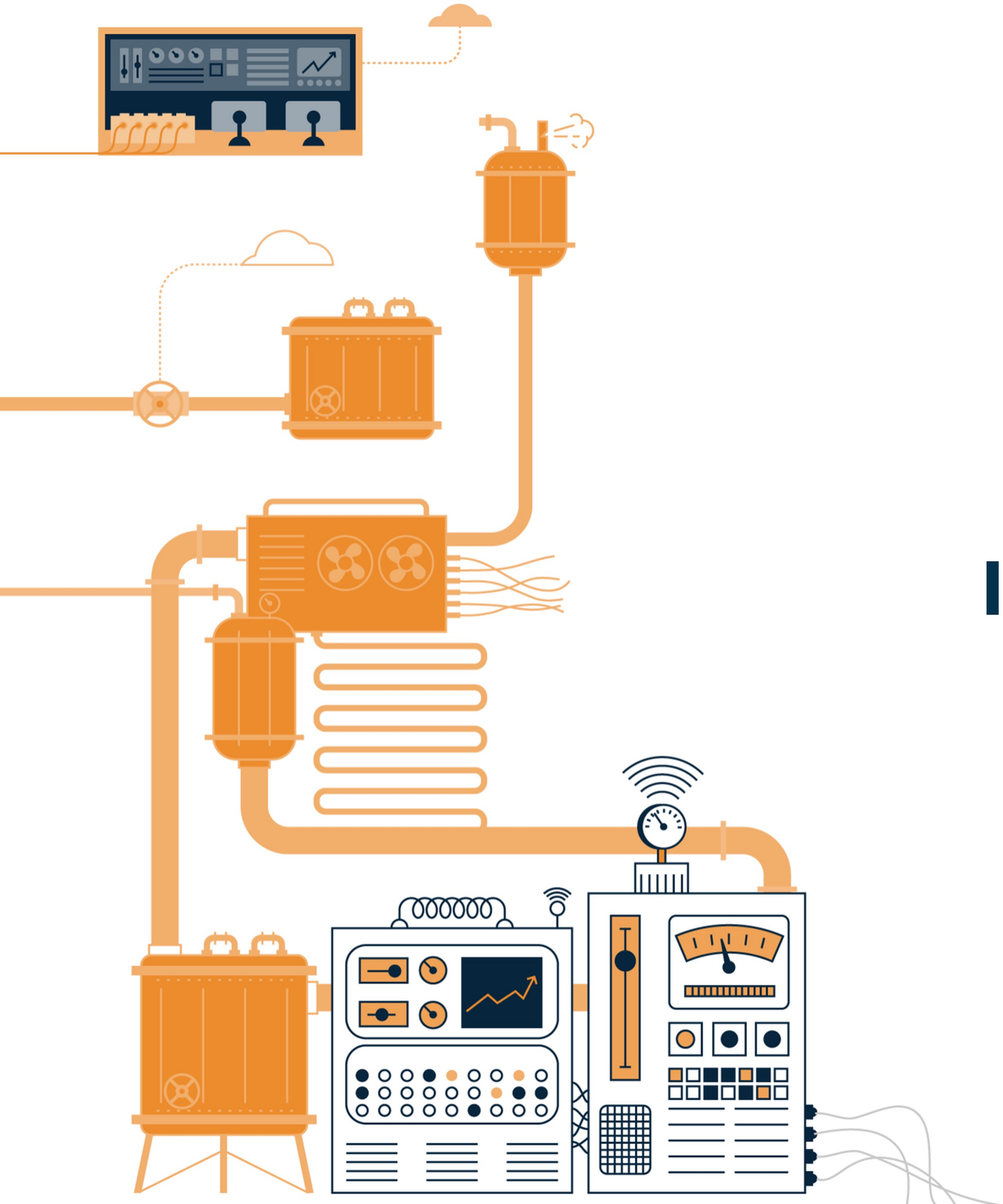


fēro labs

Industrial Process & Profit Optimization Software

Powered by Explainable Machine Learning

New York
USA

Düsseldorf
Germany

65% of executives are not realizing value from “AI” and Machine Learning investments

MIT Sloan Management Review and BCG survey of 2,555 executives representing 29 industries and 97 countries

“AI” is presented as a magic bullet

Most of it is **hype**

True “AI” does not exist yet and the term is a creation of marketers

Consultants pretend to “offer AI” to sell more services

Software companies brand themselves as “AI” to benefit from the hype

Most **Machine Learning** methods struggle to drive value for industry

The biggest obstacle to the adoption of Machine Learning in industry is **trust.**

Most ML software uses off-the-shelf algorithms designed for the tech sector and not applicable to industry

Traditional ML is black box, yet engineers need to understand the root-cause of issues

Traditional ML optimization tools do not scale to industrial systems, which leads to lower ROI

The chemicals industry is facing **many challenges** in the 21st century.

Commodity dominated companies face **increasing competitive cost pressure**.

Specialty chemicals face constant **pressure to innovate** and **increase production volume**, while operating **increasingly complex processes**.

Demographic change increases **pressure to run plants more efficiently** with fewer personnel.

Growing regulatory and financial pressure on sustainability forces the chemical sector to increase production volume, while **reducing energy consumption**.

AI is not a magic bullet, but a very powerful tool **if applied correctly by domain experts**

Our mission at Fero is to help industrial companies **turn their data into their competitive advantage**, and:

- generate **quick, bottom-line returns**,
- **democratize machine learning** across the organization and succeed in digitization, and
- **build in-house data expertise** via knowledge transfer.

Fero Software Suite offers a range of optimization applications tailored for industry

Process & Profit Optimization

- Optimize **plant metrics** for efficiency, quality, cost and sustainability
- Discover main drivers for each metric and use that to predict future values
- Recommend optimal operating zones for the process

Asset Optimization

- Optimize asset metrics around efficiency
- Discover factors across the entire process that impact individual asset degradation
- Forecast and simulate optimal maintenance schedule of assets to minimize maintenance costs

How companies are staying ahead of the curve using Fero's explainable ML

Optimize Batch Quality

Reduced raw material costs by **9%** while reducing variability; developed **28 new products** in a year at **lower cost**.

GERDAU

Improve Asset Performance

Identified **root-causes of asset health** variability and forecasted decline in performance **30 days into the future.**

covestro

Average ROI 233%

Increase Yield

Increased **production yield 9-11%** by mapping new relationships between critical production parameters.

EVONIK

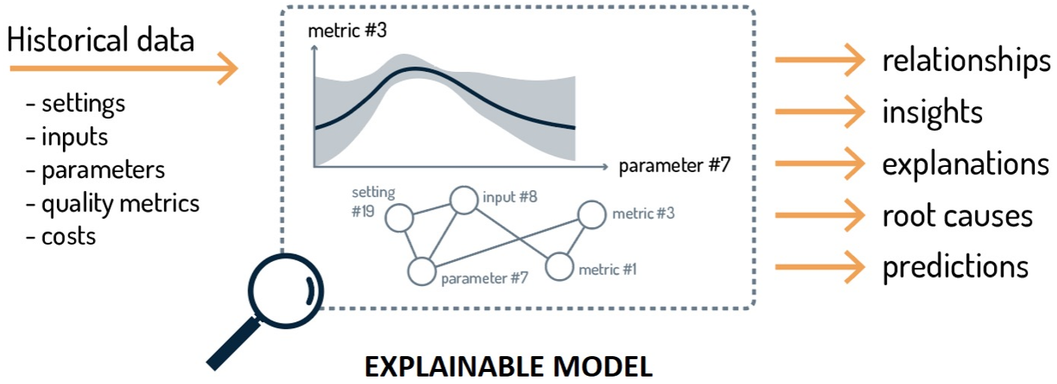
Reduce Emissions

Improved efficiency of the active filters and analyzed **over 4000 process** parameters to **reduce NOx emissions.**

uniper

Fero’s ML understands and drives profits

UNDERSTAND: process & profit drivers

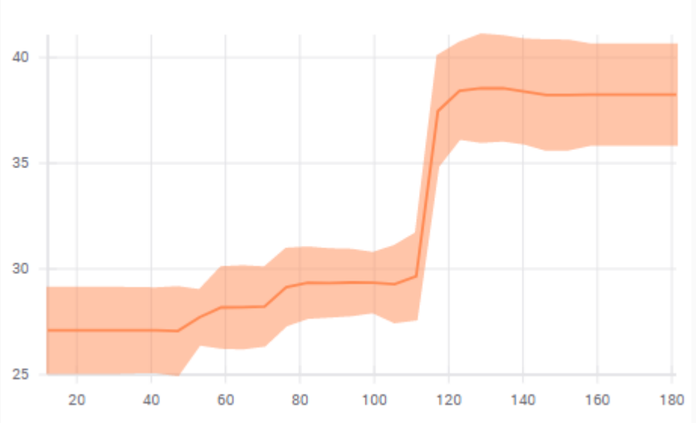


Most machine learning techniques produce black boxes; there is no way to understand how critical inputs affect the outputs.

Fero software can identify how each input affects the output and explain what leads to the predictions.

DRIVE: process & profit with precision

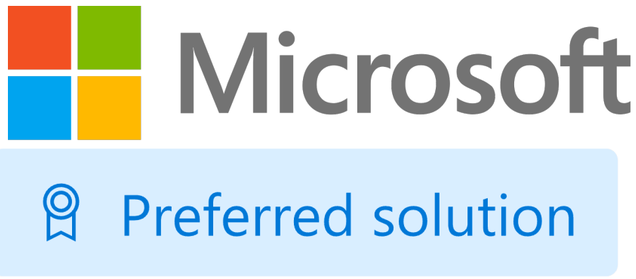
Prediction with confidence band

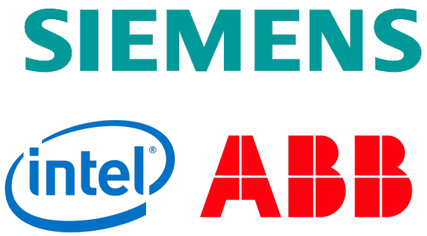


Most machine learning algorithms only predict a single value.

Fero software assigns a confidence band to every prediction, allowing safer and more precise decision making that drives profits.

Used across the globe by industry leaders

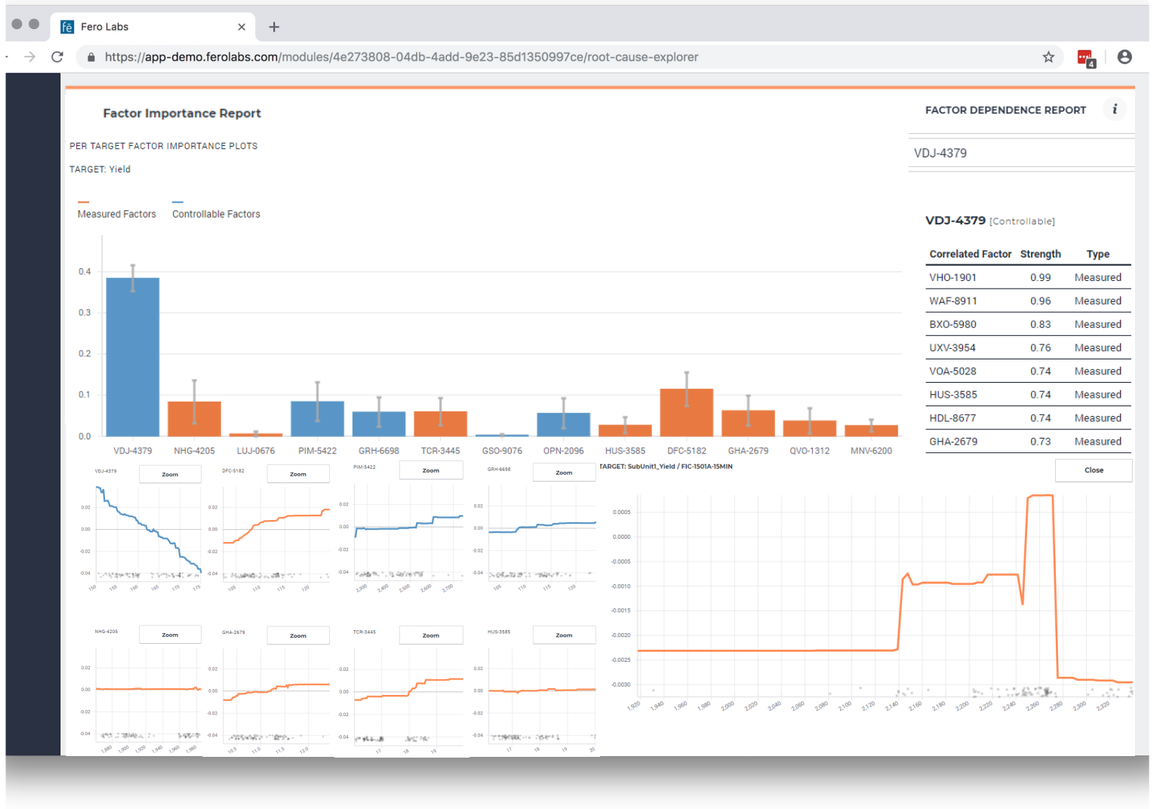




Use cases from process industries

Optimize complex chemical processes for yield

Fero Solution

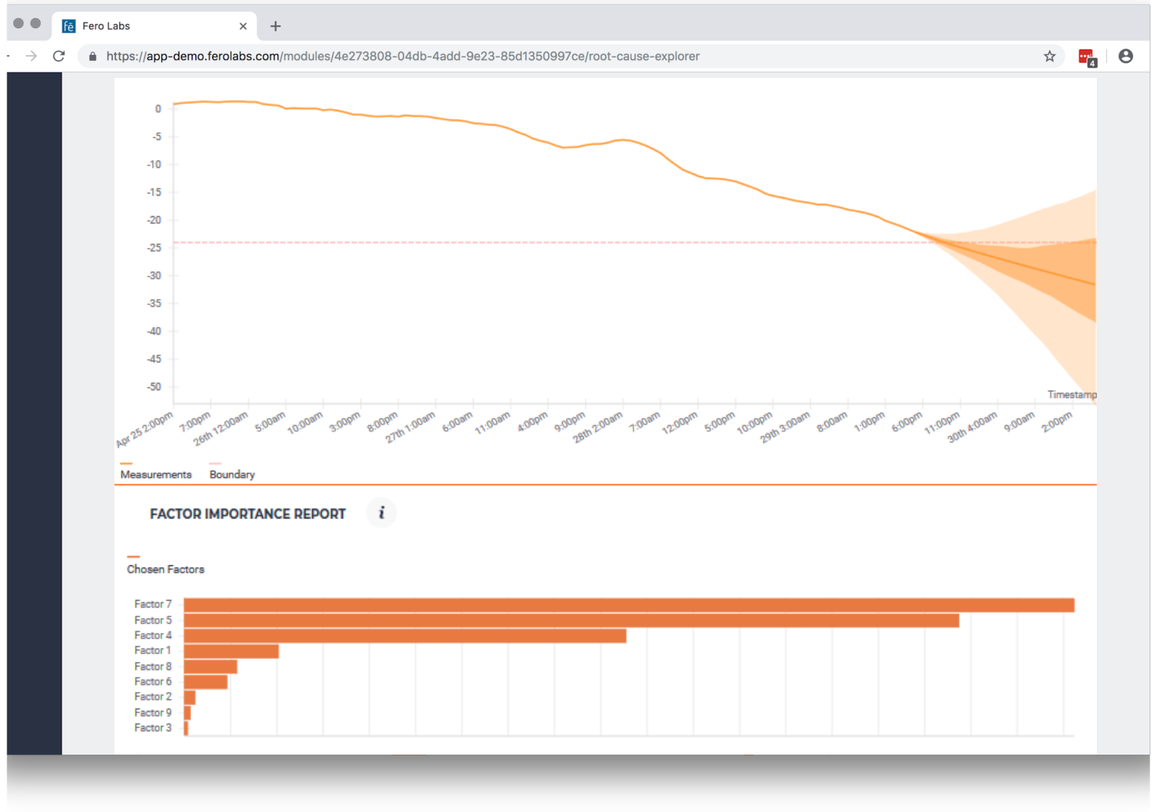


9%-11% yield increase per process

- Fero created **digital twin** of the plant to model impacts on efficiency metrics such as yield
- Amongst 1000+ process parameters, **identified factors** that directly affect KPIs
- Mapped **complex, non-linear relationships** between key inputs and targets outputs
- Customer **increased yield** and **lowered** operational **costs**

*** Will be presented jointly at Connected Plant 2020 conference (February 2020)**

Root-cause analysis and scenario testing for critical assets



Fero Solution

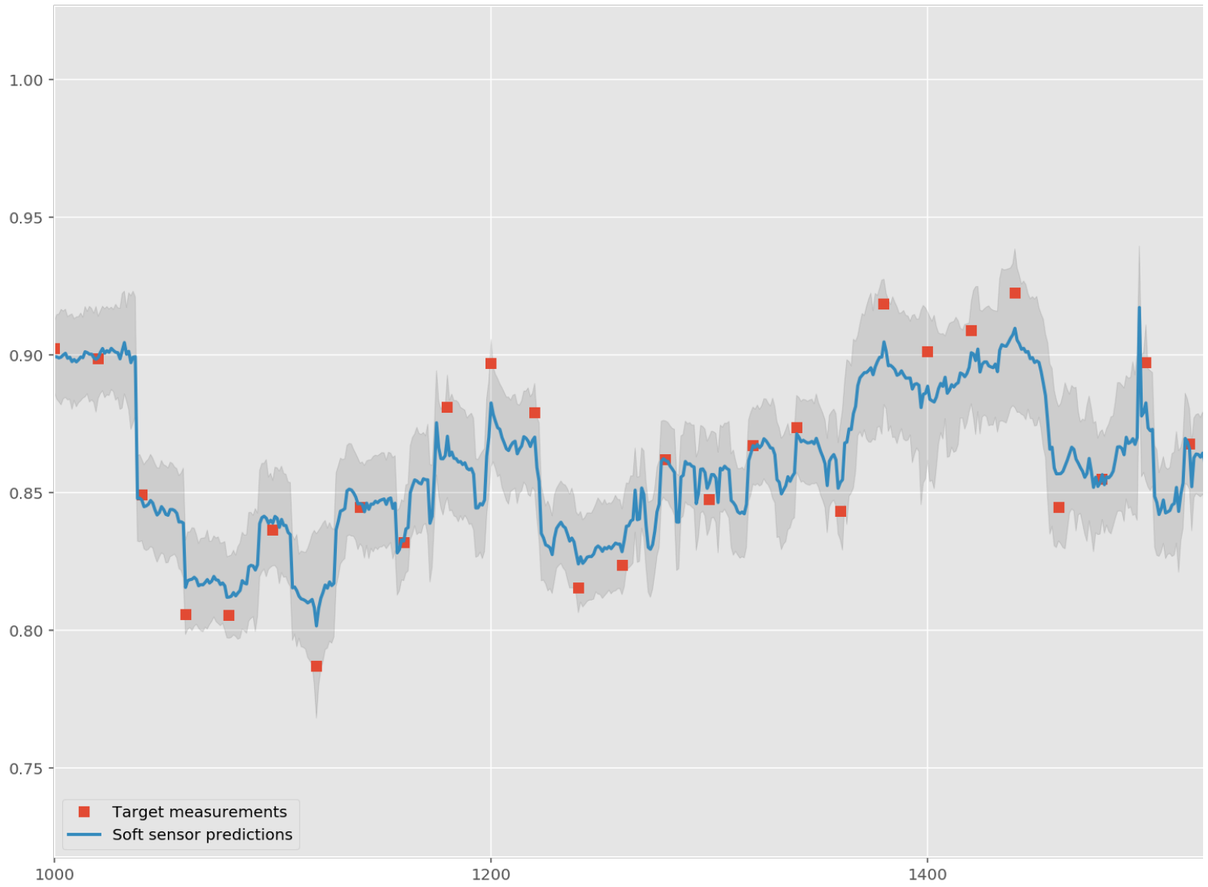
Reveal root-causes of heat exchanger fouling while forecasting RUL

- Fouling status of **100s of heat exchangers** can be tracked through Fero's dashboard
- Performance trends of individual assets are predicted **several weeks in advance**
- Maintenance engineers f**ocus on the most critical assets** with the shortest remaining life
- Process engineers **analyze the root-causes** of the failures to ensure increased reliability

*** Implementation presented by Covestro at OSI PI World, 2019. The recording of the presentation is available online.**

Soft sensor to minimize cutter stock use at the crude distillation unit

Top 3 O&G Producer

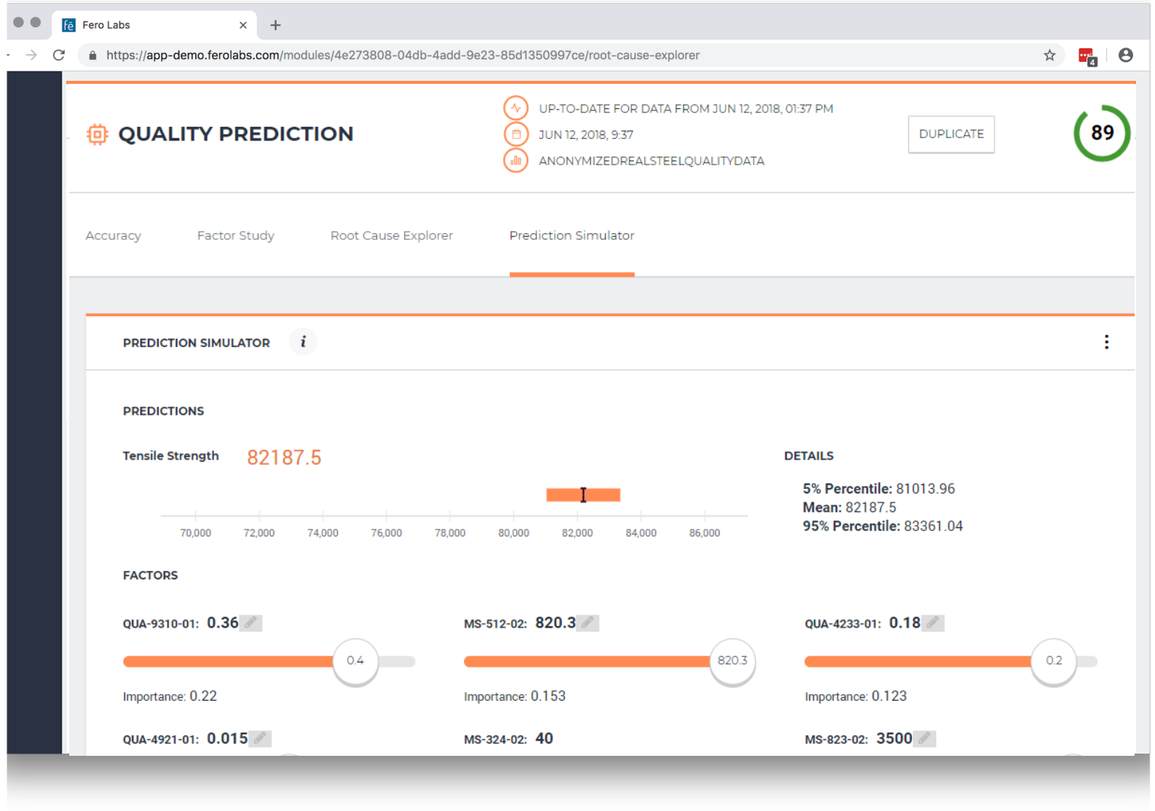


Fero Solution

$4M+ projected savings in the first year

- Loss of cutter stock to meet viscosity specifications leads to reduced margins
- Viscosity is a critical target, but it can be only measured every 8 hours due to test limits
- Fero **predicts viscosity in real-time** with high accuracy and reveals the key factors impacting the targets
- Better informed operators **adjust process during production** without waiting for tests

Reduce raw input material costs while maintaining quality



GERDAU

Fero Solution

Achieved 9% reduction in raw material costs within the first year

- Cartersville used Fero to develop a new steel chemistry that **reduced raw material costs**
- “Accelerating product chemistry refinement using ML” technical paper submitted to AIST
- Fero made sure **key mechanical properties** (tensile strength, yield strength, elongation) are within target specs with high accuracy
- Users are metallurgists, quality engineers, process engineers and operators

*** Being scaled to multiple mills in NA.**