

ETS Temperature Control with Cascade and Feed Forward Control

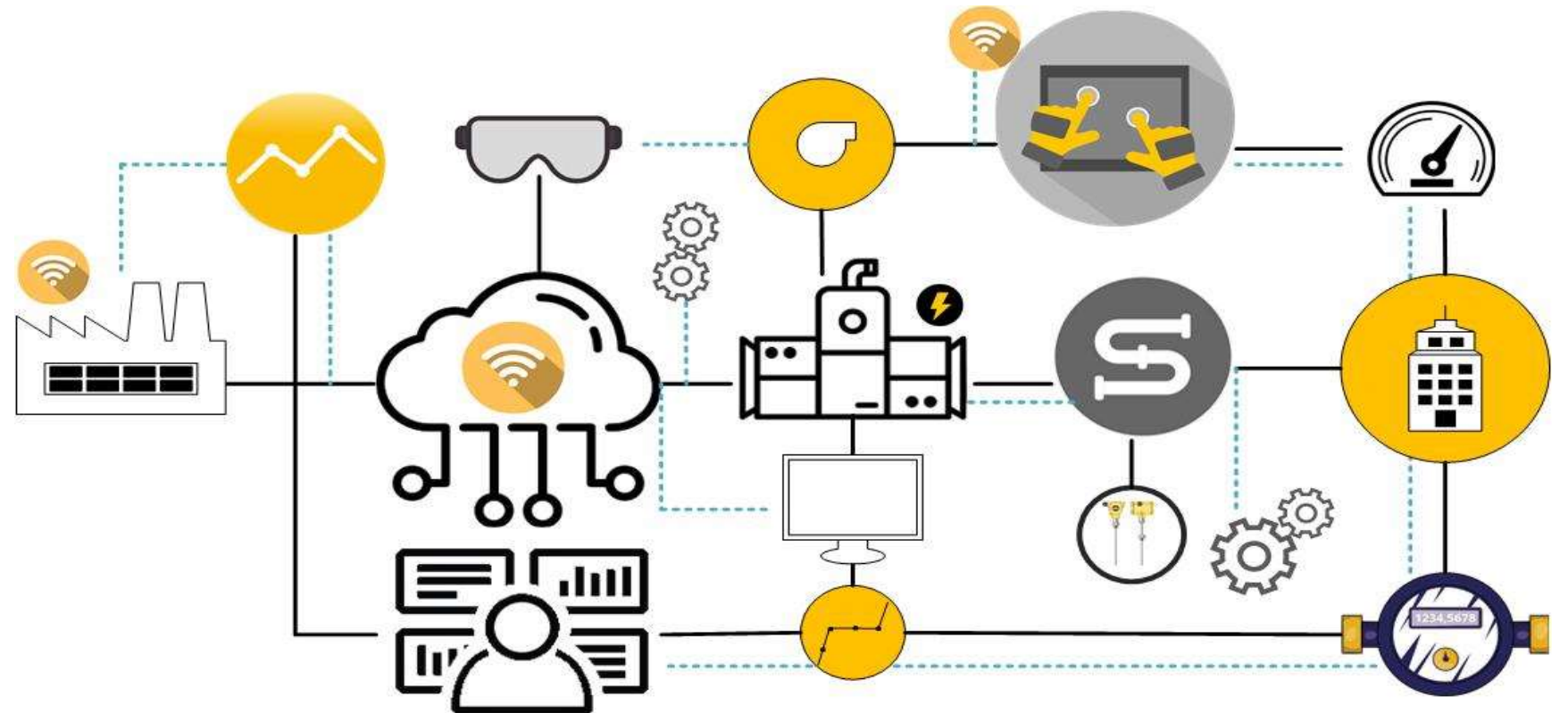
IDEA Subject Covered:

Metering, Measurement and Data
Management, System Controls

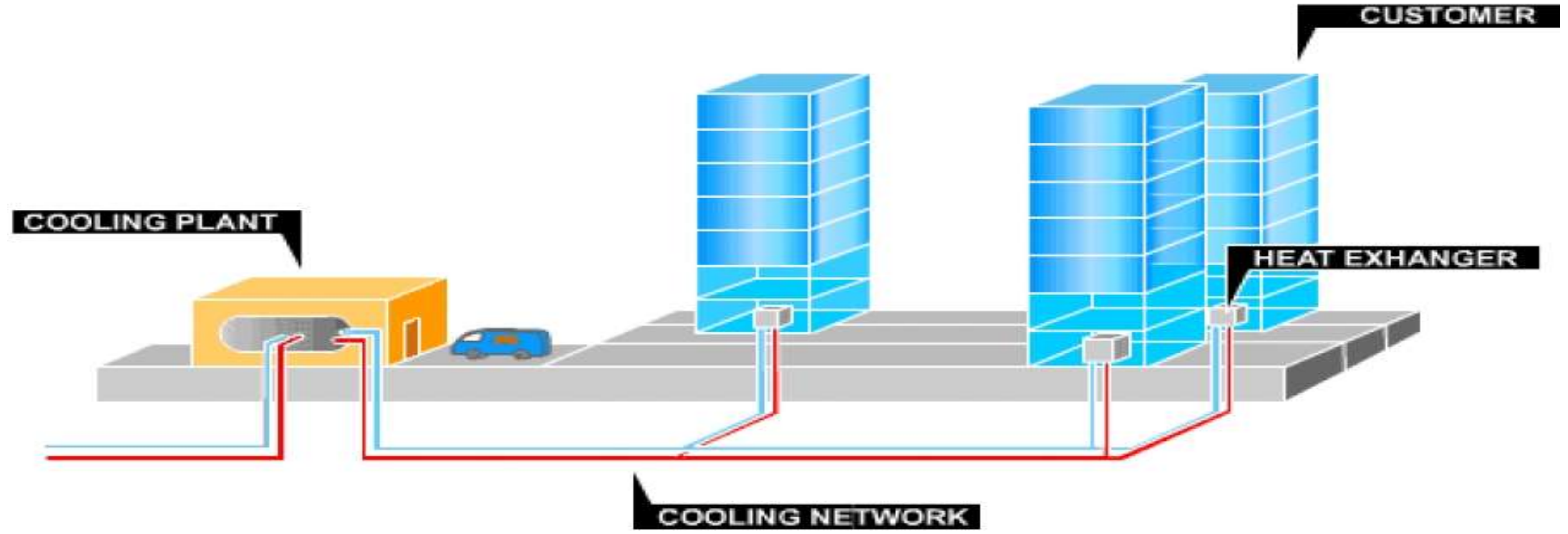
Shamma Binlahij

Presentation Agenda

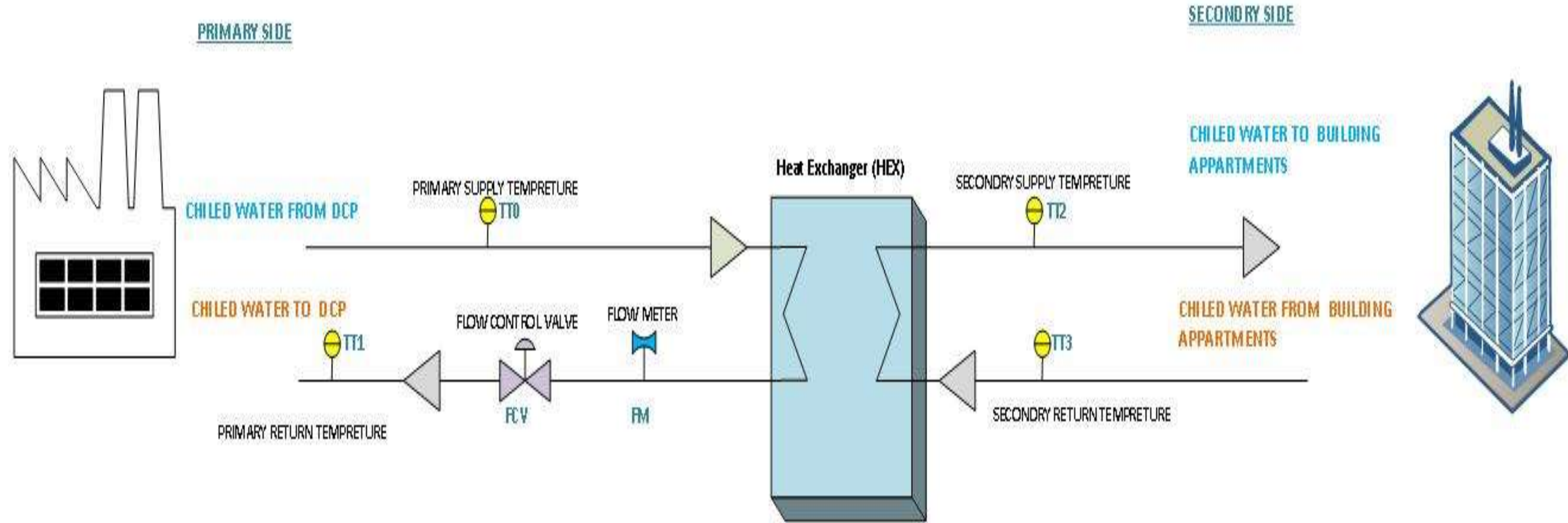
- Introduction
- Existing situation
- Challenges
- Action plan
- Comparison / Results



Introduction



Existing situation



Existing situation

Flow Control Valves

Primary side

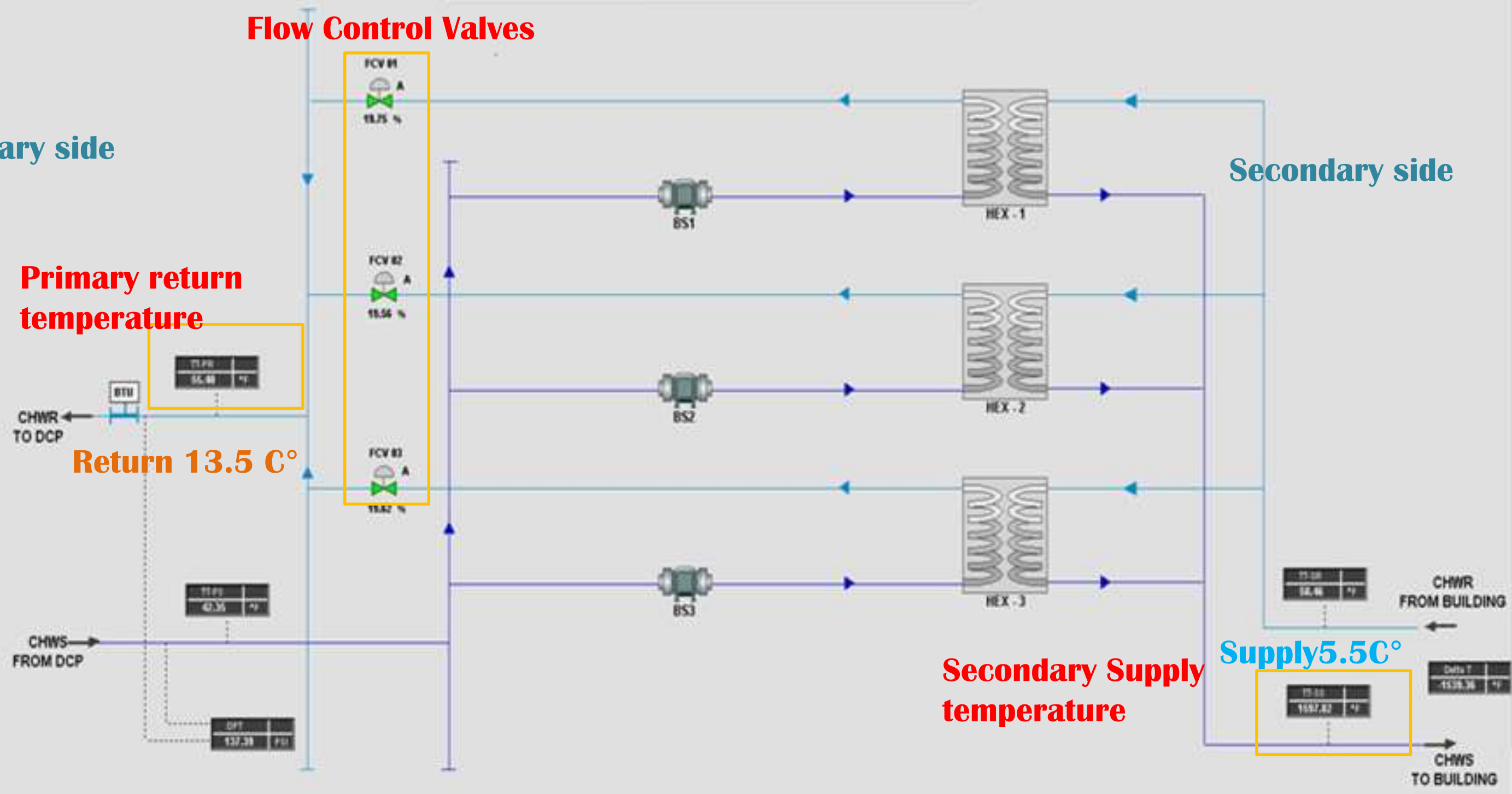
Secondary side

Primary return temperature

Return 13.5 C°

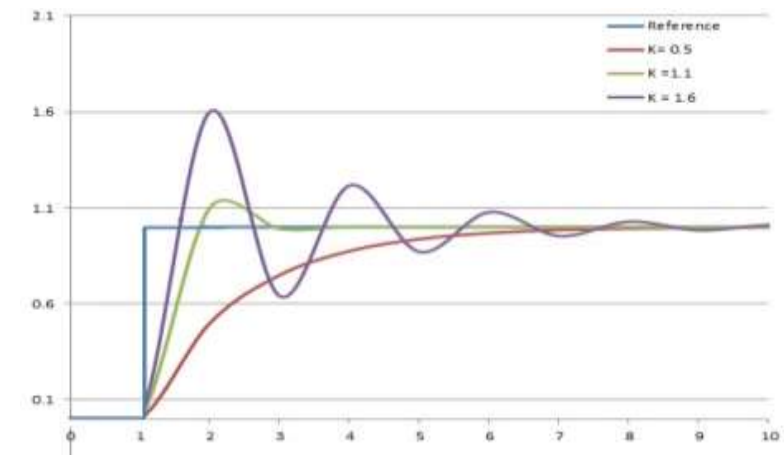
Secondary Supply temperature

Supply 5.5 C°

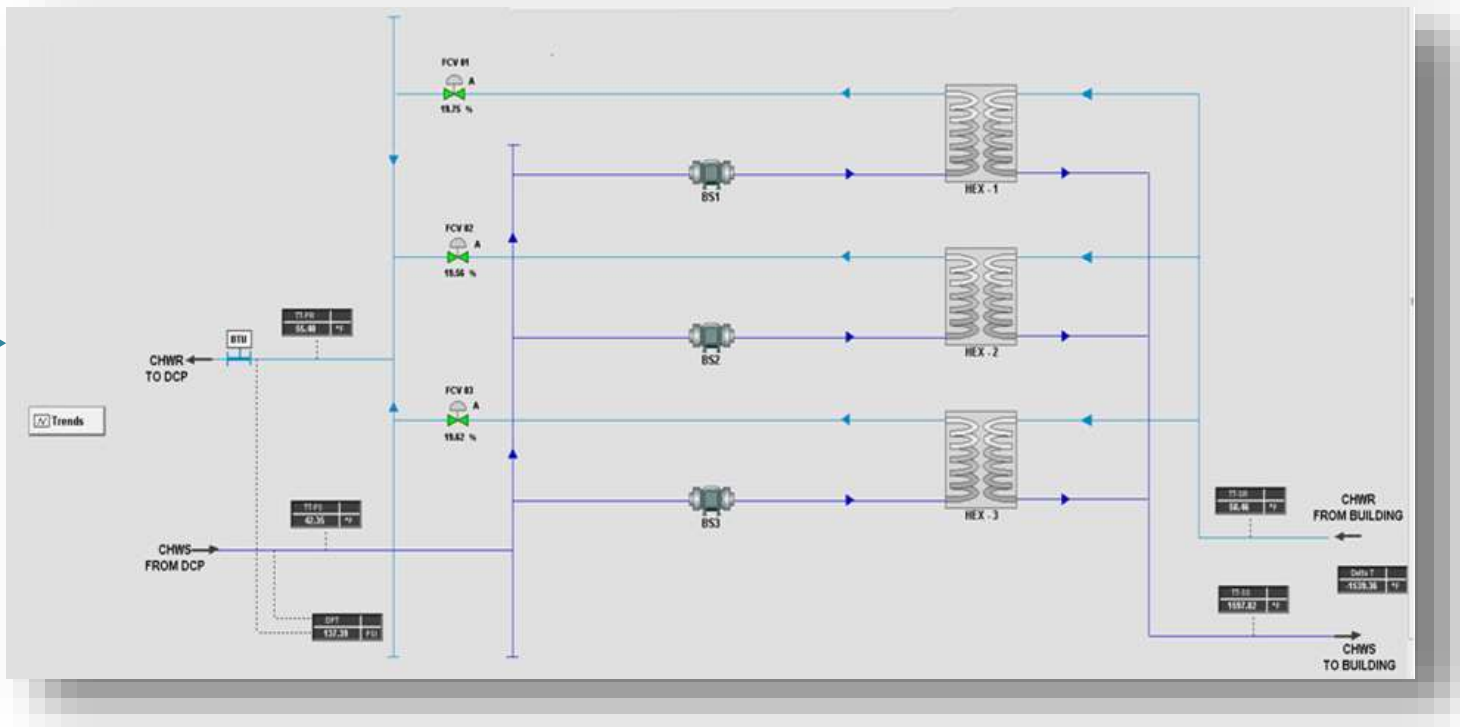
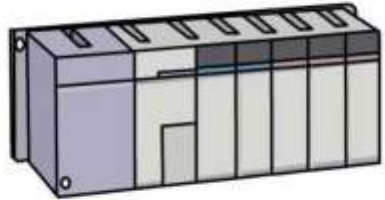


Challenges

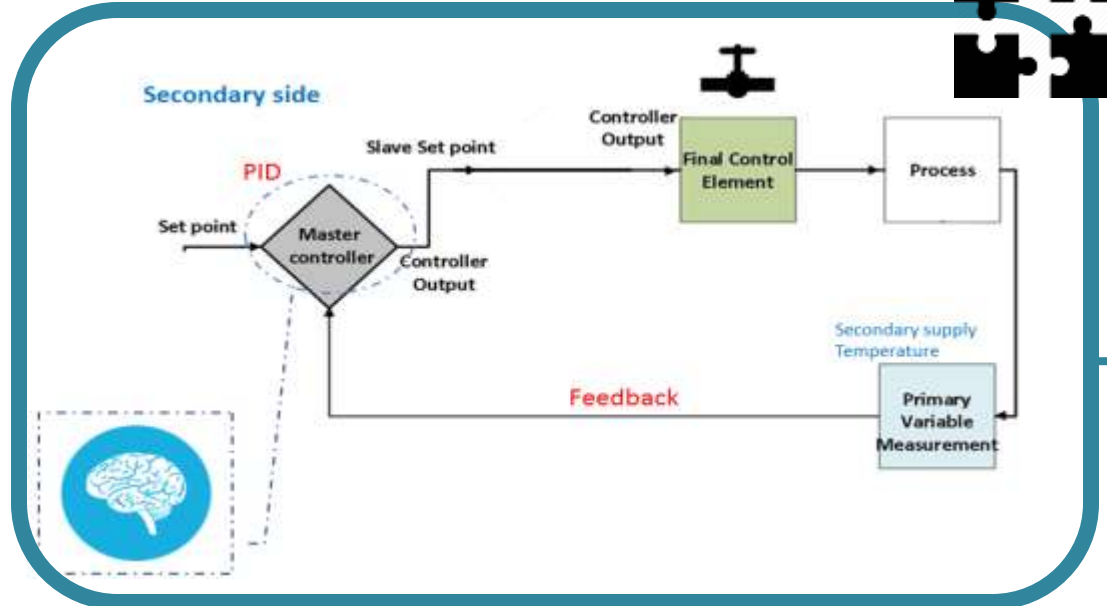
- Disturbances of sudden flow that effect primary temperature from the plant
- Slow response to the controller that reacts to changes on secondary side temperature
- Predicting plant flow changes response to react to ETS process control
- Sudden flow takes time to reach to the required temperature before it effect the secondary side.



PLC
(Programmable Logic controller)

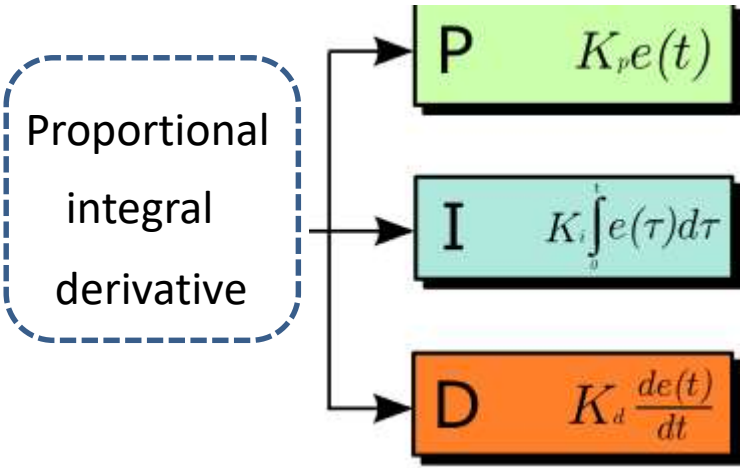


LOGIC
(Single control loop)

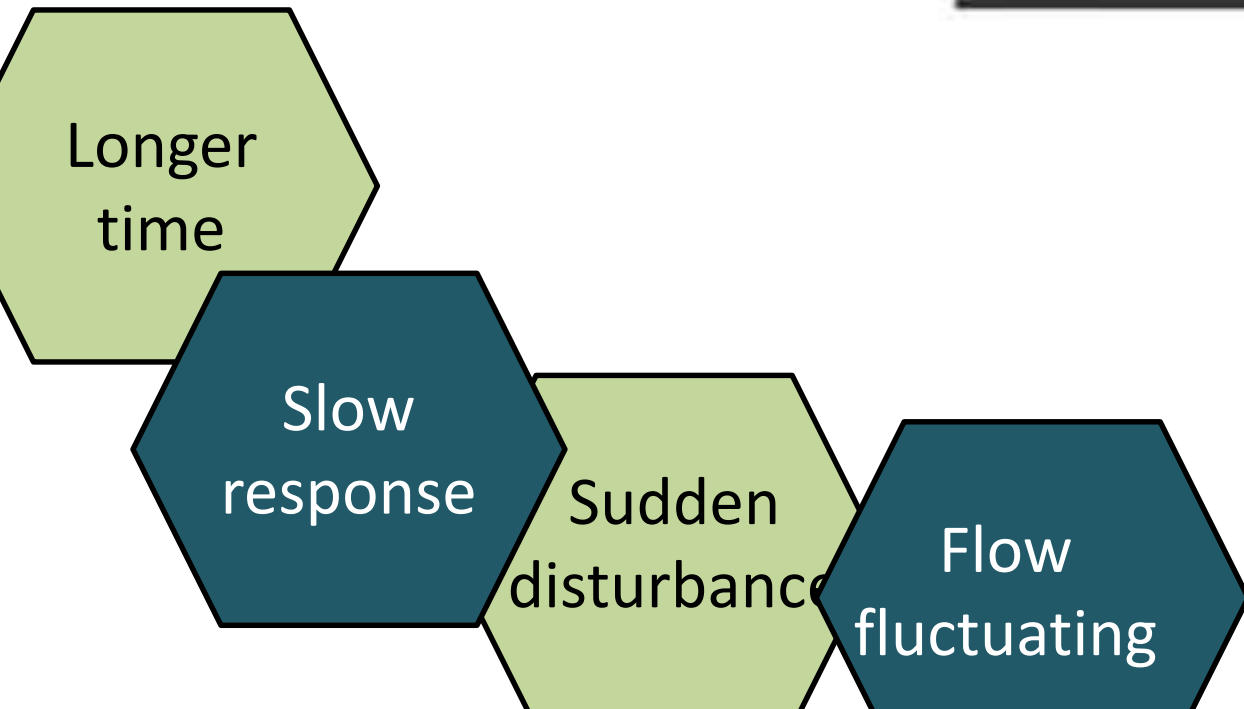


PID

ETS
(ENERGY TRANSFERT STATION)



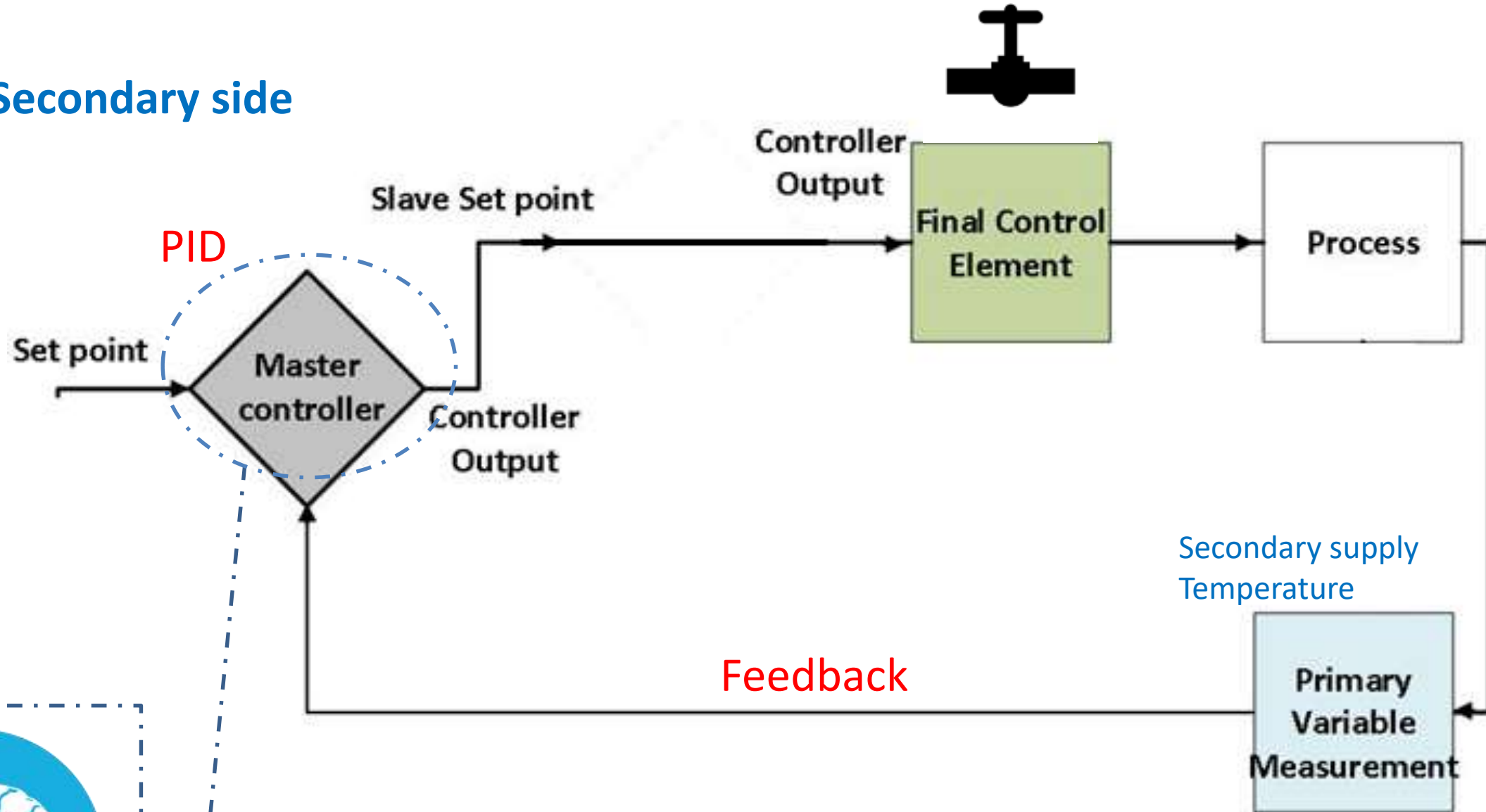
- Applied The Nested Cascade Architecture in our ETS using PID controller



Single Control Loop

P I D (Proportional , integral & derivative)

Secondary side



Secondary side
Pv: Temperature



5.5 C° Set point

5.5 C° Secondary supply temp
6.5 C°
4.5 C°

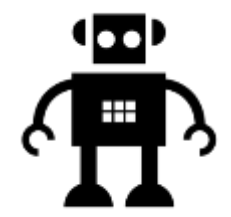
Temperature feedback



Master Controller (PID)

Master Controller Output

Primary side
Pv: Flow



Maintained
open
close

Slave Controller Output

Slave Controller (PID)



Flow Meter



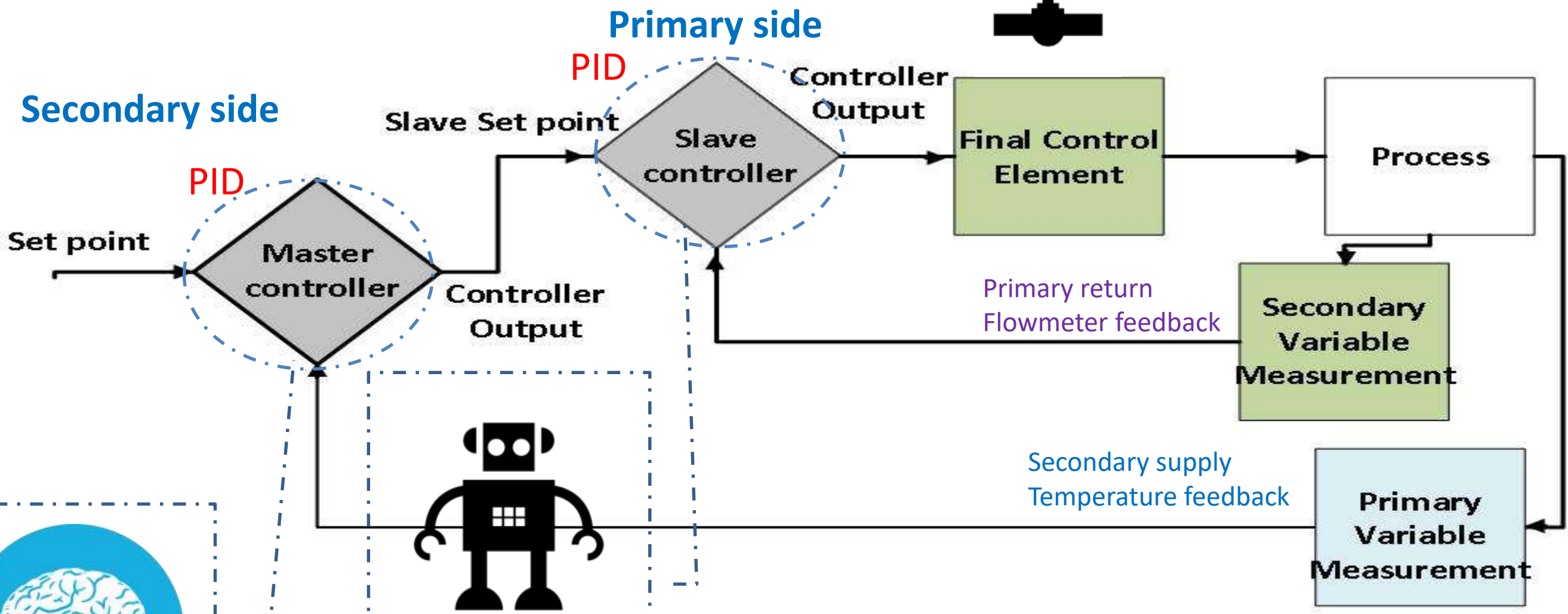
Flow meter feedback

1000 GPM
1500 GPM
800 GPM

provide tight control of the exit temperature

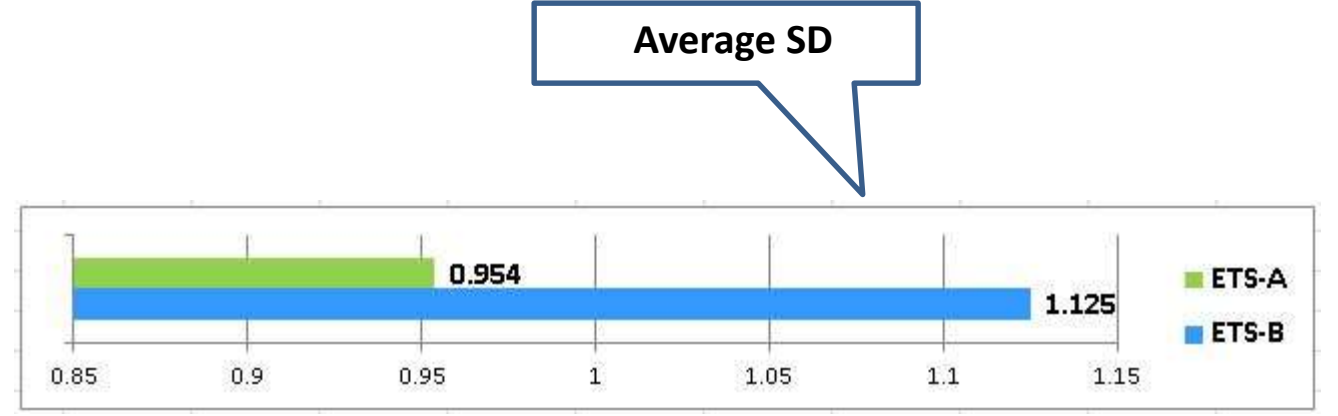
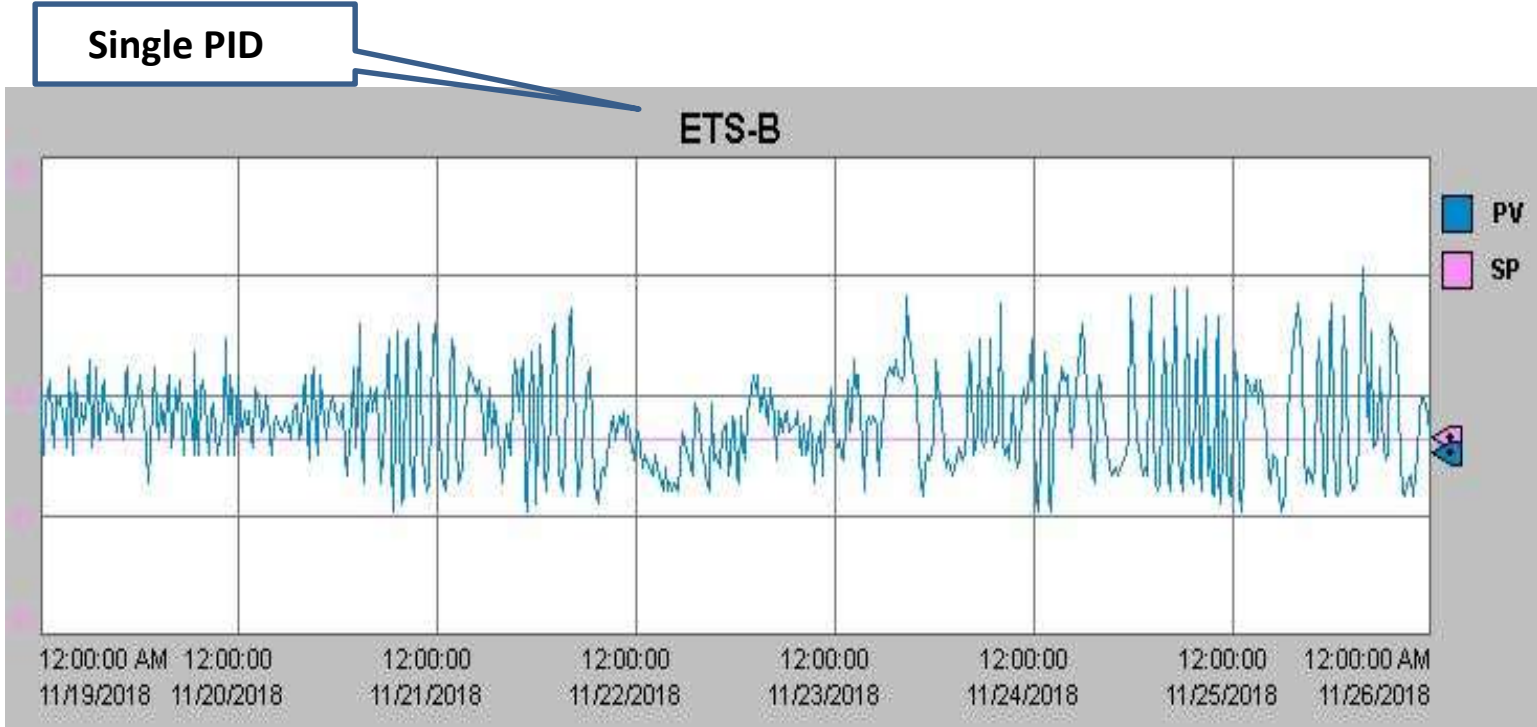
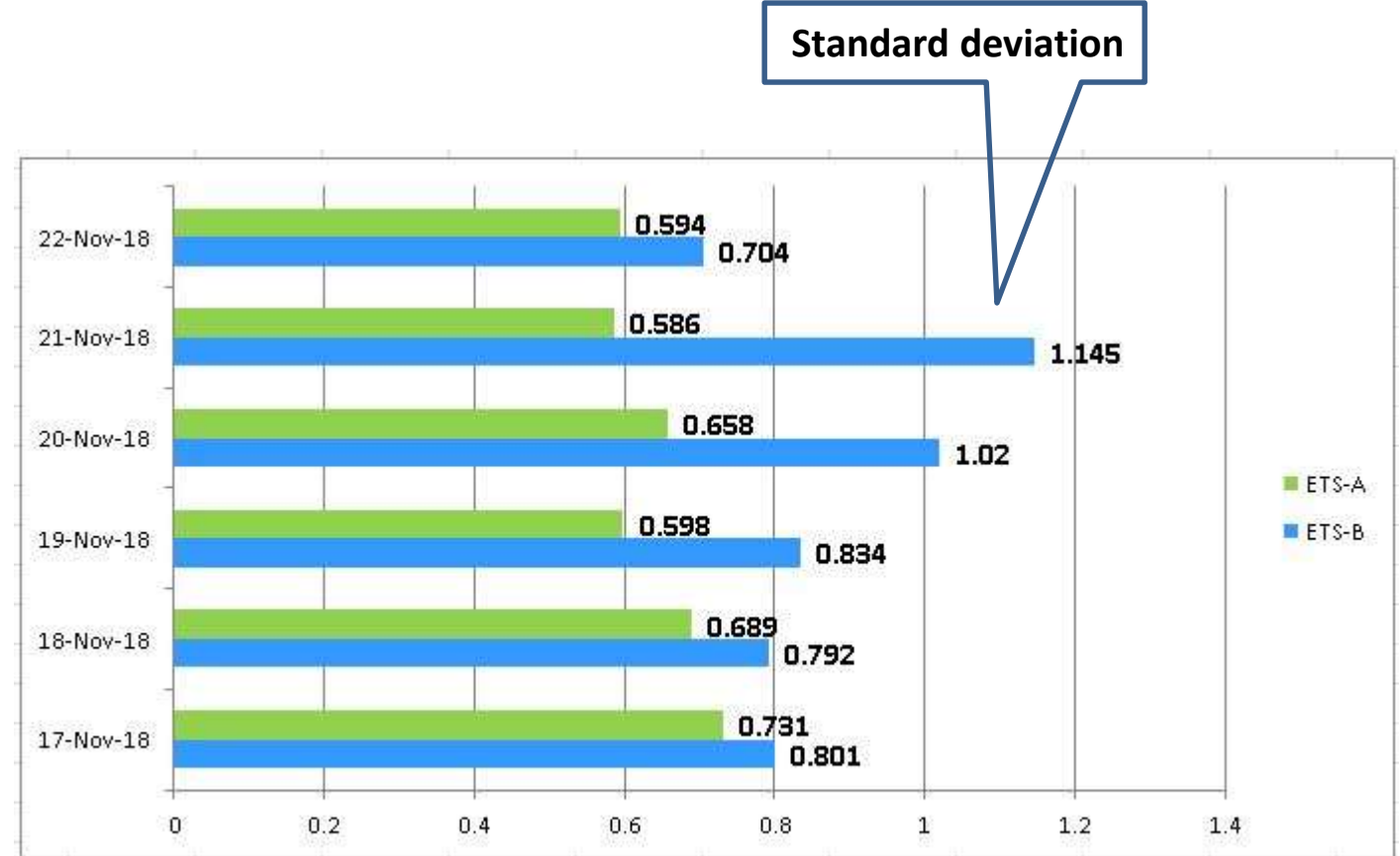
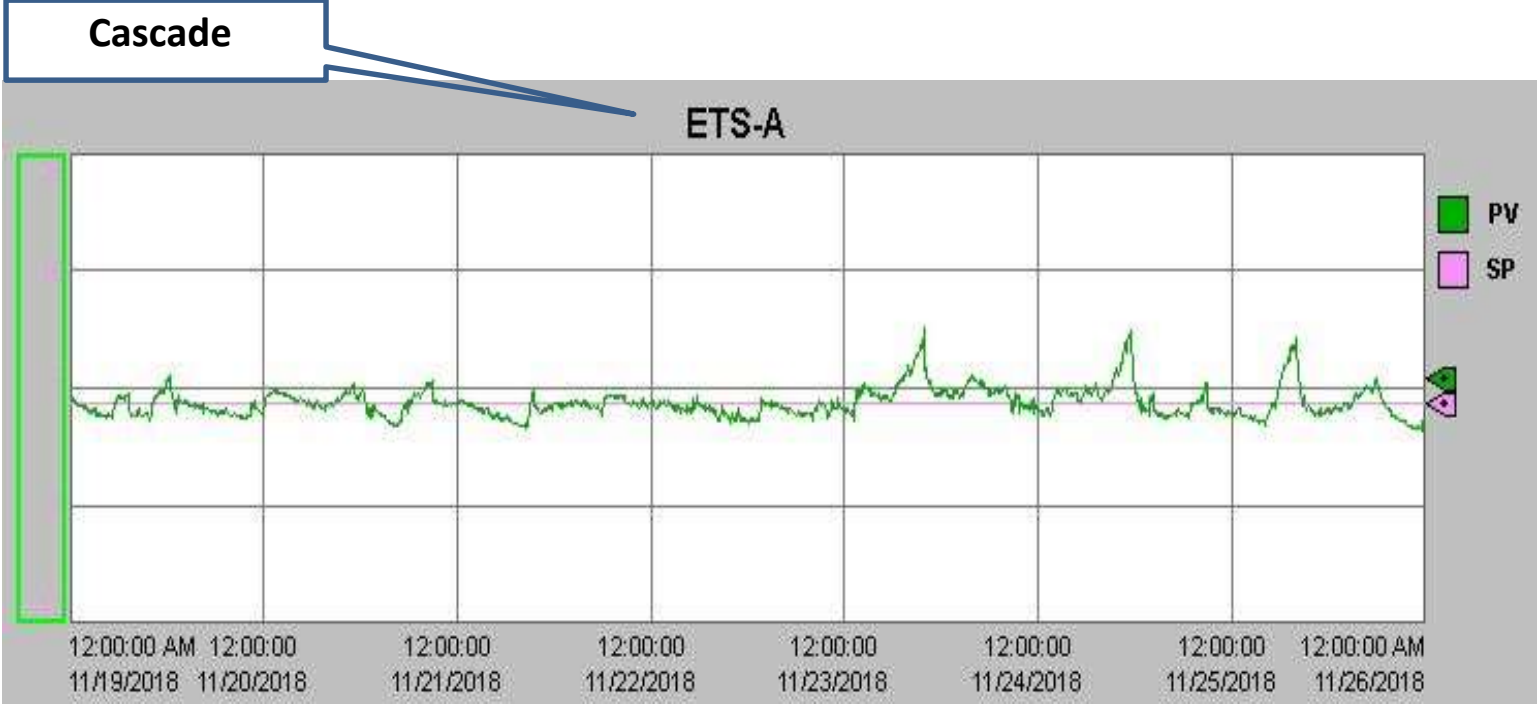
Improve speed of response

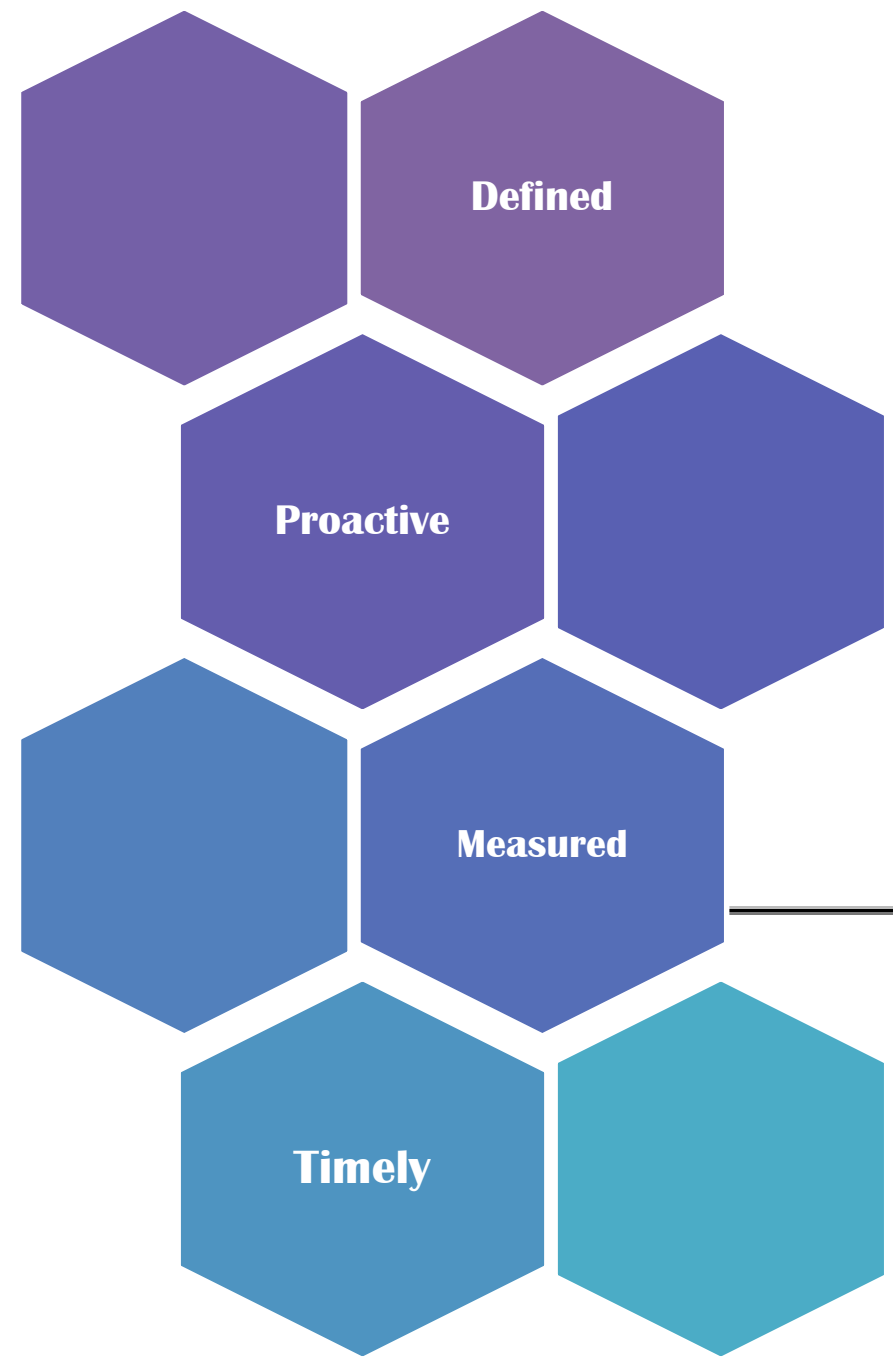
Action plan cascade control



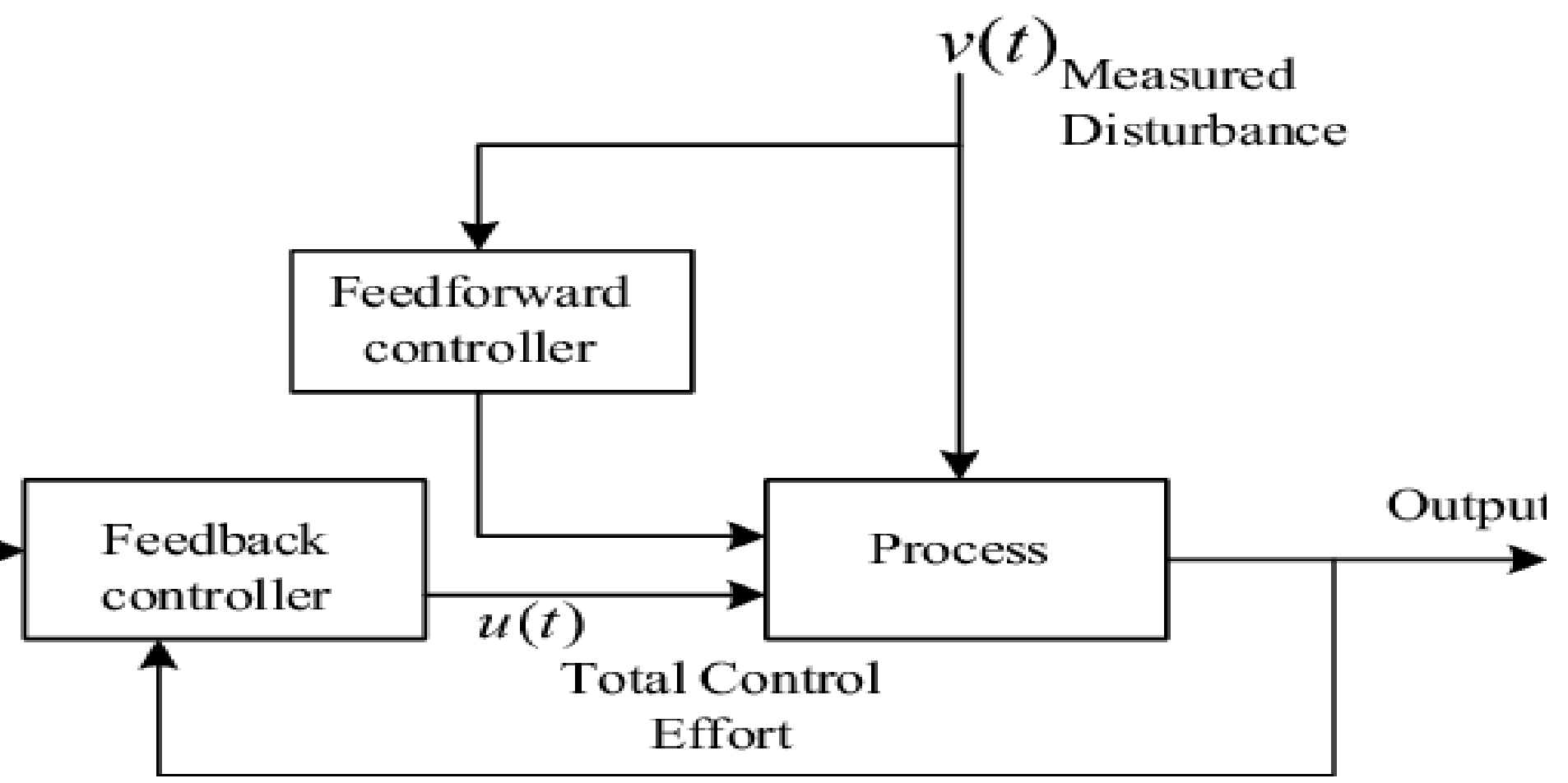
Block Diagram Of General Cascade-Control Schem

Comparison/Result





Feed Forward



Thank You For Listening

Kindly don't hesitate to contact me for sharing experience related to the same subject.

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