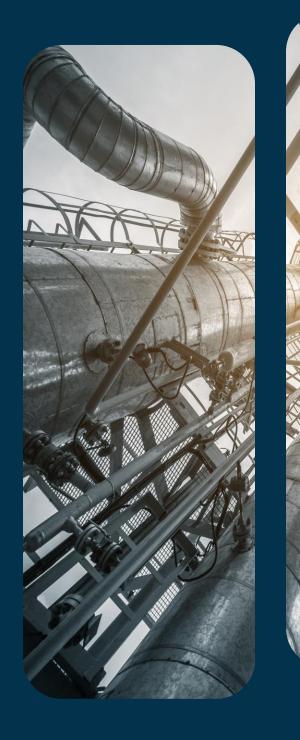


The Profitable Sustainability Platform for Industrial Process Optimization



Ferolabs.com

New York, USA

Düsseldorf, Germany





Factory optimization Al built for steelmakers

Fero helps factories to prevent and fix production issues faster and optimize process efficiencies to drive profit and sustainability.

"I thought this was another analytics tool, but I am blown out of my shoes. I wasn't even aware that this technology was out there."

-Melt Shop Manager, Largest US steel mill



The Fero Al Suite: Al to run your factory better, more profitably

Fero Diagnostics	Fero Simulator	
AI to find root causes of issues	Al to identify precise setpoints	Al o
or explore process	to fix issues faster without	Engi
improvements faster	waste	in-sp



AI for effortless data preparation and process mapping



Fero Production

optimization controlled by gineers & Operators to stay spec 24/7

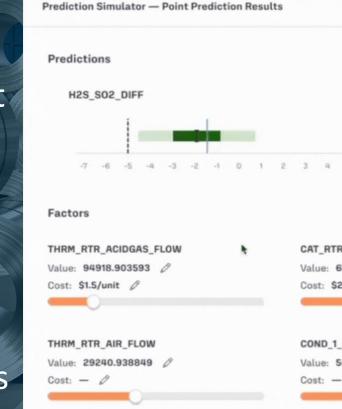
Fero Diagnostics: Al to prevent & fix issues faster

- Engineers receive explainable anomaly alerts to get ahead of potential issues & prioritize next steps
- Run deeper, faster diagnostics to determine and fix root causes, not just the issue itself
- Save time by finding historical events with similar conditions in seconds, with the Find Similar toolkit

<image/> <image/>	<section-header></section-header>
OUALITY BLUEPRINT Live Processed Data 0 3	Revise analysis Options V
Accuracy: Factor Study Root Cause Explorer Diagnostics Prediction Simulator Tactics DIAGNOSTICS	Live Prediction
Timestamp: DATE_ADDED Targets and factors: Target 1 × Target 2 × × × No filters applied Show specification limits	Add to simulator Find similar production
Time range: Custom Range	DATE_ADDED 28 Aug 2024 14:01 • Target 1 59576 • Target 2 80282.5 Explaint (lets) 0
	1 unusual factor 1 borderline factor C 0.18 P 0.016 S 0.014
	V 0.001 CR 0.19 CU 0.26 MN 0.75 MO 0.031
	NB 0.012 NI 0.10

Fero Simulator: Make confident production changes using

- A simulated environment to identify precise \bullet setpoints for each batch and product to correct issues faster
- Rapid hypothesis testing to validate in ightarrow5-mins what would previously take a day
- Actionable recommendations using historic \bullet activities that don't rely on over-design margins





Details

Measured:	-1.431196
5% Percentile:	-4.548699
25% Percentile:	-2.993344
Mean:	-1.902992
75% Percentile:	-0.81264
95% Percentile:	0.742715

Report

No changes to display

All factors currently loaded source. Any changes you make below will be noted

CAT RTR 1 TEMPDIFE

Value: 65.835172

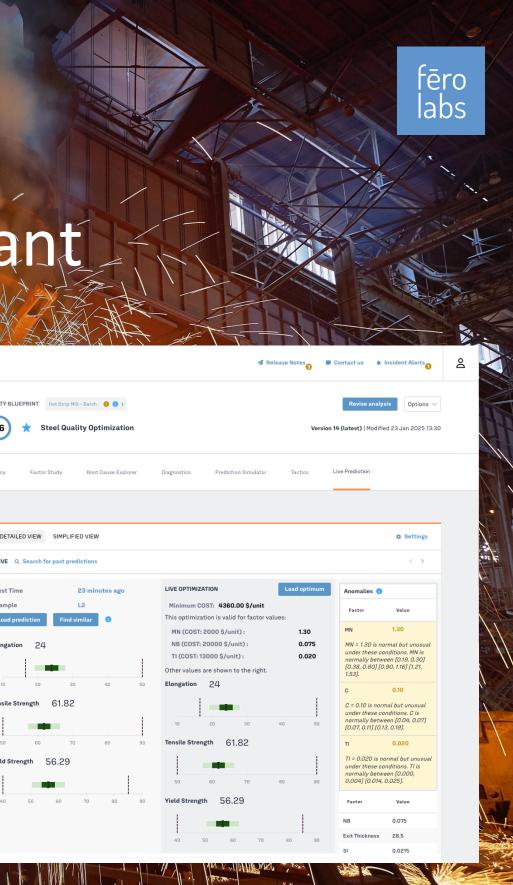
COND_1_PRESS_IN Value: 50.619291

CAT RTR 2 TEMPDIF Value: 48 814681

COND 2 PRESS OUT Value: 35.44539

Fero Production: Seamlessly deploy changes to your plant

- Production changes can be seamlessly deployed and monitored without anything falling through the cracks
- Engineers can choose a manual or automated production optimization mode
- Fero's AI optimization can automatically adapt to changing conditions to keep production inspec without intervention



🛹 Analvse

N MAL

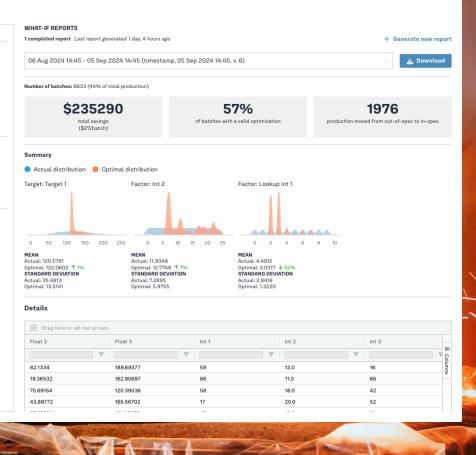
Fero Foundation: Al to turn domain experts into data heroes

- Engineers with any experience can quickly connect & ulletcombine production data sources in one place
- Al-guided data preparation democratizes \bullet data-readiness across the entire team so no one is waiting on others
- Instantly back-test changes to provide greater ulletdeployment confidence
- Have greater control over custom changes deployed ulletto production

Condition







A typical workflow using Fero starts with an anomaly alert

replicated in

H2S SO2 D

THRM RTR ACIDG

Value: 94918.903593 Cost: \$1.5/unit Ø

Value: 29240.93884 Cost: — 🖉

Fero Simulator

Incident conditions

× 8 6 0 v 1

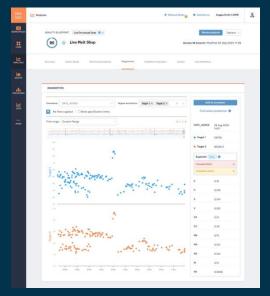
CAT_RTR_2_TEMPDIFF Value: 48.814681 Ø Cost: \$1.5/unit Ø

COND_2_PRESS_OU

Value: 35.44539 0 Cost: - 0

Receive incident anomaly Alert

Yield Strength	66900
tield Strengtr	00092
Test_time 17 M	1ay 2022 10:58:55 EST
Heat 4590890	02
Sample_ID Ca	ster (Final)
ASTM Grade C	
Product Produ	ot Size 25
C Open Diagnos	tics 🕜 Load prediction in simulator 🛛 🖓 Go to live prediction
Anomalies	
C 0.25	
C = 0.25 is unusu	al. C is normally between [0.06, 0,09] [0.11, 0.18].
V 0.019	
	al but unusual under these conditions. V is normally between [0.000, 0.005]
What do the colors	i mean?
	usual—worth investigating further within normal ranges but unusual given the other factor values—worth keeping a
ther factors	
	S 0.2 CB 0.007 NB 0.002 MN 0.90 SHAPE CHANNEL
	0 19.3 SI 0.19 CR 0.15 PB 0.00 NI 0.14 MO 0.04 SN 0.012 P 0.02



Incident conditions

Fero Diagnostics

replicated in

Where a typical process starts with a failure, a Fero alert helps to prevent them

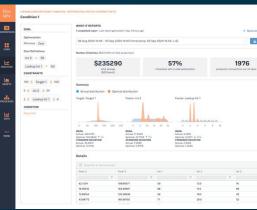
Identify root causes 'Find Similar' events

Determine precise setpoints in seconds

CAT_RTR_1_TEMPDIFF Value: 65.835172 Cost: \$2.5/unit

COND_1_PRESS_IN

Value: 50.619291 Ø Cost: – Ø Create & back-test production changes



Create rules that instruct production when to deploy a change

Back-test to ensure it works and model the changes on historical data



Deploy changes to Operators with a Simplified view



féro labs	Analyses			Inizate Notes
	00ALITYBLUEPRINT 2 Barries - 0 1			Review antiferie Deptimes V Version 21 (latest) Modified 30 Aug 2024 11:03
worses	Accuracy Factor Study Roct Cause Explore	Diagnostica	Prediction Simulator	Taction Live Prediction
ф.,	DETAILED VIEW SIMPLIFIED VIEW			2ª Enter full screen mode @ Settings
	Text Time 05 Sep 2026 07:33			$\langle \rangle$
	HE/ 4310			00UCT X 5/8
NONE -	NB	Fero Aim 0.013	Current 0.013	No action needed
	MN	Fero Aim 0.73	0.65	↑ Increase by 0.08
		ASSUM	PTIONS	
		c 8	8	

Engineers access a detailed live production view

	for past predictions		* *	1-10 of 120 >
Test_time	10 minutes, 12 seconds ago	LIVE OPTIMIZATION	Factor	Value
	17 May 2022 10:58:55 EST	Minimum surface defect rate (%) 6.2	Cooling water	2.1
Heat	123456789	This optimization is valid for factor ranges:	pressure (bar)	
Grade	46-MNVNI-S4	Casting speed (m/min) 1.12	Carbon (%)	0.29
Load prediction		Casting temperature (°C) 1510	Silicon (%)	0.58
Surface defec	-	Mould water flow (l/min) 1408	Manganese (%)	1.11
	T i	Other values are shown to the right. Load optimum	Sulfur (%)	0.009
0 2	4 6 7 10 12	Surface defect rate (%) 6.2	Chromium (%)	0.19
Surface defec	t length (mm/m) 3.93		Nickel (96)	0.11
1		0 2 4 6 8 10 12	Aluminium (%)	0.005
		Surface defect length (mm/m) 3.54		



Ferroalloy Minimization

Additive costs were Gerdau's greatest product expense. They wanted to cut costs whilst maintaining their high product quality.

Planning

- Minimized lab tests by forecasting setpoints \checkmark
- ✓ Gerdau initially added artificial buffers to the software's recommendations, prioritizing production volume over maximum profits

Optimization

- Real-time optimization to dynamically allow for heat- \checkmark to-heat fluctuations
- ✓ Fero software provided real-time recommendations for the minimum amounts of alloys needed for each heat









variation





Reduced raw material costs by \$3 per ton steel

Conserved 500,000 lbs

manganese, carbon, niobium, and vanadium

15% reduction in quality

Significant Scope 1 & 2 reductions



Distillation Unit Steam & Energy Minimization

German chemistry company needed to reduce energy consumption to adapt to rising European energy costs, whilst maintaining yield.

Diagnostics

 Determine the timeframes where they were using unnecessarily high levels of natural gas

Forecasting

- Predict yield and energy costs
- Ensure production remained in-spec using the \checkmark new setpoints



10% reduction in energy costs

Maintained maximum yield

Scope 1 reduction (on-site energy usage)

The Fero Labs Advantage



Explainability



Transparency









What customers say about us



"This is a fantastic tool for process engineers. It's a tool with great peculiarities – the kind that engineers know what to do with."



"The speed of calculation is unreal. No matter what unstable conditions surround a process, Fero is going to immediately give the right answer."

"Usually we assume the worstcase scenario, plus a buffer for failure. Fero tells us the lowest amounts of alloys we can use to pass, so we can optimize in real time."

"Manufacturing leaders that rely on the accumulated skills of an aging workforce to balance production variables, can use Fero Labs' ML capabilities to support a smaller workforce that may lack decades of intuition and experience." –Gartner Cool Vendor, 2024





Together we'll build a sustainable tomorrow

