

# Fero Labs

# Industrial Use Case Playbook

## Golden Batch Analysis

# Table of Contents

---

<input type="radio"/> Introduction	3
<input type="radio"/> Industry Overview	4
<input type="radio"/> Industry Challenges	5
<input type="radio"/> Use Case Description	6
<input type="radio"/> Process & Business Outcomes	8
<input type="radio"/> Fero Adoption Timeline	9
<input type="radio"/> Use Case Data Requirements	10
<input type="radio"/> Activating This Use Case	11

---

# Introduction

Welcome to the **Industrial Use Case Playbook**, crafted by [Fero Labs](#) for the forward-thinking professionals dedicated to enhancing factory production optimization.

Whether you're a Data Scientist, Process or Production Engineer, or Plant Manager, this playbook is tailored to equip you with the strategies, insights, and tools necessary to drive transformative change within your organization.

In today's rapidly evolving industrial landscape, maximizing production efficiency and minimizing operational costs are imperative for maintaining competitiveness and sustainability.

Within each of our industrial playbooks, we present a curated collection of use cases designed to address the specific challenges faced by modern manufacturing facilities. Each use case is meticulously crafted to deliver tangible outcomes, ranging from increased productivity and quality to reduced waste and energy consumption to help achieve sustainability goals.

Featured within these pages is a use case which spotlights **Golden Batch Analysis for chemical plants**. This case exemplifies how to tackle complex production optimization challenges head-on, leveraging data-driven approaches to drive measurable improvements in operational efficiency and cost-effectiveness.

As you embark on this journey for operational excellence, we encourage you to approach each Fero Labs use case scenario with curiosity, a willingness to embrace innovation and change.

By harnessing the power of your production data, domain knowledge, and collaborative problem-solving, we believe that you can unlock the full potential of your factory's production capabilities.

Together, let's redefine what's possible in industrial manufacturing and pave the way for a future of unprecedented productivity and sustainability.

Welcome aboard,

Fero Labs

# Industry Overview

The global chemical industry plays a pivotal role in driving economic growth and innovation, serving as a cornerstone for various downstream industries, including pharmaceuticals, agriculture, automotive, and consumer goods. With an ever-increasing demand for specialty chemicals, polymers, and advanced materials, chemical manufacturers face mounting pressure to enhance production capabilities while minimizing their environmental impact.

However, the chemical manufacturing process is inherently complex, characterized by stringent safety standards, strict regulatory compliance, and the need for precise control over chemical reactions and process parameters. Challenges such as raw material variability, energy-intensive operations, and waste generation pose significant hurdles to achieving operational excellence and cost-effectiveness.

One critical aspect of chemical manufacturing optimization lies in the concept of **Golden Batch Analysis**. This methodology involved identifying and replicating the ideal conditions that result in the highest quality and most efficient product runs. By leveraging data analytics and advanced statistical techniques, chemical manufacturers can analyze historical production data to pinpoint the optimal process parameters, equipment settings, and material formulations that yield the desired outcomes.

Golden Batch Analysis not only enhances product **quality** and **consistency** but also improves production efficiency, reduces waste, and minimizes resource consumption. By identifying and replicating the golden batches across production lines, chemical manufacturers can streamline operations, mitigate risks, and maximize profitability.

By reducing energy consumption, minimizing raw material usage, and optimizing waste management practices, chemical plants can demonstrate their commitment to sustainable manufacturing practices while enhancing their bottom line. At [Fero Labs](#), we refer to this as [Profitable Sustainability](#).

# Industry Challenges

In Industry 4.0, the promise of digital transformation often gets stuck in "**pilot purgatory**," with **70% of initiatives failing to progress beyond testing phases**. McKinsey's research highlights that the choice of use case significantly impacts this phenomenon.

**Selecting use cases that lack strategic alignment, clear value propositions, or encounter technical barriers contributes to pilot initiatives' failure.**

Pilot purgatory not only wastes resources but also risks eroding confidence in digital transformation efforts. To navigate this challenge, organizations must strategically select use cases closely aligned with their objectives, offering clear pathways to value creation and scalability.

In each **Fero Labs Use Case Playbook**, we explore industrial use cases designed to address modern manufacturing challenges. Leveraging advanced analytics, AI, and machine learning, these use cases aim to drive tangible improvements in operational performance, cost-effectiveness, and sustainability.

By focusing on strategic and transformative use cases, organizations can break free from pilot purgatory and unlock new opportunities for growth and innovation.

# Use Case Description

## Background

A golden batch is a batch during production that had met optimal quality metrics. Golden batches serve as a benchmark or standard for comparing subsequent production batches. By analyzing and replicating the conditions under which a golden batch was produced, plant operators can aim to consistently achieve these optimal conditions in future production runs.

## Problem

Quality metrics in batch production can vary widely, often influenced by raw material variations, different batch durations, shifting environmental conditions and variation in plant utilities throughout different stages of production.

**Process and quality engineers** in the plant must promptly identify the factors that could lead to subpar quality metrics. Their challenge is to find ways to maintain these quality metrics close to at the optimal standards, all while avoiding major alterations to standard operational procedures.

### ***Problem Summary***

*Adjust process parameters at critical decision points to ensure quality metrics fall within the ranges at or near that of the golden batch, without significant modifications to standard operational practices.*

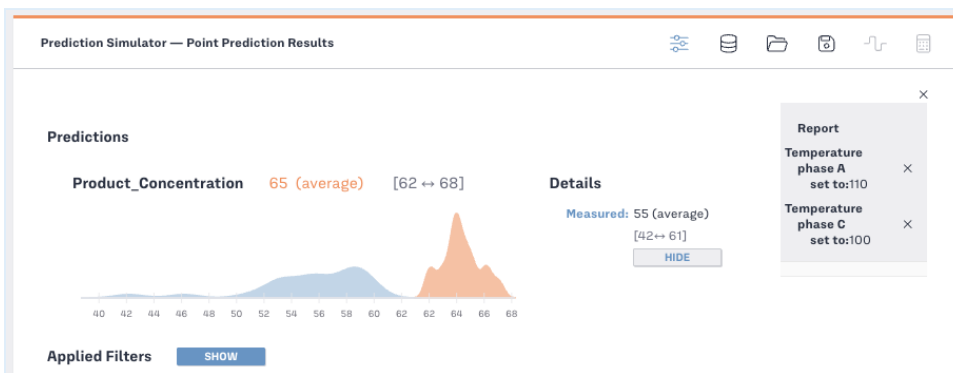
In the context of continuous improvement methodologies like Lean Manufacturing and Six Sigma, the concept of a golden batch is integral for efforts in minimizing variability and defects in quality metrics. However, these methodologies, which rely on statistical analysis and manual hypothesis testing, can become quite complex. This complexity is amplified by the vast amounts of tabular and time series data from Laboratory Information Management Systems (LIMS) and Process Information Management Systems (PIMS) respectively, and the detailed analysis required to understand the interactions among various process variables and process constraints.

Neglecting to efficiently and safely manage these critical aspects can lead to several challenges including:

1. Reduced revenue due to quality metrics that fall short of expectations.
2. Prolonged periods spent on diagnosing the problem and applying modifications to the process that may have little to no impact on the quality metrics.

## Fero Labs Solution

**Process engineers** can employ Fero as a **digital twin** to precisely fine-tune a select number of operational parameters that have the most impact on the underperforming batches within the production process. Utilizing Fero Labs, they can quickly identify the most impactful process parameters and deviations from the golden batch, subsequently leveraging Fero's "Group Prediction Simulator" to explore various "what-if" scenarios in a single, streamlined process. This involves making adjustments to these important process parameters to see how changes to them could have improved the outcomes of underperforming batches. This functionality not only helps in achieving the desired quality but also facilitates strategic decision-making by offering a virtual testing ground for testing and improving the production process. Once tested, process engineers can use this knowledge to determine the necessary set-points to adjust in their process.



# Process & Business Outcomes

## Identify the root causes of out-of-specification quality metrics

With Fero's Root Cause Explorer, plant engineers can swiftly identify which variables impact batch quality —often **within minutes**. Utilizing Fero enhances overall process comprehension, allowing the team to rapidly determine the most influential factors out of hundreds that affect batch quality.

## Conduct 'what-if' simulations to gauge the effects of process modifications

Fero's Group Prediction Simulator lets the plant engineers test **hundreds of different “what-if” operating scenarios** for underperforming batches. This feature assists plant managers to make slight adjustments to the most relevant process set-points across the entire operation. Such targeted adjustments can save plant engineers **several days or even weeks of analysis**, streamlining the process improvement efforts.

## Gain approval from top-level management to make process adjustments

Virtual testing with Fero enables boost plant engineers' confidence in predicting how changes will impact future batch quality. After validating their hypotheses through Fero's simulations, plant engineers can confidently approach top-level management and **quickly build trust** to adjust several process set-points within the plant, facilitating rapid implementation of necessary adjustments within the production process.



# Fero Adoption Timeline

Plant teams can collaborate to set up and deploy Fero. Below is a timeline highlighting typical steps. With Fero's easy-to-use, no-code interface, this can be achieved in a matter of weeks, not months or years.

Time	Process & Quality Engineers	Data Scientists / IT	Operators	Management
Week 1	Pull data	Pull data		
Week 1	Upload to Fero			
Week 1	Configure Fero	Configure Fero		
Week 2	Corroborate results			
Week 3	Run "what-if" scenario simulations, spot check production, run root cause analyses			Receive regular reports showing savings
Week 3	Identify setpoints/ operating parameters to adjust			
Going forward	Monitor deployment		Trial process parameter adjustments	Receive regular reports showing savings

# Use Case Data Requirements

The Fero Labs Platform has convenient integrations into common process information management systems, such as Aveva PI System, AspenTech, Wonderware, and SQL databases, as well as laboratory information management systems, such as SAP, Oracle, and other ERP systems. Initial data exploration can be done either through direct integration into these services, or data file uploads in Excel and CSV data formats.

The data requirements for this use case typically involve the following sources:

## Lab Analysis Data

- Batch IDs, raw material concentrations, product concentration, batch start/end times

## Batch Stage 1 Data

- Batch definitions, reactants, solvents, catalyst, operating conditions, etc.

## Batch Stage 2 Data

- Batch definitions, feed rates, reactor temperatures, reactor pressures, etc.

# Activating This Use Case

Consider our **Industrial Use Case Playbooks** as inspiration and tactical ideas for your team to align on to maximize the efficiencies of your plant. Each Playbook has a matching **Use Case Blueprint** which provides detailed steps to activate each use case within the Fero Labs platform.

If you're curious to see these in action please [book a use case demo](#) with our team!

Together, let us continue to push the boundaries of what's possible, driving towards a future where industrial manufacturing is not just efficient and sustainable but truly transformative in its impact on society and the world at large.

Thank you for joining us on this journey, and we look forward to continuing to partner with you in your pursuit of excellence.

Sincerely,

Fero Labs

## About Fero Labs

Fero Labs helps factories work better together by bridging the gap between the disconnected goldmine of production data and industrial knowledge inside every plant.

The Fero Labs Augmented Intelligence Platform collects data and knowledge, and augments it with powerful Fero ML so factories can make more confident changes that drive profit and sustainability.

Harnessing Fero Labs, a factory creates an augmented workflow which allows for better use of raw and recycled materials, production time, and energy utilization. Teams can work 90× faster, using Fero's AI powered simulated predictions or live optimizations. They can run root cause analyses in minutes, and make continuous process improvements that drive [Profitable Sustainability](#).

Fero Lab's white-box explainable ML makes decisions clearer by showing the context and confidence levels behind every prediction and recommendation. This expands a plant's production knowledge and drives better production results for manufacturers, all while minimizing emissions. Together we'll build a sustainable tomorrow.