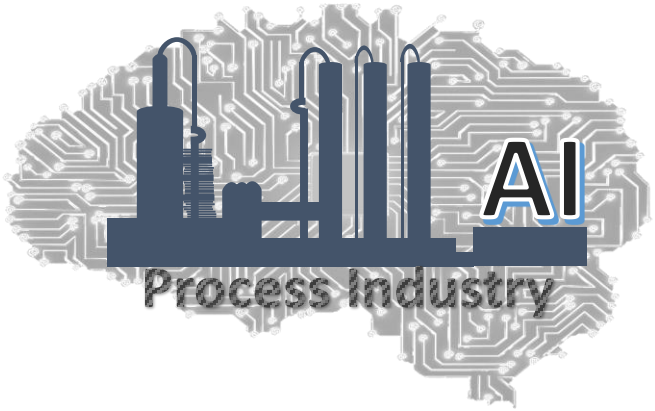
Statistical Techniques for Monitoring Industrial Processes



Topic : Monitoring an Industrial Reactor

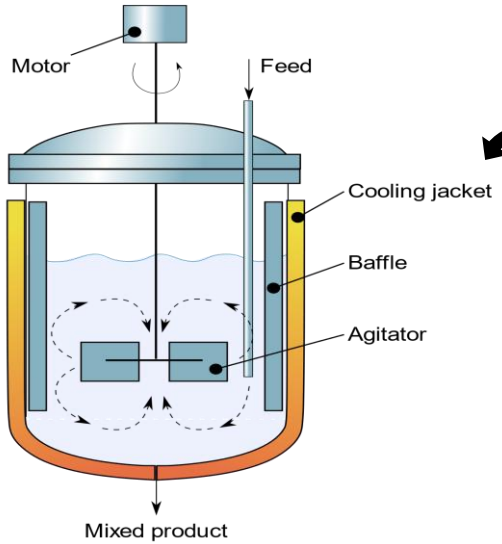
Module : Coding Exercise

System & Fault: Continuous Stirred Tank Reactor (CSTR)

Continuous Stirred Tank Reactor

Monitoring objective: *Catch unexpected 'behavior' of reactor signals as soon as possible as a leading indicator of process and/or controller fault*

Scenario: *A fault in the cooling jacket leads to a step change (decrease) in the heat transfer coefficient*



Cooling jacket temperature is used to control the reactor/product temperature at optimal set-point

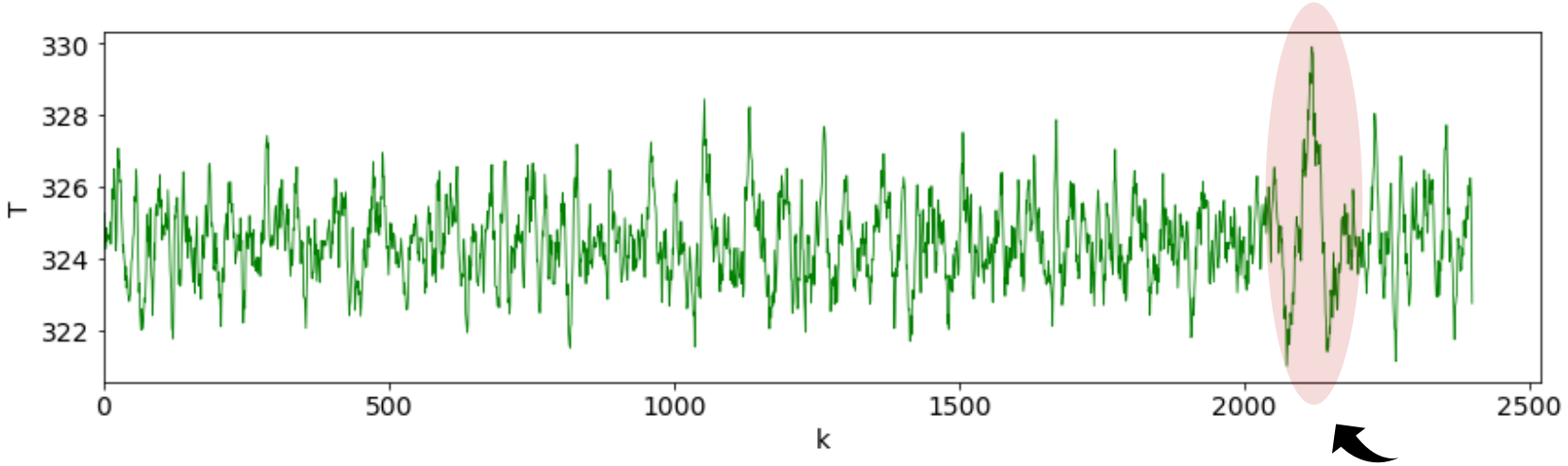
Measurements available in plant database:

- *Reactor temperature*

- ❑ **4 hours of measurements sampled at 0.1 minutes**
- ❑ **A process fault occurs at 3.5 hours causing a 20% decrease in the heat transfer coefficient**

CSTR schematic: (Created by Daniele Pugliesi under Creative Commons Attribution-Share Alike 3.0, https://commons.wikimedia.org/wiki/File:Agitated_vessel.svg)

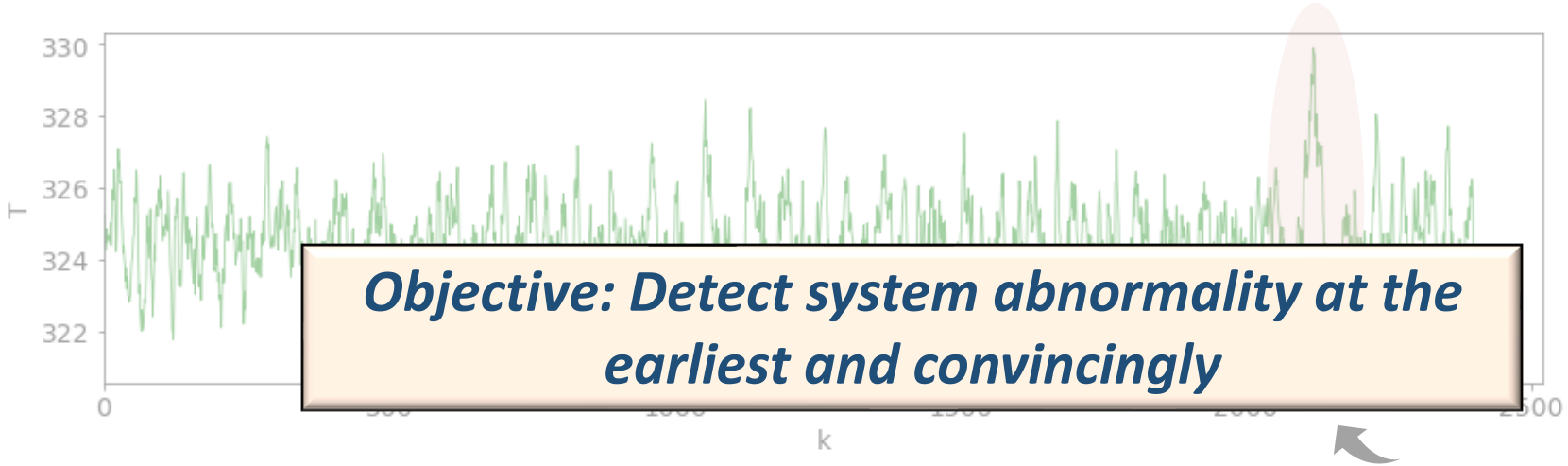
Dataset



Short-lived deviation in absolute value at start of the process-fault

- Reactor controller adjusts the jacket temperature to compensate for the reduction in the heat transfer coefficient and keeps the reactor temperature at setpoint

Dataset



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