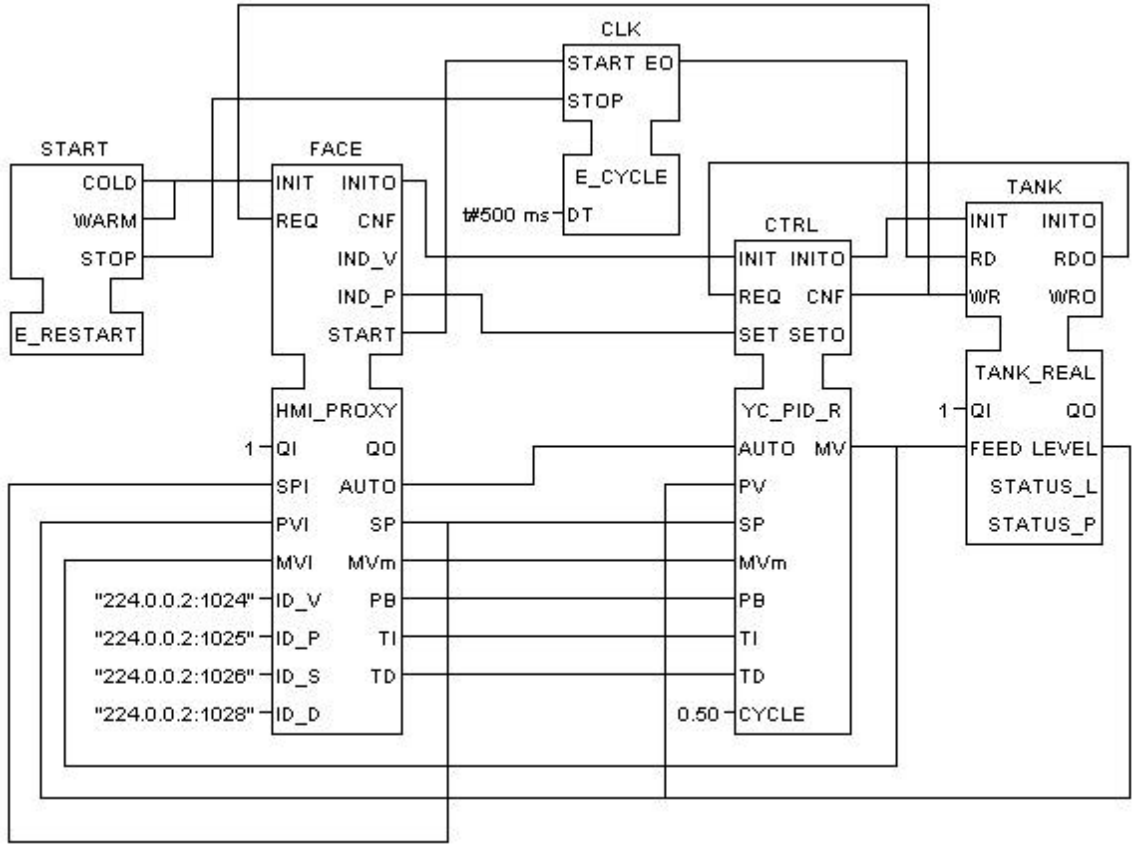


Separate

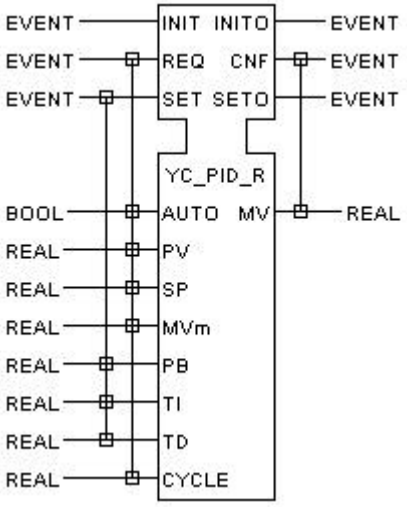
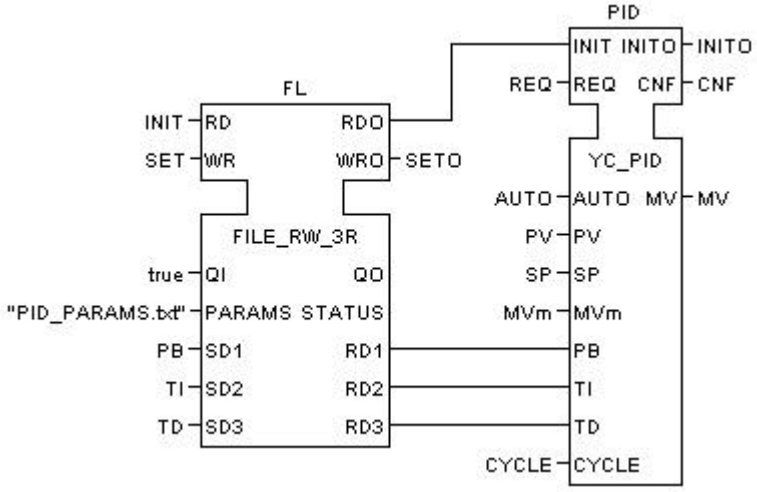


Sub Application of the Tank

Application in the tank unit



YC_PID_R

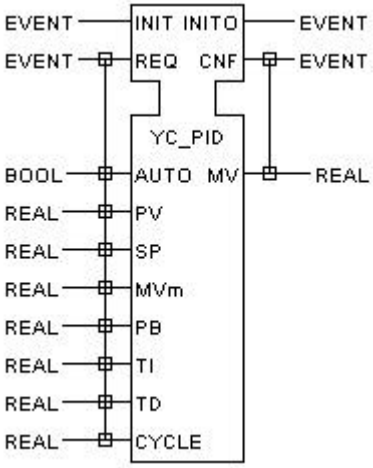
Interface	Body
	

FILE_RW_3R:

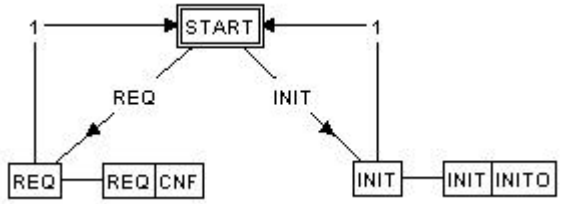
Read and Write 3 data in order to memorize PID parameters.

YC_PID

Interface

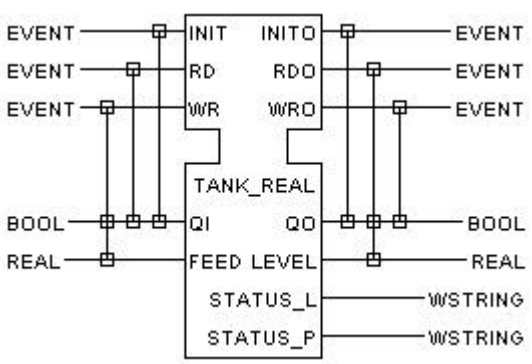
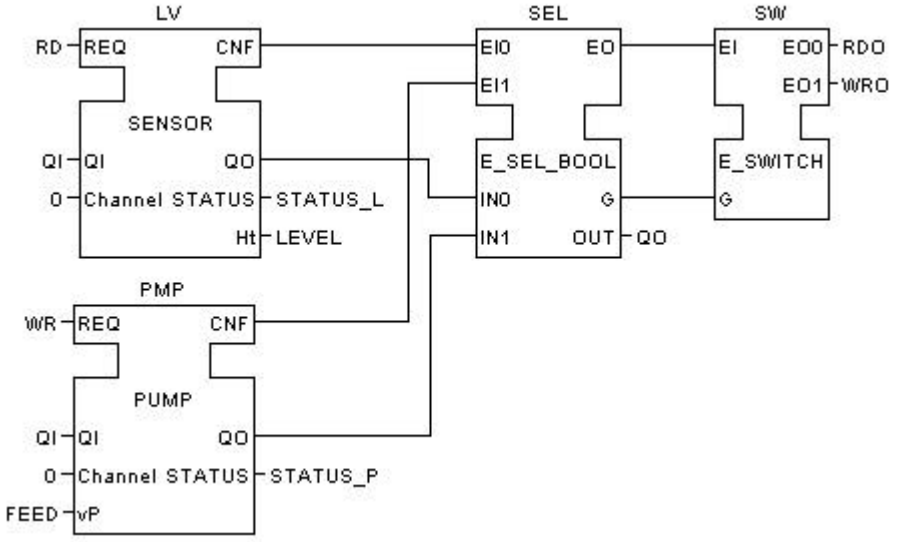


ECC

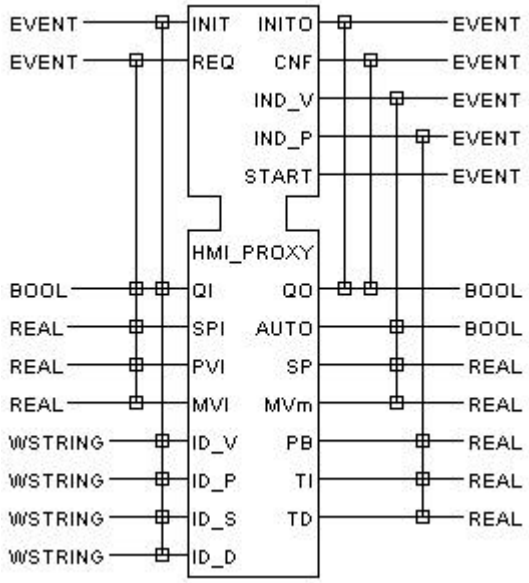


Input Variables			TI	*REAL*	Integral Time (Sec)
AUTO	*BOOL*	0-manual,1-auto	TD	*REAL*	Derivative Time (Sec)
PV	*REAL*	Process Variable	CYCLE	*REAL*	Sampling Interval (Sec)
SP	*REAL*	Set Point			
MVm	*REAL*	Manipulated Variable in MAN mode	**Output Variables**		
PB	*REAL*	Proportional Band (%)	MV	*REAL*	Manipulated Variables

TANK_REAL

Interface	Body
	

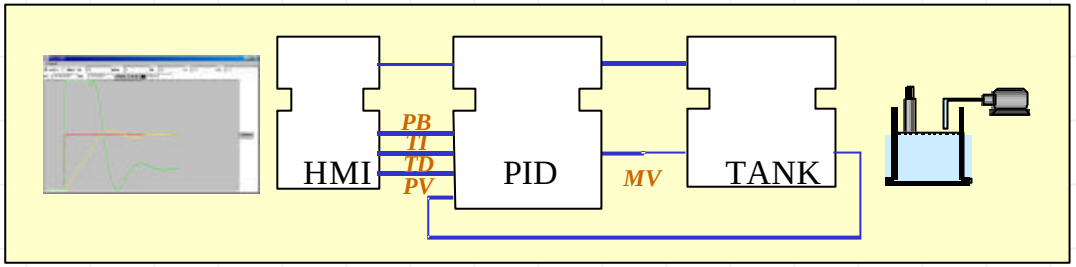
HMI_PROXY

Interface	Events
	Inputs REQ: for monitoring Outputs IND_V: for batch control IND_P: for PID tuning

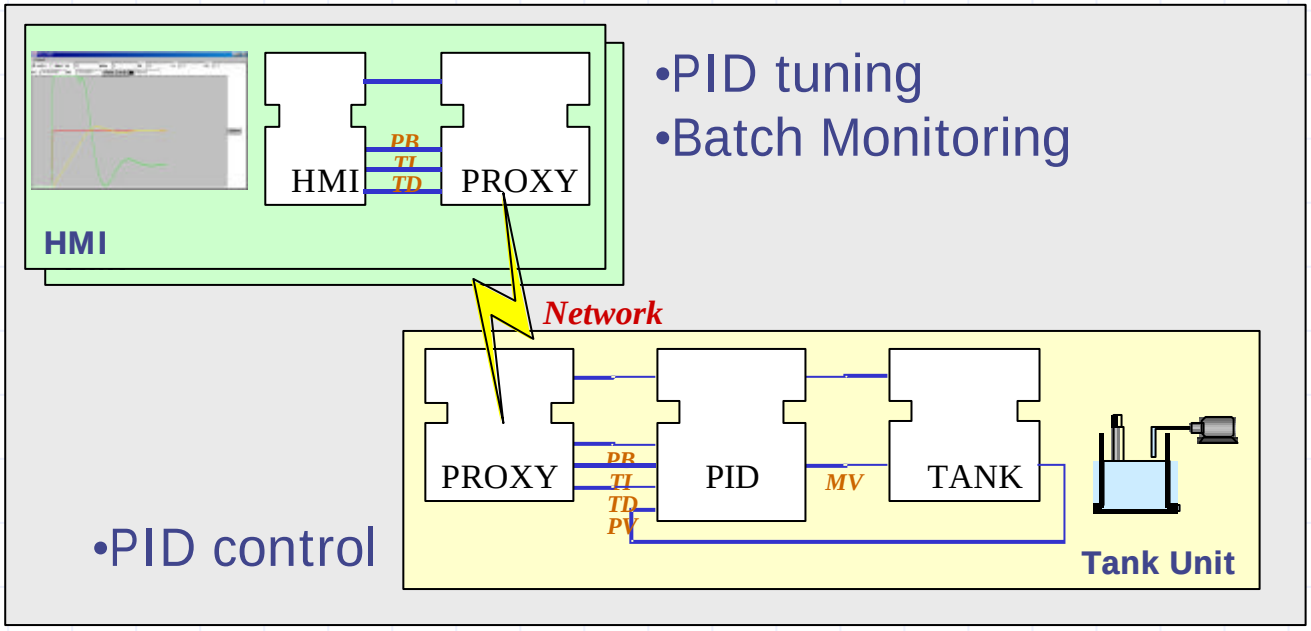
Application

1. Components
2. Tank Control
3. PID Tuning
4. Batch Process
5. Results

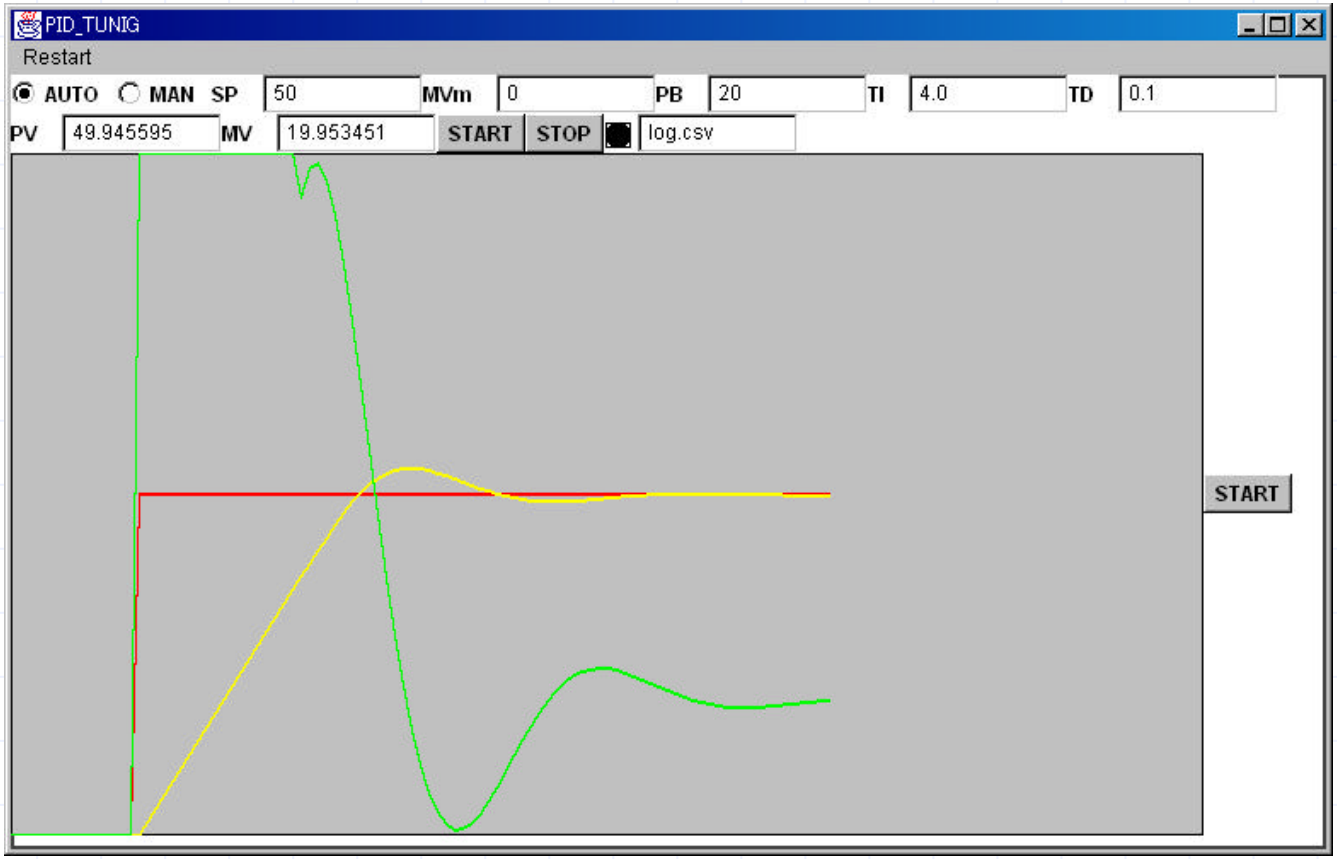
HMI and Control



Separate

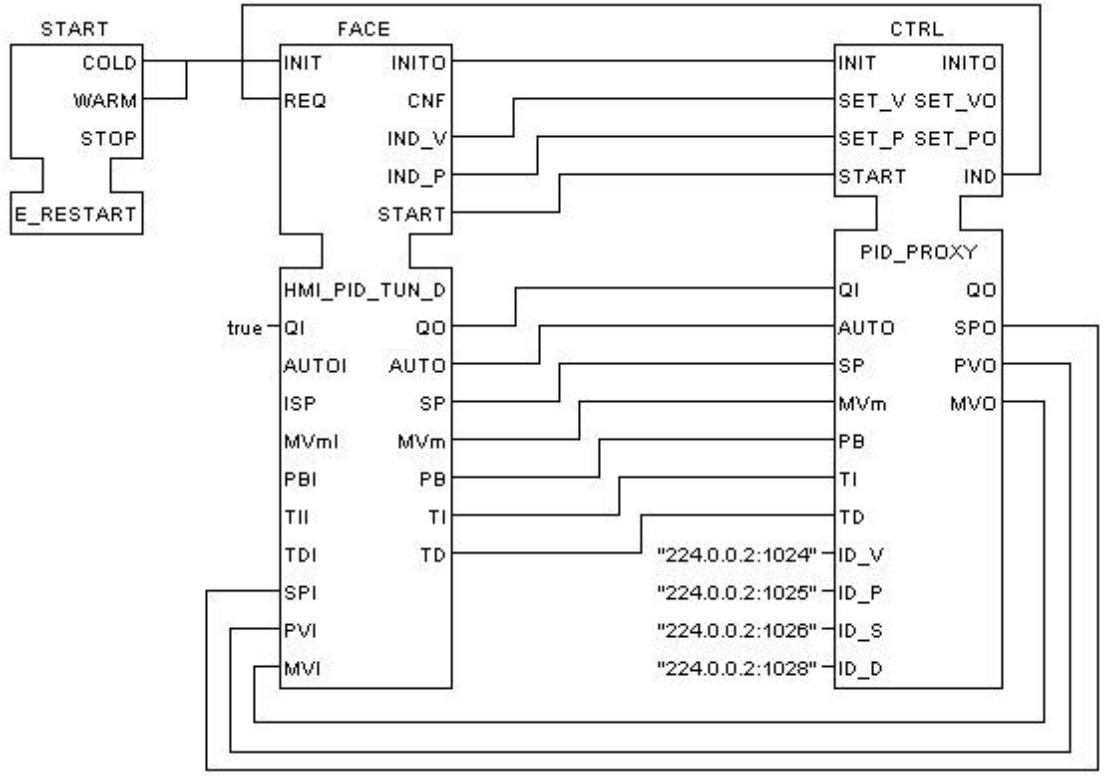


HMI for PID Tuning



HMI for PID Tuning

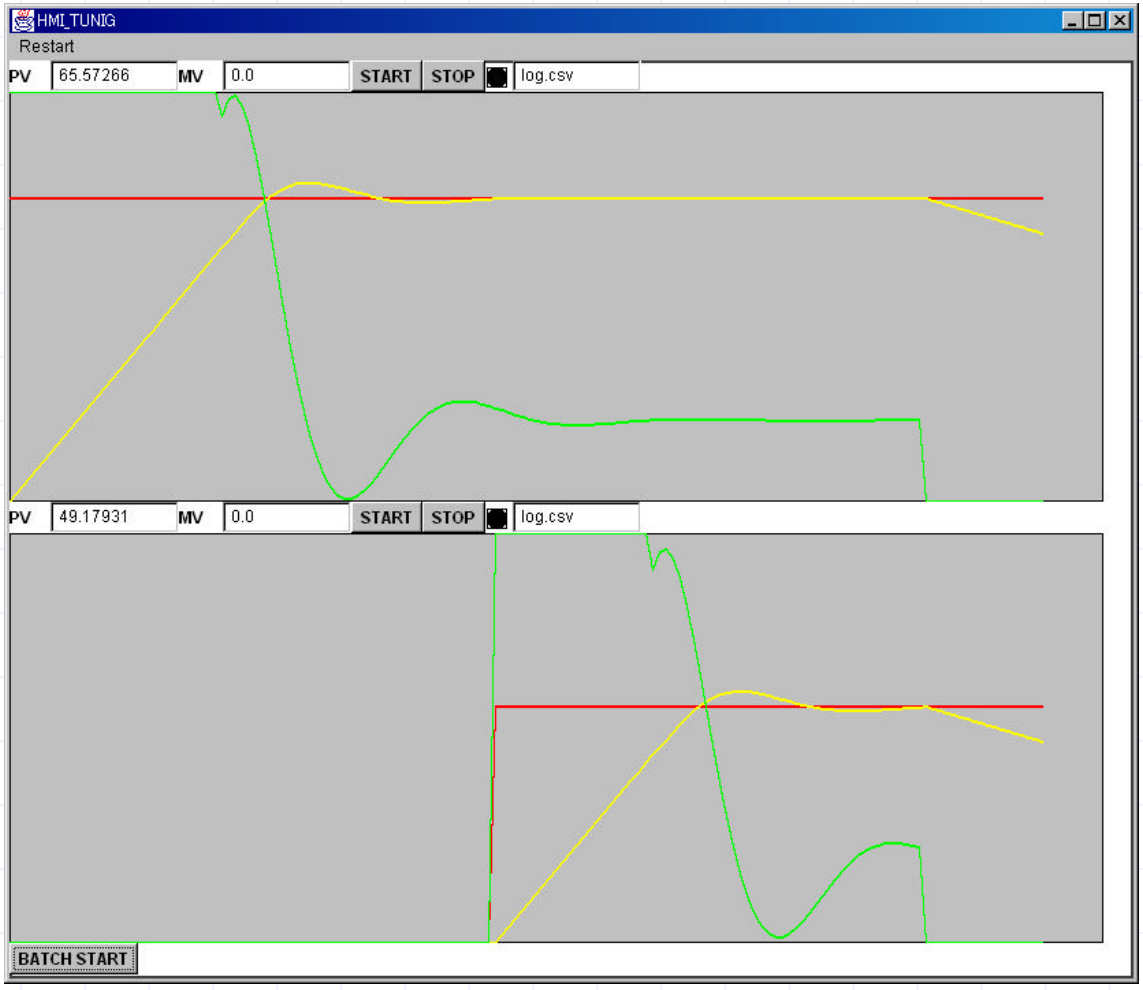
Application of HMI



Application

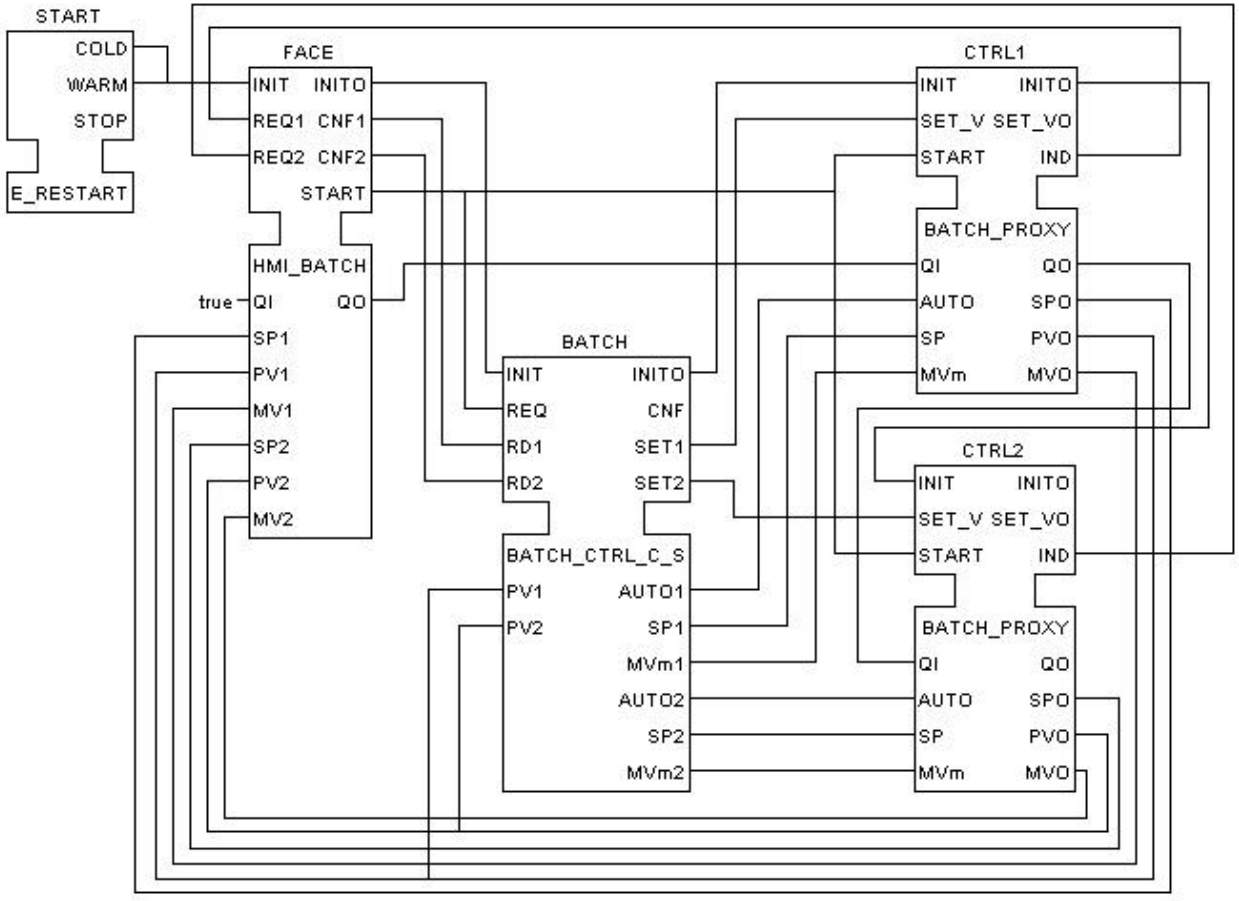
1. Components
2. Tank Control
3. PID Tuning
4. Batch Process
5. Results

HMI for Batch Control

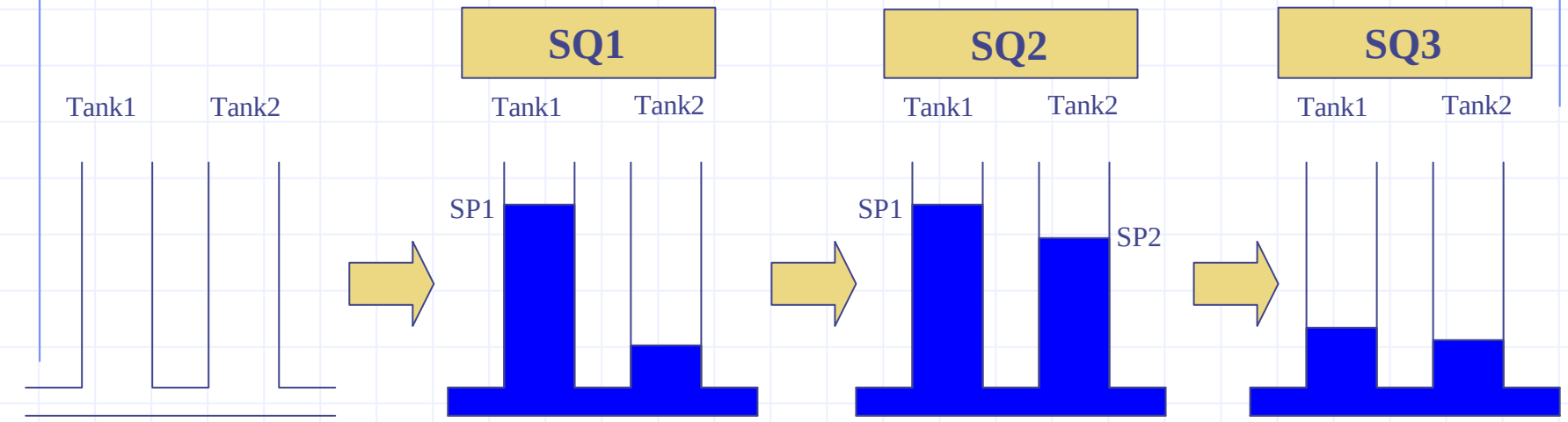


Batch Control and HMI

Application



Batch Procedure



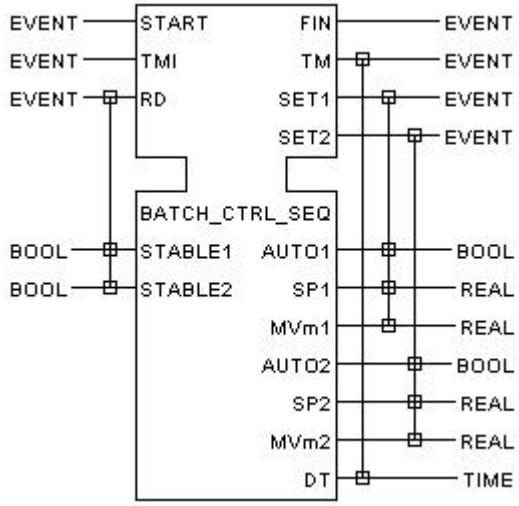
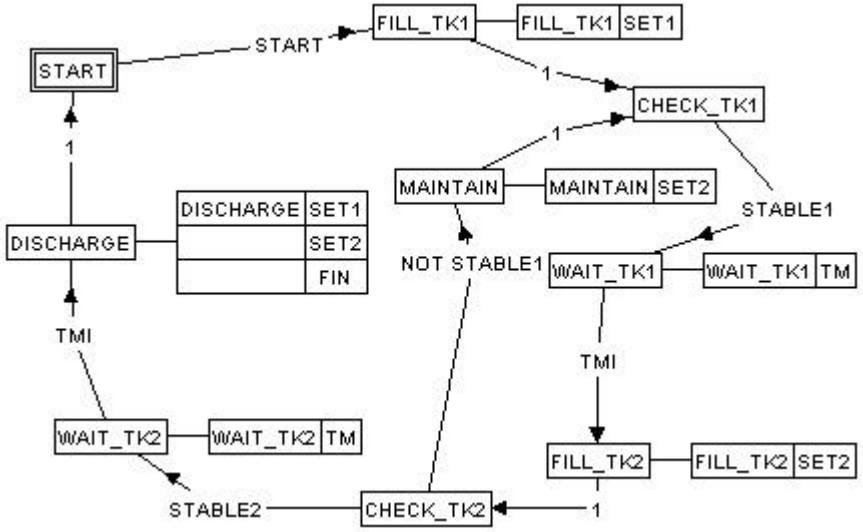
Procedure

SQ1) Set SP of Tank#1
SQ2) Set SP of Tank#2
SQ3) Discharge both tanks

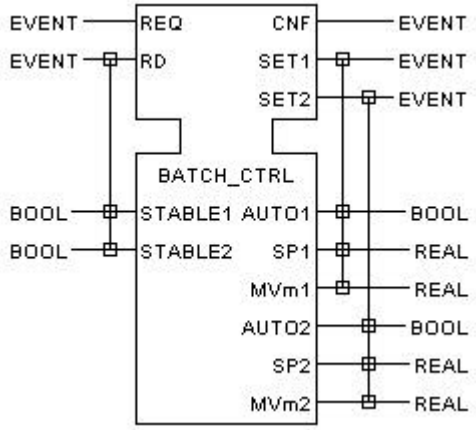
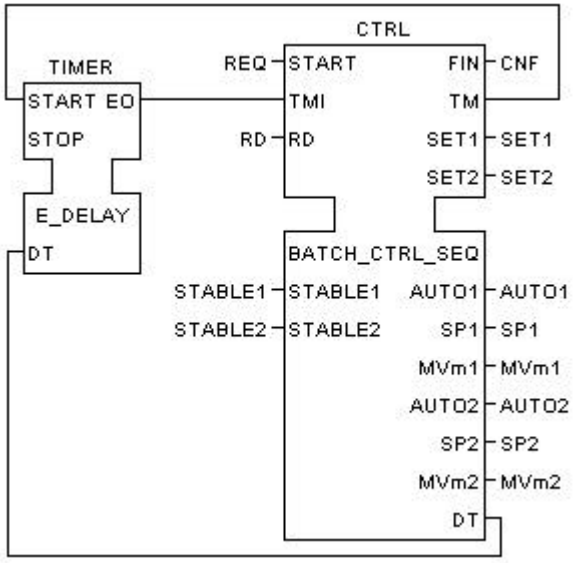
Note:

If Tank#1 level have been disturbed in SQ2, step back to SQ1.

Batch Procedure

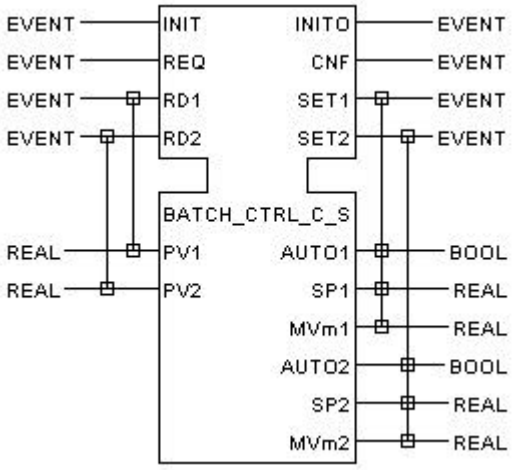
Interface	Body
	

BATCH_CTRL

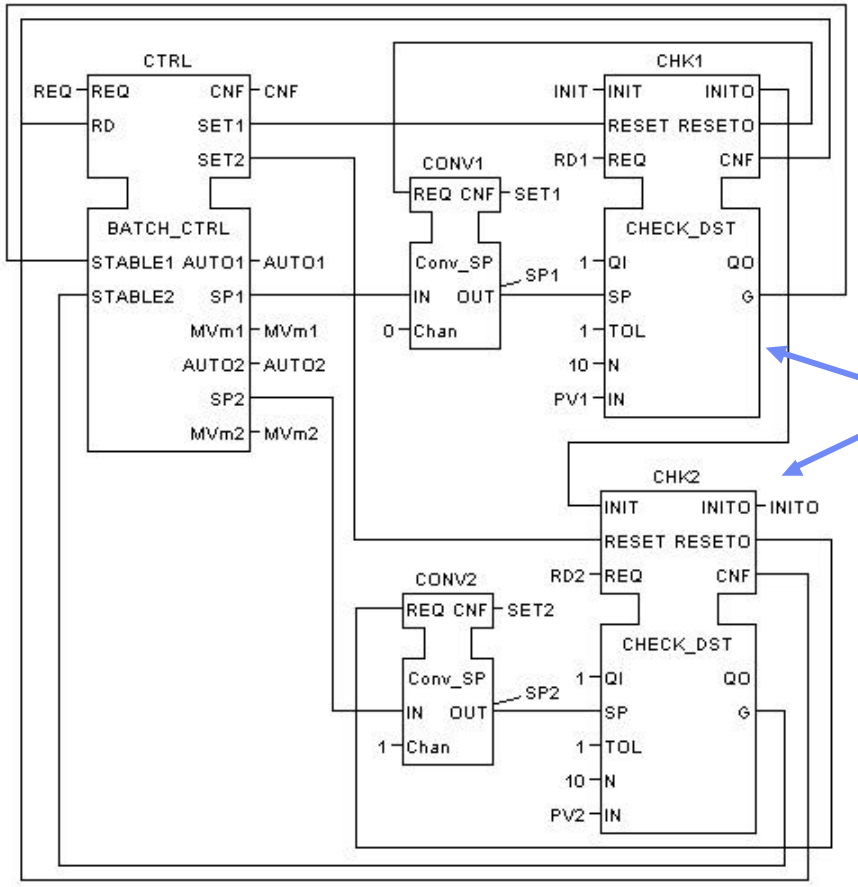
Interface	Body
	

BATCH_CTRL_C_S

Interface



Body

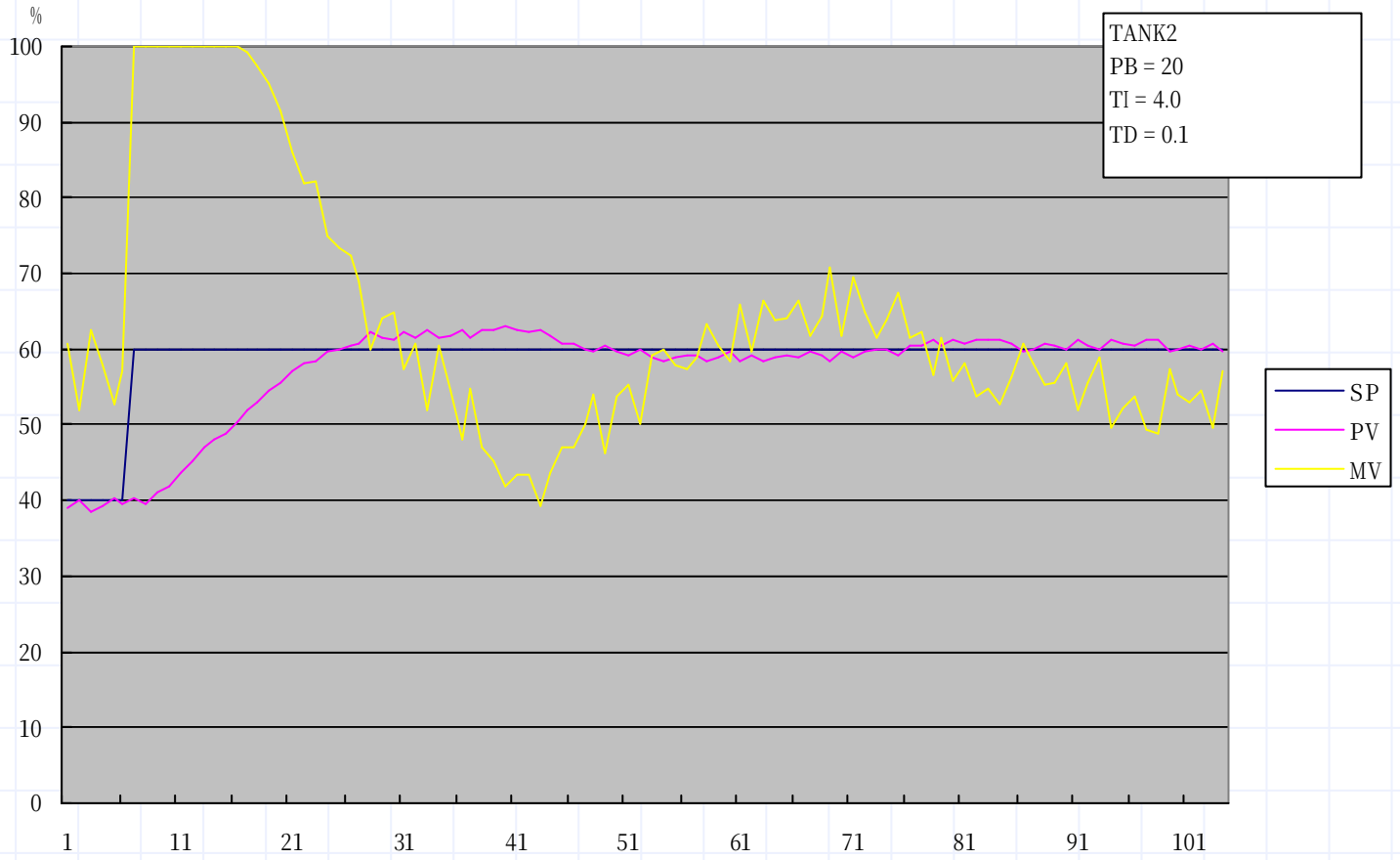


Process variable checking function block

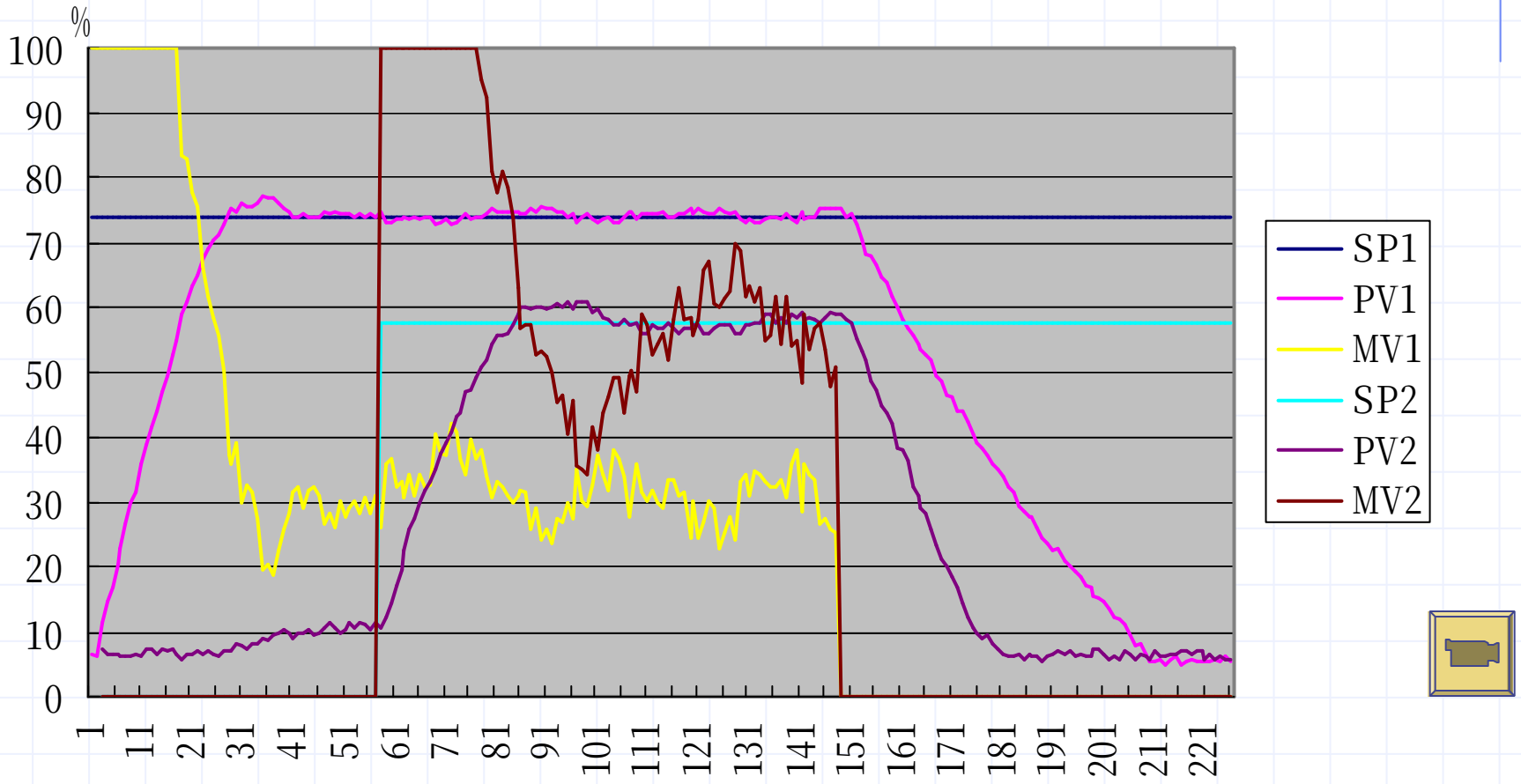
Application

1. Components
2. Tank Control
3. PID Tuning
4. Batch Process
5. Results

Result of PID Tuning



Result of Batch Control (1)



Result of Batch Control (2)