FRONTROL

Advanced Process Control System

Frontrol provide the industrial automation market with high quality and technology systems and services.

What

Advanced Process Control (APC) refers to a broad range of techniques and technologies implemented in industrial plants.

APC are usually deployed optionally and in addition to basic process controls, typically added subsequently.

APC address performance and economic improvement opportunities in the industrial process.
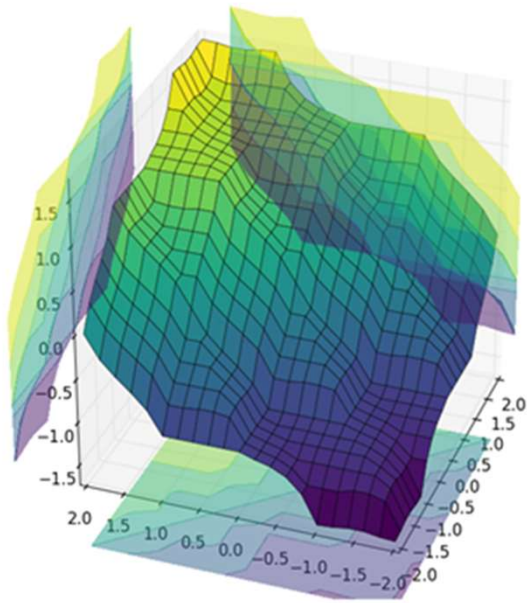
Features

Scope → control of complex plants

Multi-variable → many inputs and outputs

Nonlinear

High dead time constants

Time variant systems

How do we do it?

Fuzzy logic

Control multiple variables simultaneously

Predictive control

OPC communication

Disturbances

- In each control loop, there could be as much as 10 disturbances

- The same disturbances can influence several control loops, simultaneously.

Multiple Loops

CONTROL OF INTERDEPENDENT LOOPS

NO LIMIT FOR THE NUMBER OF CONTROL LOOPS

MORE THAN ONE CONTROL VARIABLE CAN ACTUATE ON THE SAME PROCESS VARIABLE

Virtual Meter

- Allow the estimation of non-measurable quantities of the process

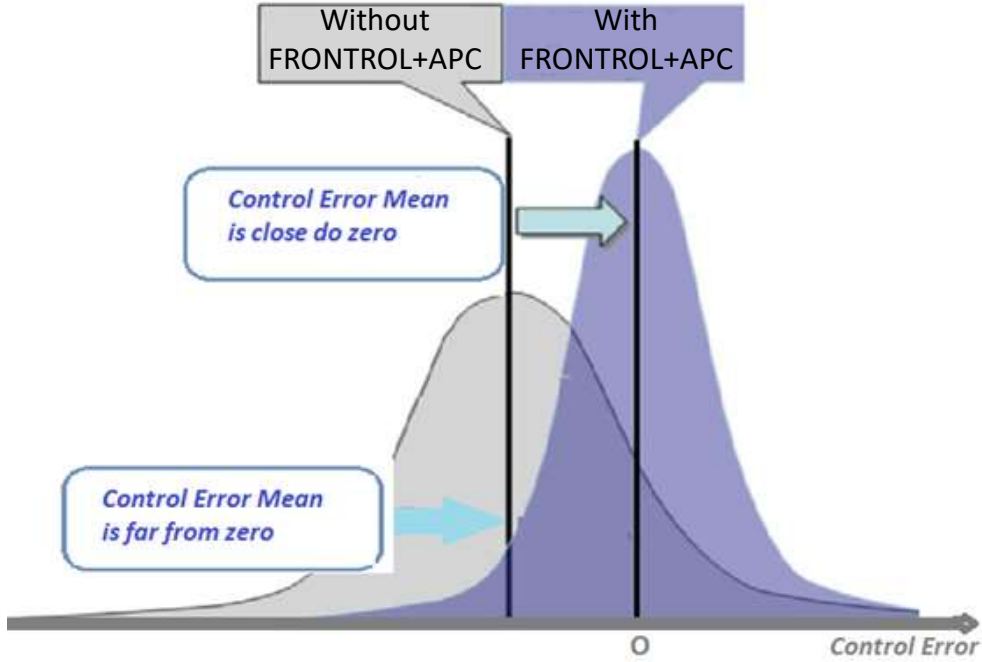- The adjustment of the virtual meters is done based on historical data

Historian

- A database system stores the values of process variables

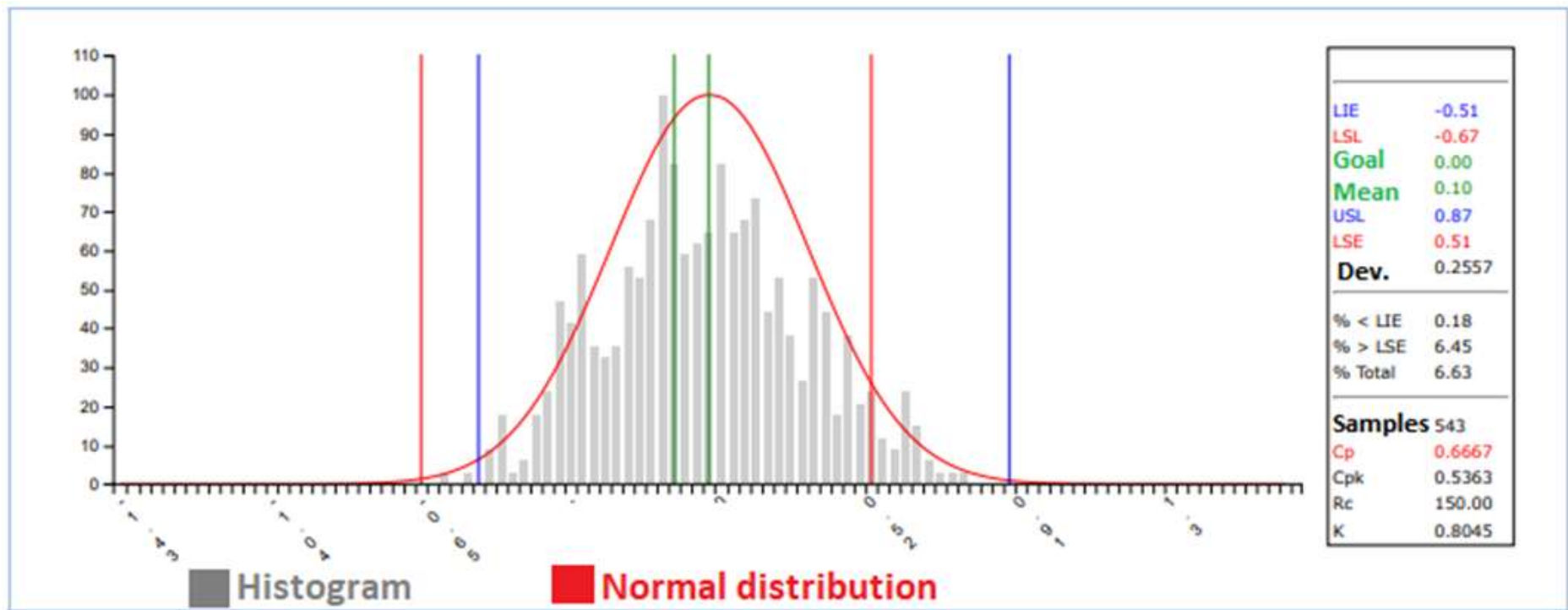- Trend plots and statistical analysis are presented
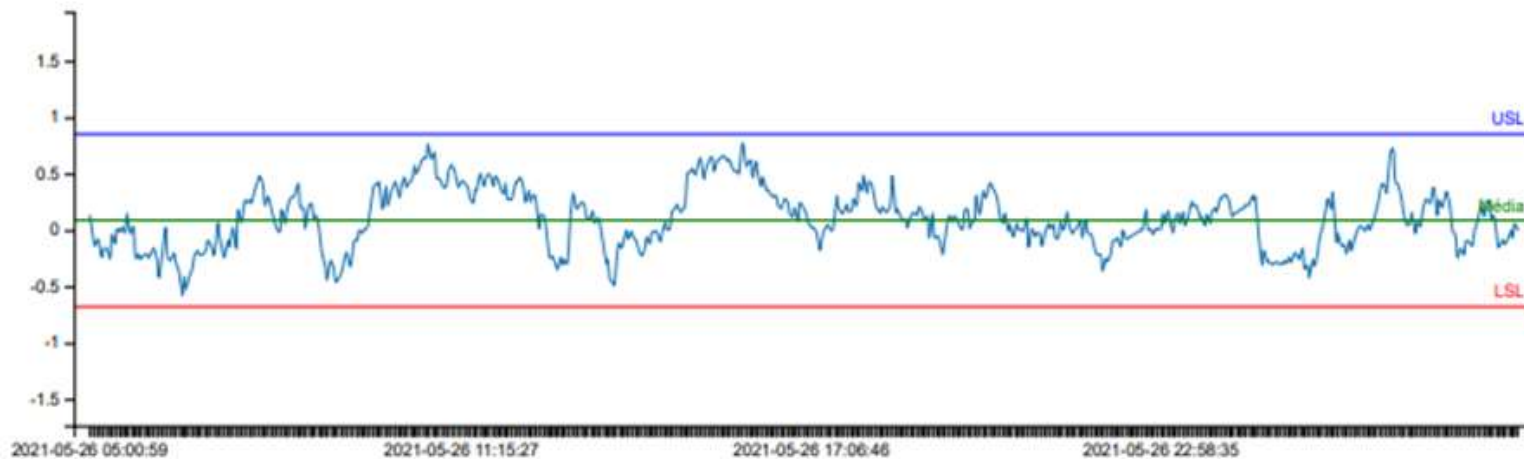
Example: Soybean meal moisture

Histogram of the control variables and statistical analysis

Statistical Analysis

Example: Steam flow for soybean meal dryer

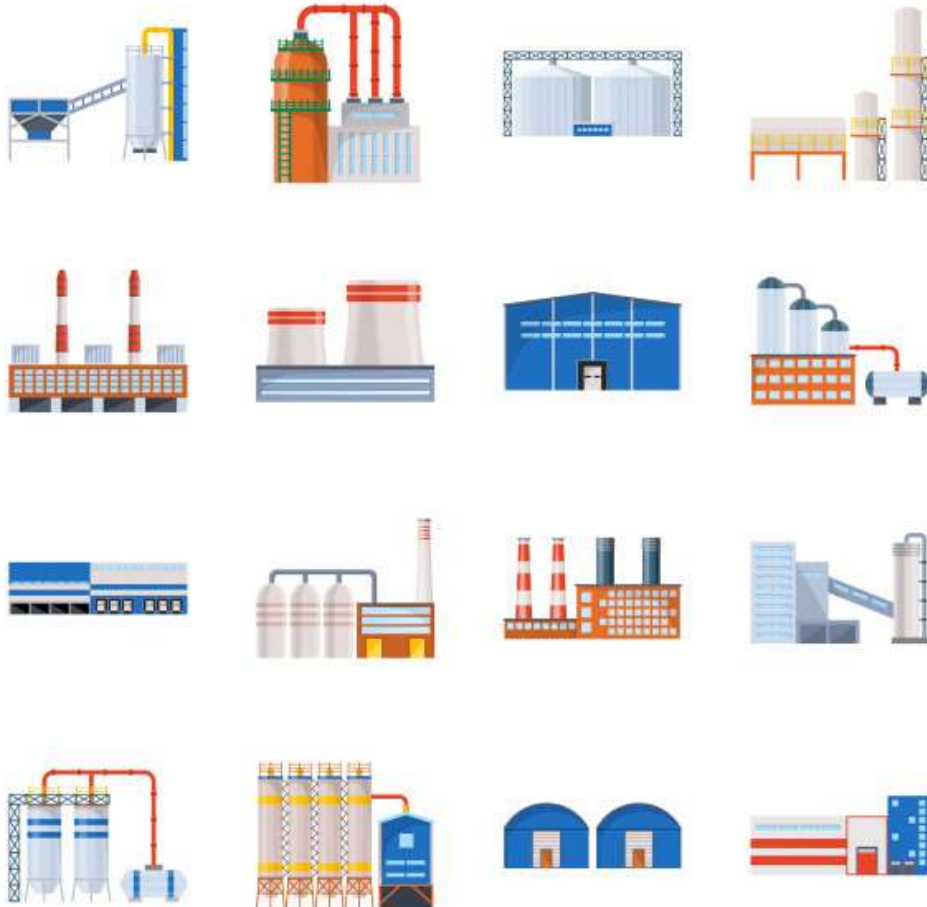# Frontrol Systems implementation steps!

Data collection and analysis

Controller configuration

System implementation

Tests and adjustments

Where?

- Process industries
- Oil & gas units
- Chemical and petrochemical
- Soybean and corn processing
- Sugar, ethanol and energy production

Some Applications

- Fermenter temperature control
- Moisture control in dryers:
  - soybean meal
  - corn meal
  - maize starch
  - corn gluten
- Control of speed and level of extractors of soybean oil
- Dissolvent level control in the production of soybean meal
- Control of dissolvent top temperature in the production of soybean meal
- Simultaneous control of soybean meal moisture and protein
- Density control in Alcohol Distillation Columns
- pH control in sugar mills.

Application case-1

Sugar and Ethanol

✔ pH control

🍾 Injection of wine

⚗ Ethanol density control – Distillation Column Control

🌡 Temperature control of steam in dessuper

Application case-2

Soybean Processing

Some soybean mills process as much as 4000 tons of grains per day. It is a very complex continuos process.

- Moisture and protein control of the soybean meal
- Gum dosing control on the soybean meal
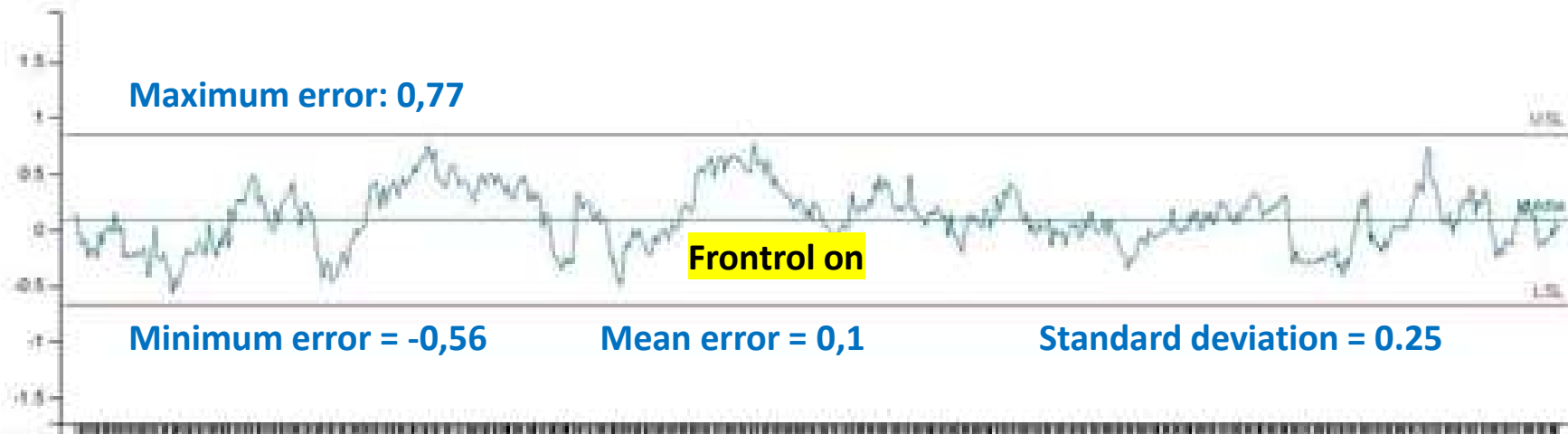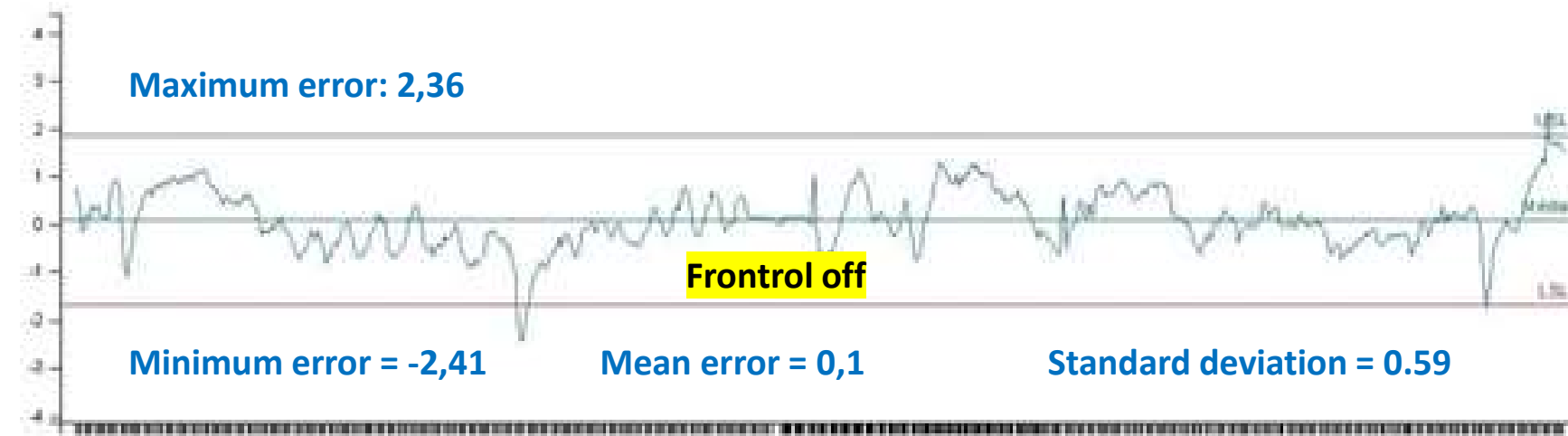- Desolventizer level control
- Desolventizer top temperature control.

Results - case-2
Control Error of the Soybean Meal Moisture

Maximum error: 2,36

Frontrol off

Minimum error = -2,41   **Mean error = 0,1**   **Standard deviation = 0.59**

Maximum error: 0,77

Frontrol on

Minimum error = -0,56   **Mean error = 0,1**   **Standard deviation = 0.25**

Frontrol Systems benefits

- Enhance process stability and production
- Improve control and operation
- Extend safety and site availability
- Reduce process shutdown
- Save energy usage
- Improve product quality
- Overall optimization of site
- Increase revenue and IBDA

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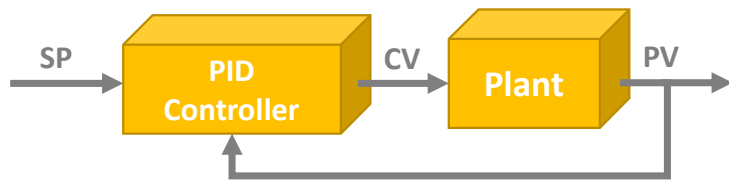Empowering Industrial Solutions To Enable Peace of Mind

CORTEX
INDUSTRIAL SYSTEMS

CJ **Selecta**

Tech-Notes

- Deficiencies of conventional control
- The FRONTROL -Systems fuzzy logic module
- Implementation technical details

Deficiencies of conventional control that are overcome by the Frontrol Systems
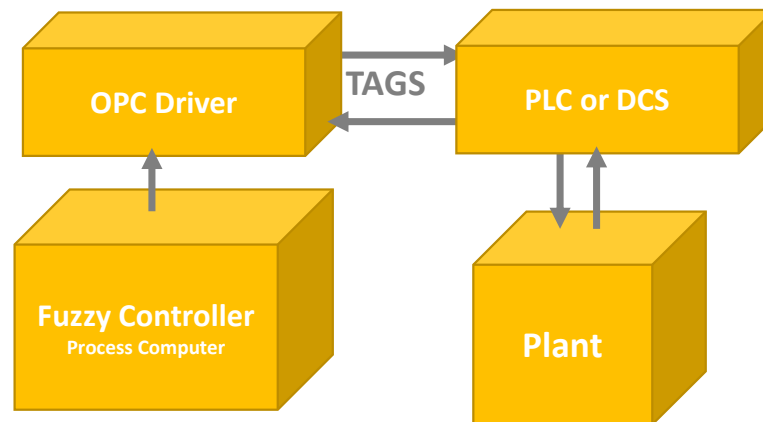

- Difficult tuning in cases of large delays and non-linearities.

- In multivariate systems, it does not consider the interaction between variables.

- Controller performance changes under different operating conditions

Frontrol Systems Fuzzy module
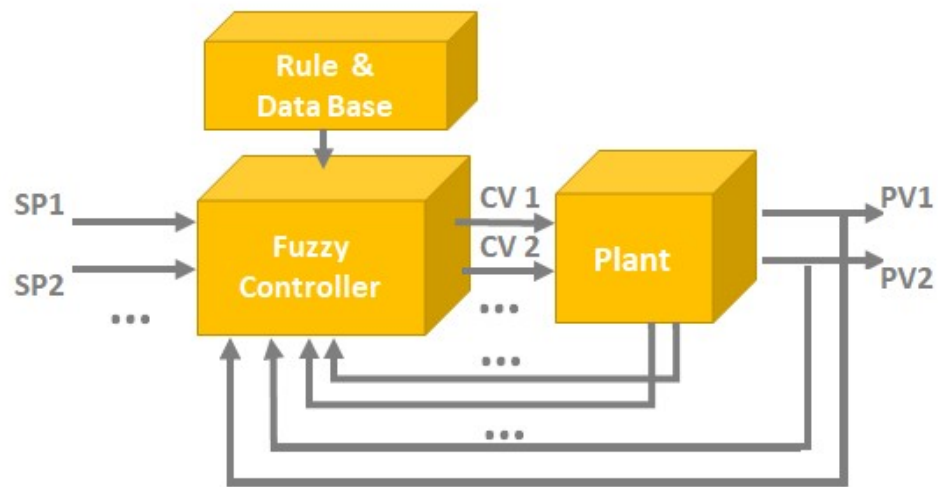
- It is based on fuzzy set theory

- The system is controlled by a rule base

Implementation of the Frontrol Systems

Thank you!

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https://www.frontrolsystems.com/