Production

Production

This Wiki page summarizes all of the standards from Star Factory relating to Production.

1. Advanced Process Control

1.1. 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).

1.2. 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.

1.3. 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%)

1.4. 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
DCS /PLC (Level 1)	**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	
	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

2. Advanced Analytics

2.1. Introduction

Some of our plants trace their production methods back to the Solvay process invented in the 19th century while others are based on modern organic synthesis methods. However old the process or the factory, all of our sites can benefit from the progress of Advanced Analytics to improve operations, boosting productivity and quality while reducing costs.

2.2. Solution

The Solvay Industrial teams have developed a playbook on Data Science Playbook for the Digital Acceleration of Plants. This can be seen as a guide to show how data science is delivered within the digital acceleration in plants program.

In order to promote data-driven decisions, Advanced Analytics at Solvay will first start with a Root Cause Analysis with descriptive models. Once the requirements are properly identified and documented, models can be developed for the following applications:

- Online Quality Control with model-based sensors
- Monitoring/maintenance with predictive (forecast) models
- Process/Energy optimization with Prescriptive models

The diagnostic / RCA activities will take about 1 to 2 weeks with the support from the Site Production and Process Engineer. Depending on the solutions to be developed, the delivery time may vary (see playbook).

2.3. Impact

With the proper modeling in place, data-driven decisions will reduce variability, OPEX and (planned or not) shutdowns, while improving product quality. Financial impacts expected are the following:

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

Used in conjunction with APC (see section 1.), Advanced Analytics will help digitize operations. With the standardization of IT systems and data sets, numerous tools can be replicated more easily.

3. Overall Equipment Efficiency (OEE)

Overall Equipment Efficiency (OEE) is the best way to monitor your asset performance on production assets. From your strategic supplies to quality performance or annual shutdown strategy. Where OEE is low, once gaps are identified, gains & improvement can be achieved.

OEE tracking allows to:

- Increase production rates
- Improve the reliability of the assets
- Reduce maintenance costs (planned versus unplanned breakdowns)
- Identify real production limits/bottlenecks
- Optimize safety stocks

A detailed playbook on this central KPI has been made by the Industrial teams. For more information on the OEE, please visit the dedicated Wiki page .

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Playbooks

- **Overall Equipment Efficiency Playbook**
- **Process Control Excellence transformation Playbook**
- **Data Science Playbook for the Digital Acceleration of Plants**

Synthesis Standard One Pager

- **OEE**
- **APC**
- **Advanced Analytics**

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Linked Pages

- **Overall Equipment Efficiency (OEE)**