Advanced Process Control

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Introduction

As chemical production processes are continuous in nature, Process Control is needed to continuously control the performance of our production processes. In other words, Process Control is designed to keep variables within predefined specifications to optimize productivity. Advanced Process Control (APC) refers to techniques and technologies used to improve industrial Process Control systems. In particular, production and asset optimization through APC will help solve asset availability problems and bring down costs through higher product quality and Right First Time (RFT).

Solution

The Solvay Industrial teams have developed a Process Control Excellence transformation which is described in the following playbook.

The transformation aims at achieving the following goals:

- Implement performance monitoring tools & quick wins ideas through Basic Process Control
- Identify enhanced design improvements through APC/Optimization scheduling tools focusing on:
  - High-Throughput/Energy intensive product
  - High-Value products
- Implement the most profitable enhanced design improvements

The diagnostic will identify the best enhanced control strategies & use of Real Time Optimization (RTO) / APC to optimize assets. Tools are presented such as Online Quality Control which relies on soft (model-based) sensors. Finally, the sites are presented with the opportunity to introduce digital twins and Operator Training Simulations (OTS) to upskill operators.

Impact

APC will naturally reduce variability, OPEX and shutdown. Focused as well on improving operator skills and reaction, it will also improve safety and overall operations (including startup duration). More control over the process will enable product quality improvement. With these improvements, the expected financial impacts of deploying APC are:

- Volume increase (+2-3 %)
- Variable Cost reduction (-5%)

Tools to be used within the Process Control Excellence Framework

The following table highlights the different tools that are available as well as their value for sites when implemented.

LAYER	TOOL	DESCRIPTION	VALUE
	SLVPERF*	• Monitor/track PID control loops layer performance	• Reduce variability, OPEX and shutdown, increase Quality and Production
	Solvay-4-Tune*	• Identify optimum PID control loops tuning parameters	

DCS /PLC (Level 1)	**Advanced Regulatory Control**	• Enhanced control if simple PID not operate properly • Using process knowledge & modeling for complex situation	• Optimize throughput • Reduce Energy cost • Reduce Raw Materials cost • Improve product quality
	Real Time Optimizer/ Advanced Predictive Control (Aspentech)	• RTO/APC for Continuous processes & Utilities • Soft sensors • Being closer to optimum	
	Real Time Optimizer/Highly Automated Line (Solvay-HAL*)	• RTO/APC for Batch-continuous processes • Scheduling & optimizer @DCS level	
SCADA (Level 2)	**Operator Training Simulator /Digital Twin (AVEVA/Aspentech)**	• Simulate process behavior & DCS interface • Support DCS upgrade projects (Functional tests)	• Shorten startup duration, improve safety • Improve operator skills and reaction

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Playbooks

- **Process Control Excellence transformation Playbook**

Synthesis Standard One Pager

- **APC**

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Linked Pages

- **Production**