

AIFACTOR INC.

Calgary CA

We are changing the Process Control Industry

By **MAKING THE FUTURE INFLUENCE THE PRESENT**



PROCESS PLANTS



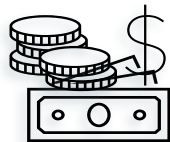
DO NOT ACHIEVE FULL POTENTIAL

TYPICAL OPPORTUNITY LOSS IS 10-30%



LOWER PRODUCTION

- Breakdowns
- Bottlenecks
- Quality issues
- Faulty or No sensors
- People Skills and experience



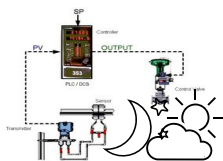
HIGH INPUT COSTS

- Purchasing constraints & Prices
- Inventories
- Quality Issues



INEFFICIENCIES

- Raw Materials
- Catalysts
- Chemicals
- Energy



OTHERS

- Too many sensors & Controllers
- No sensors where needed
- Data Issues
- Data Anomalies
- Weather cycles
- Day-Night effects

COMPANIES PROVIDE

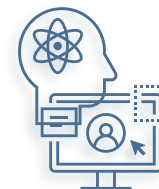
**DATA
ANALYTICS
SERVICES**



**ENGINEERING
SOLUTIONS**



**ML-AI
SOFTWARE**



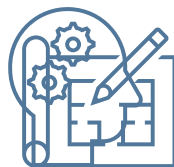
We Combine **ENGINEERING DOMAIN KNOWLEDGE** and **DATA SCIENCE**

to build collaborative **ML-AI APPLICATIONS AND SOLUTIONS**

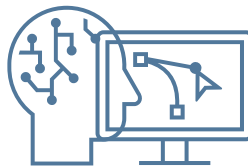
Plant DATA



Engineering Domain Knowledge



ML-AI Data Analytics



ML-AI Solution

- Consistency
- Productivity
- Efficiency
- Proactive Quality Control
- Predictive maintenance
- Demand Forecasting and Inventory Management

We help our Clients **Realize** their **Hidden Potential**

WE LEVERAGE DATA AND ANALYTICS

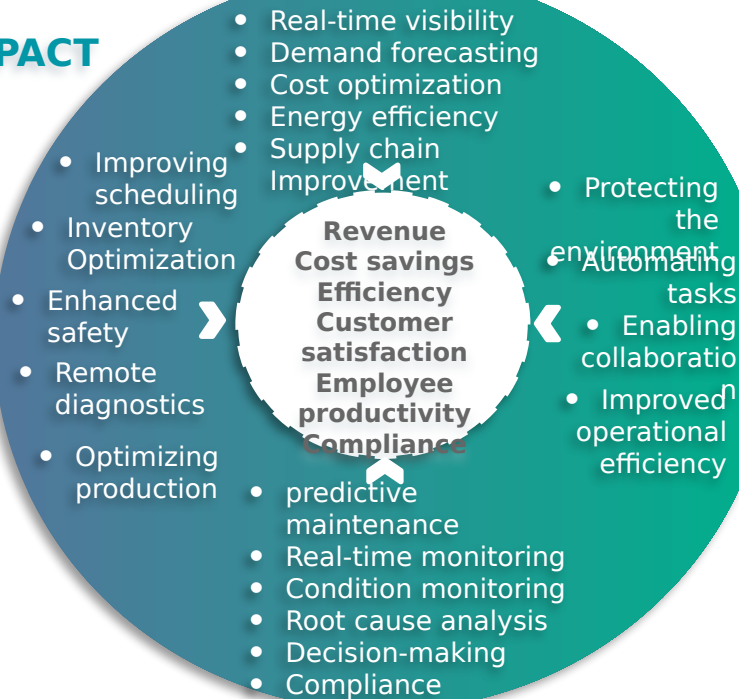
DATA



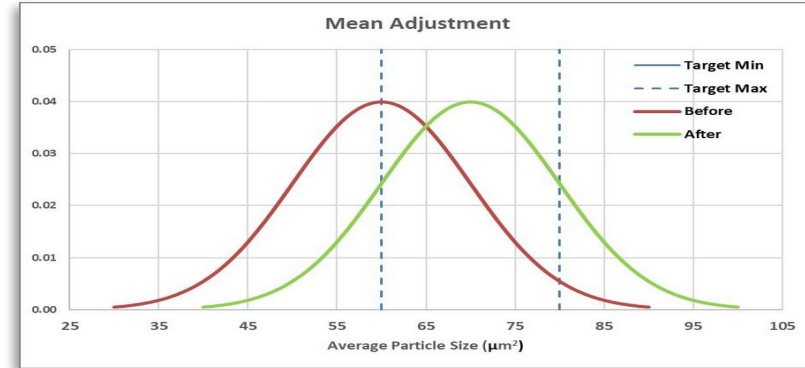
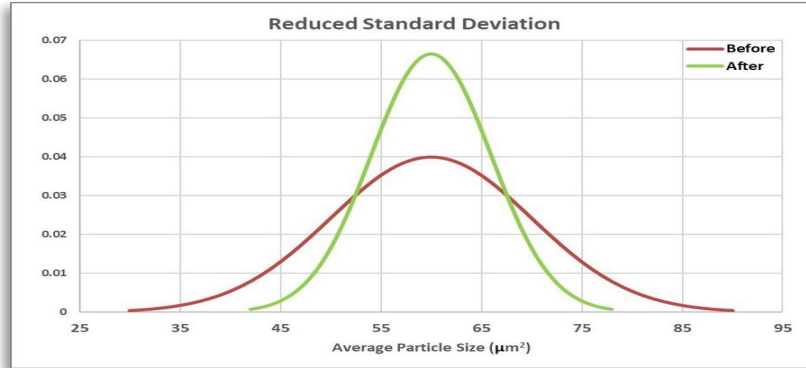
ML-AI Solutions & Applications

- Soft Sensor
- Prediction Engine
- Recommendation Engine
- Realtime Sweetspot Analysis
- Collaborative Process Control
- Realtime optimizer

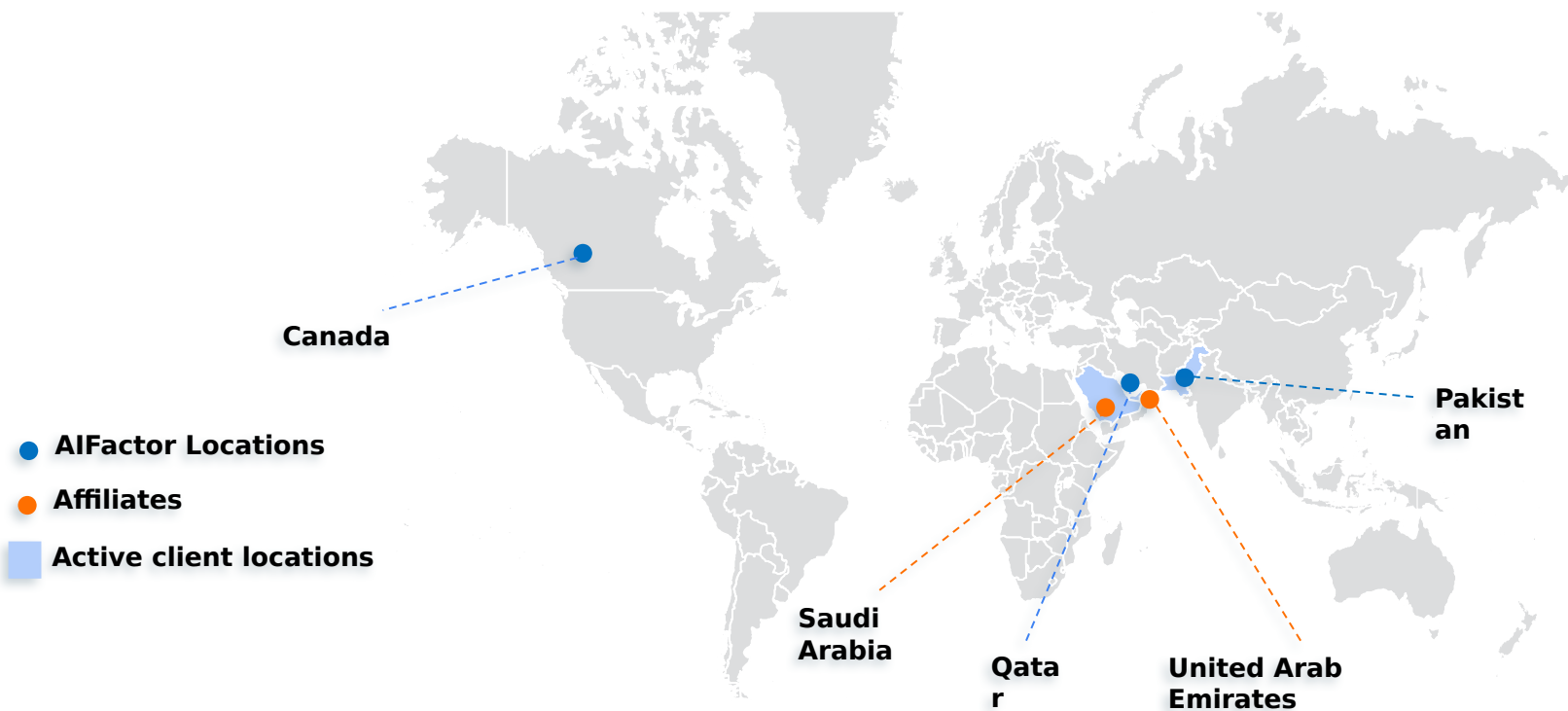
IMPACT

- 
- Improving scheduling
 - Inventory Optimization
 - Enhanced safety
 - Remote diagnostics
 - Optimizing production
 - Real-time visibility
 - Demand forecasting
 - Cost optimization
 - Energy efficiency
 - Supply chain Improvement
 - Protecting the environment
 - Automating tasks
 - Enabling collaboration
 - Improved operational efficiency
 - predictive maintenance
 - Real-time monitoring
 - Condition monitoring
 - Root cause analysis
 - Decision-making
 - Compliance
- Revenue**
Cost savings
Efficiency
Customer satisfaction
Employee productivity
Compliance

WE MOVE THE BELL CURVE



POSITIONED FOR GLOBAL GROWTH



PRODUCTS & SERVICES

EXISTING PRODUCTS & SERVICES

PRODUCTS

- **A/FLO**
ML-AI Modelling Tool
- **A/BESPOKE**
Custom made Client & Problem specific ML-AI Solutions
- **A/SET**
Sustainability, Energy & Carbon Management Tool
- **A/LOG**
Comprehensive Shift Log
- **A/LAB**
Powerful Tool for Lab digitization, AI Assistance, Chemical Inventory & Shift Management, Equipment Maintenance

KEY SERVICES

- Process Prediction
- Soft Sensors
- Recommendation Engine & Advisory
- Real Time Process Optimization
- Energy, Sustainability & Carbon Mgt

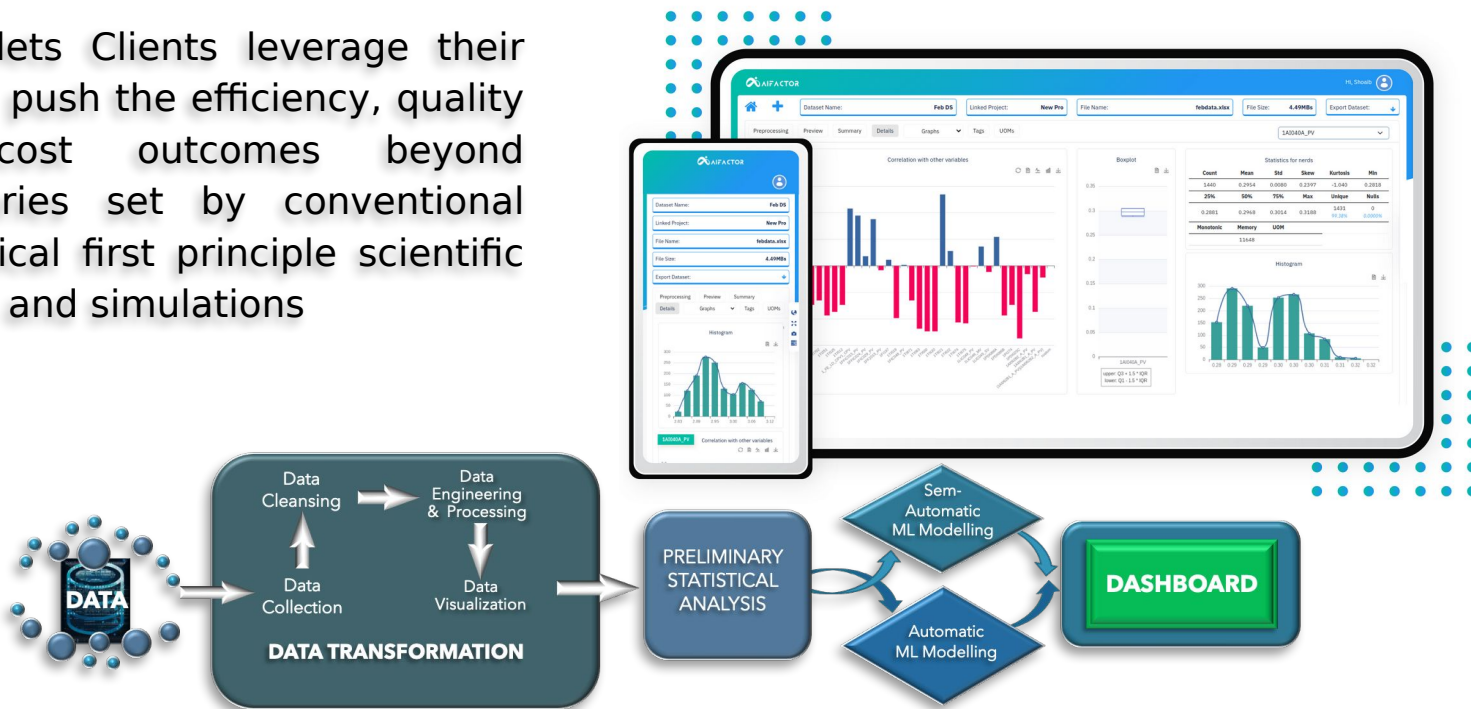
PRODUCTS UNDER DEVELOPMENT

- **A/MEX**
- **A/PROPER**

AIFLO

ML-AI Modelling Tool

AIFLO lets Clients leverage their data to push the efficiency, quality and cost outcomes beyond boundaries set by conventional theoretical first principle scientific models and simulations



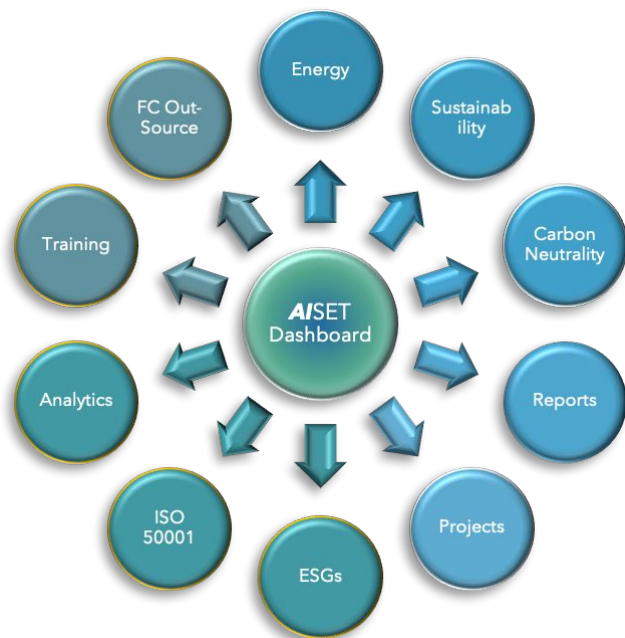
AIBESPOKE

Custom made Client & Problem specific ML-AI Solutions



AISET

Sustainability, Energy & Carbon Management Tool



AILOG

Plant Shift log covers

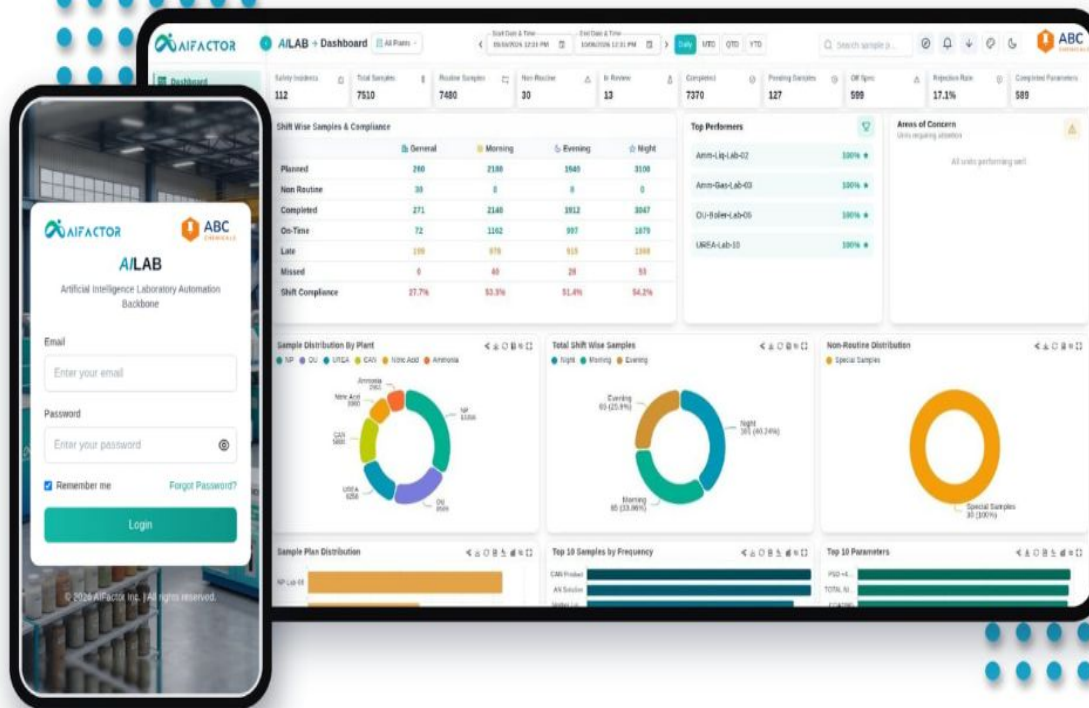
- Real-time Field data collection
- Area log sheets
- Area Operator, DCS & Shift Engineer logbook
- Maintenance Work Requests & Tracking
- Permit to work Record & maintenance log
- Incidents & Events data
- Dashboard & Data Analytics
- Role based access



AILAB

Digitizes & Covers

- Sample Management & Reporting
- Shift Management & Auditing
- Chemicals & Glassware Inventory
- Equipment Maintenance & Calibration
- Data Analytics
- AI Assistance & Central Database
- Training & Skill Development



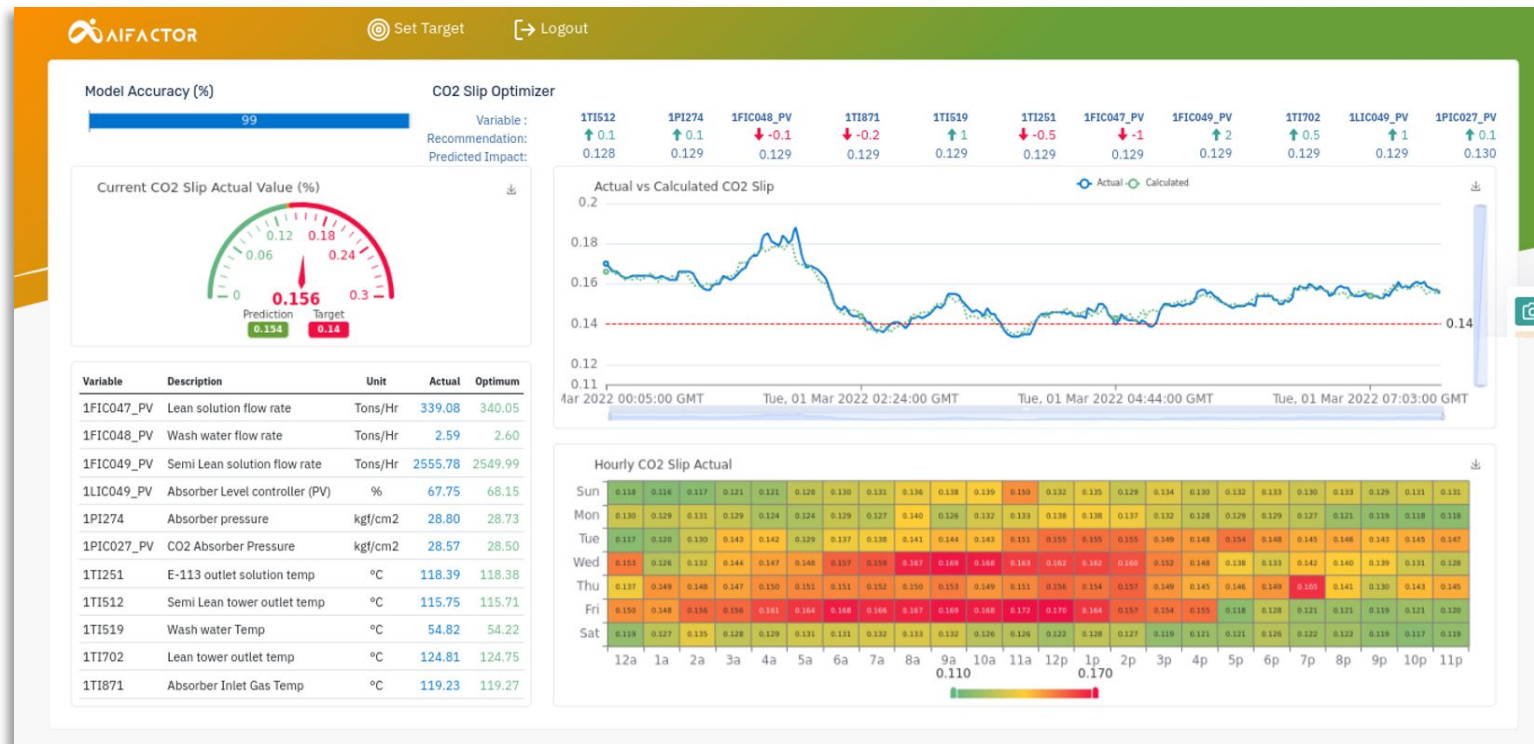
AIPRO

Powerful Tool for Data

- Data Collection, Cleansing, Engineering, Visualization and Analytics
- Real time monitoring
- User-friendly interface
- Seamless data integration
- Customizable Dashboards
- Performance Benchmarking
- Actionable insights



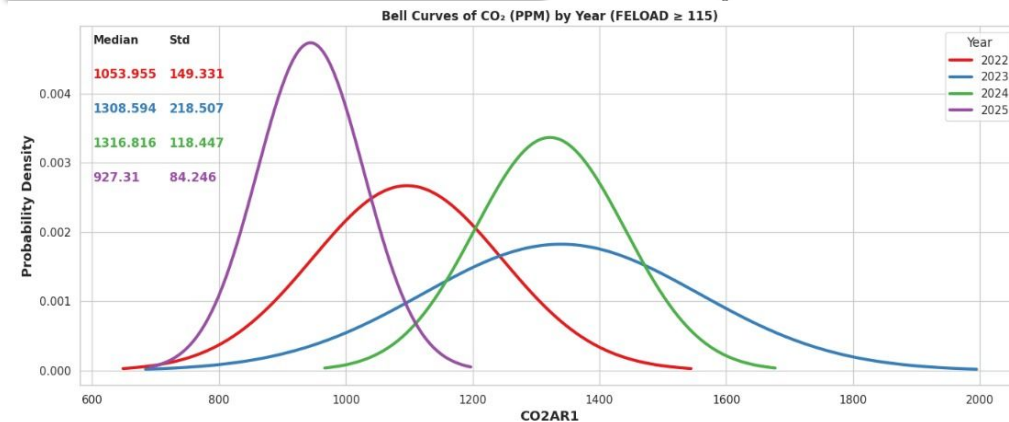
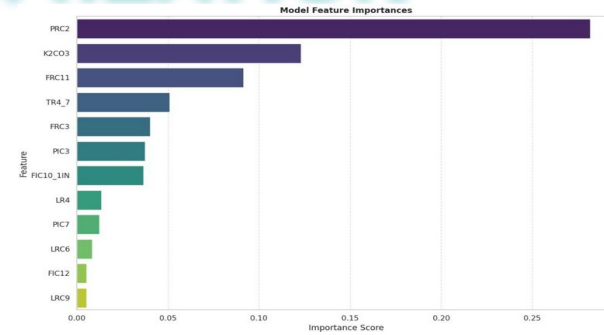
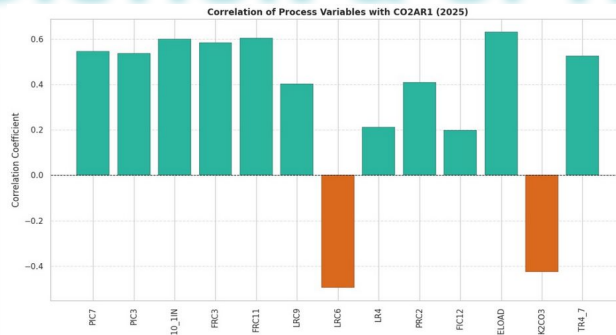
SLIP PREDICTION & OPTIMIZATION



A/BESPOKE - A/SPOT (SLIP PREDICTION & OPTIMIZATION TOOL)

SLIP PREDICTION & OPTIMIZATION

Sr. #	Variable	Value	Sr. #	Variable	Value
1	PIC7	27.73	8	FELOAD	114.16
2	PIC3	4.27	9	K2CO3	27.44
3	FIC10_1IN	63.12	10	TR4_7	303.94
4	FRC3	341.56	11	CO2AR1	1165.52
5	FRC11	1030.37	12	LR4	39.54
6	LRC9	40.00	13	PRC2	0.39
7	LRC6	60.00	14	FIC12	7.79



CO2 Slip (ppm) at >=115% FE Load						
	2022	2023	2024	Jan'25	Post T/A'25	Test Week
Count	77,28	49,08	58,37	1,09	100,62	9,838
10%	963	1,11	1,18	1,08	867	875
50% (Avg)	1,054	1,312	1,315	1,176	925	915
Std. Dev	149	217	121	98	68	39

A/BESPOKE - A/SPOT (SLIP PREDICTION & OPTIMIZATION TOOL)

PRODUCT QUALITY CONTROL



A/BESPOKE - NP PRODUCT QUALITY CONTROL

PRODUCT QUALITY CONTROL



AI-ML BASED
NITRO PHOS
NUTRIENT CONTROL PROJECT



The Challenge



The Goal



The Team



The Journey

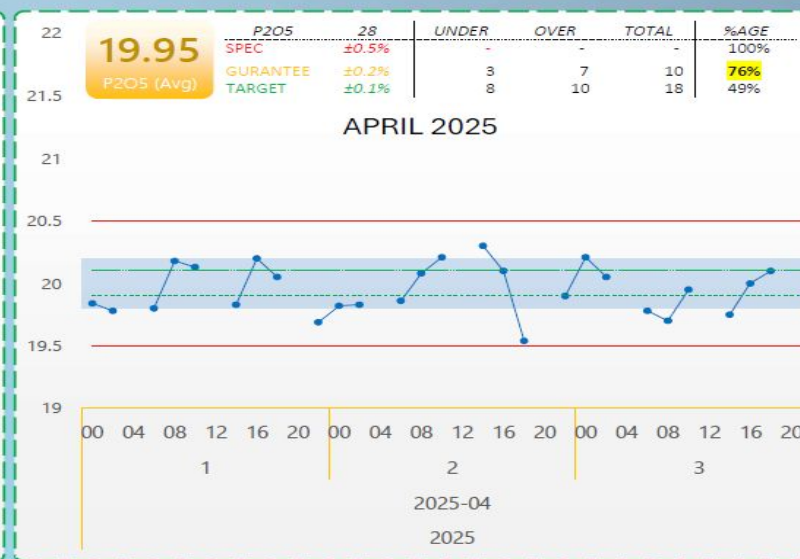
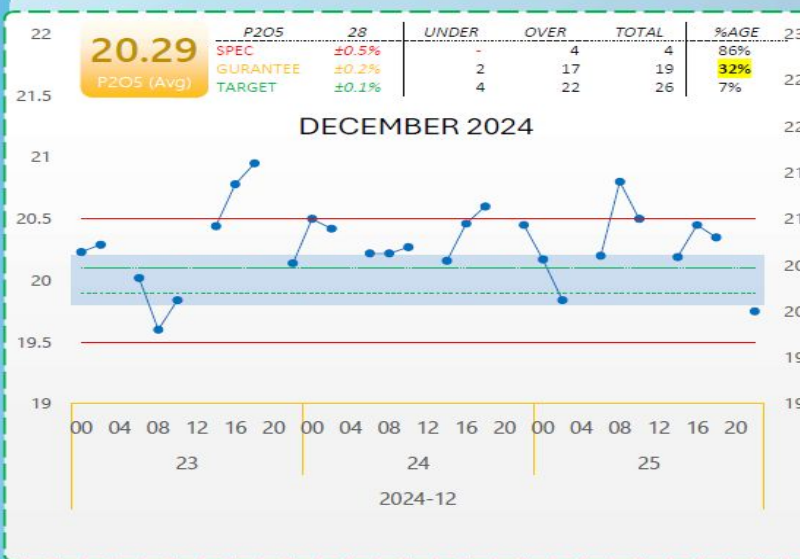


The Impact

72 HR. PERFORMANCE TEST RUN

20

DEC 2022 VS APR 2025 – WHAT HAS CHANGED?



A/BESPOKE - NP PRODUCT QUALITY CONTROL

THE IMPACT

22

RESULTS & MODEL PERFORMANCE

The Impact?

117% GAIN

CONTROL BAND 19.8 - 20.2%

PRECISE CONTROL
ACHIEVED

100% COMPLIANCE

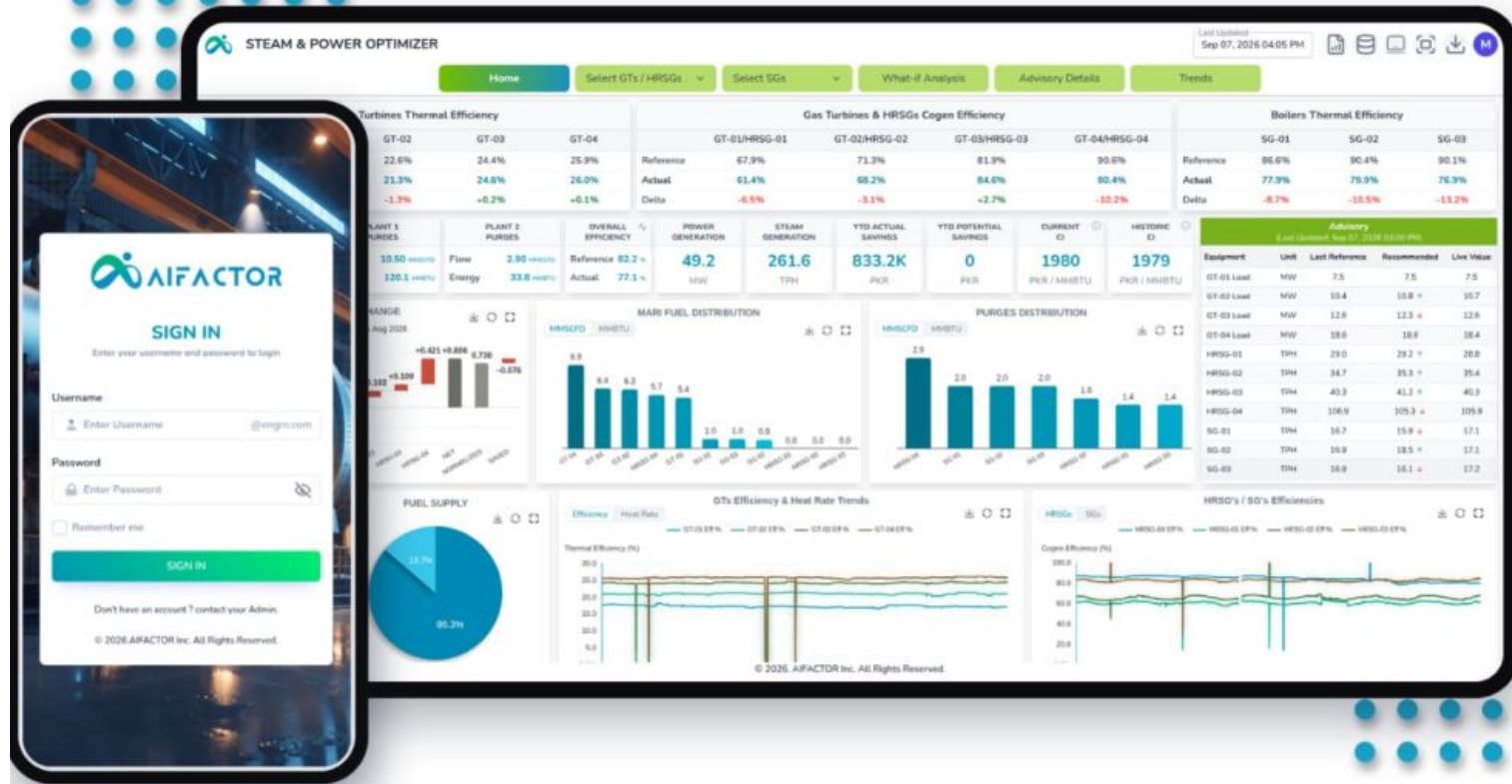
SPEC BAND 19.5- 20.5%

REDUCED OFF-SPEC
& QUALITY DEVIATION

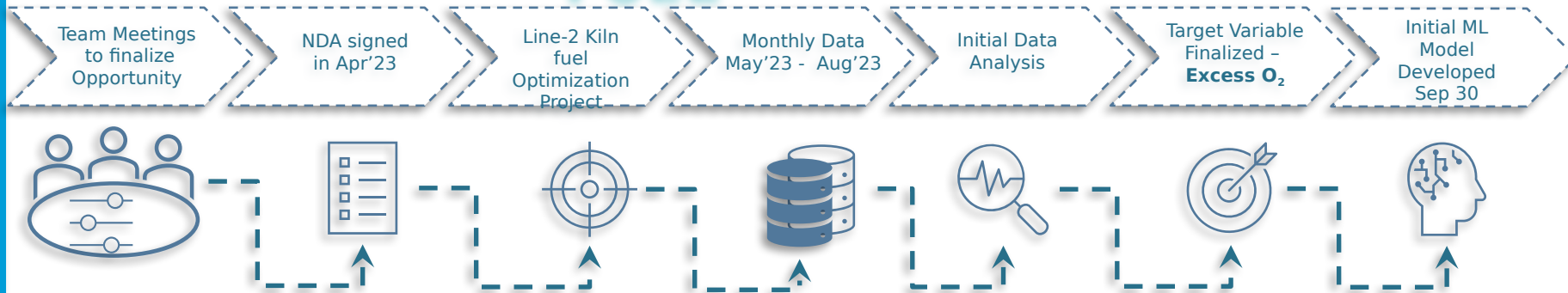
REAL-TIME PREDICTION POWERED BY

 CaO , P_2O_5 , $\text{NO}_3\text{-N}$ THREE SOFT SENSORS
WITH ACTIVE CONTROL

AI/BESPOKE - NP PRODUCT QUALITY CONTROL



CEMENT PLANT- OPTIMIZATION OF KILN FUEL



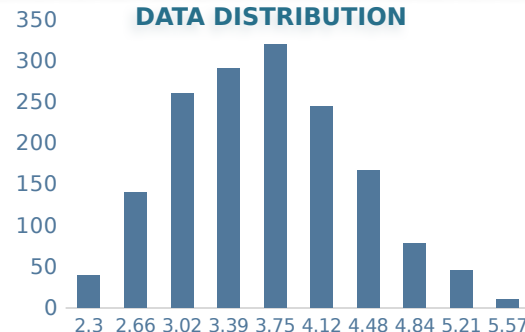
Production
6,336
Tons/day

TOTAL HOURLY DATA POINTS 1595

Top **90%**
Data Average
O₂ 3.8 %

Bottom **10%**
Data Average
O₂ 2.85 %

DATA DISTRIBUTION



WITH **AIFACTOR** ML-AI SOLUTION
90% of time O₂ can be achieved
at 2.85%

Target Oxygen
<3.0 %

FUEL CONSUMPTION

762.3 Kcal/kg

735.7 Kcal/kg

924 Tons/day

891 Tons/day

Estimated Annual Savings
PKR 101.3 Million

QUALITY SOFT SENSOR



Oxidation Reactor (R-101) 4CBA Soft Sensor

Start Date 01/01/2018 12:00:00 AM
End Date 29/03/2018 11:55:00 PM

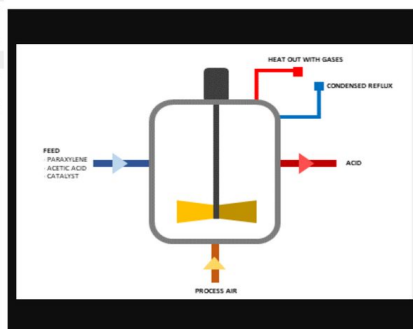
ML Confidence (%)	4CBA Actual (%)	4CBA Cal. (%)	PX Flow (T/h)	CMB Flow (T/h)	Process Air (Nm³/h)	Sec. Air (Nm³/h)	Mother Liquor (T/h)	Bottom Temp (°C)
95	0.28	0.29	41.25	363.3	152,627	3,416	130.0	199.8

4CBA Results

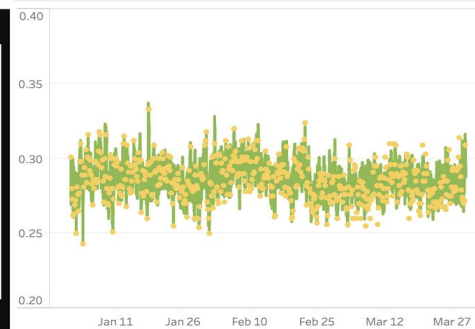


Contributing Variables

FT_1187 T/H	Actual	152,639	Target	149,919
FT_1201 T/H	Actual	3,154	Target	3,416
FT_1000 T/H	Actual	351	Target	309
FT_1130 T/H	Actual	279	Target	246
TT_1129 °C	Actual	200	Target	200
TT_1148 °C	Actual	199	Target	200
TT_1205 °C	Actual	192	Target	194
FT_1157 A	Actual	400	Target	400



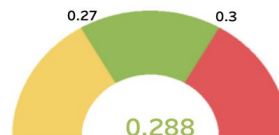
Actual vs Calculated 4CBA



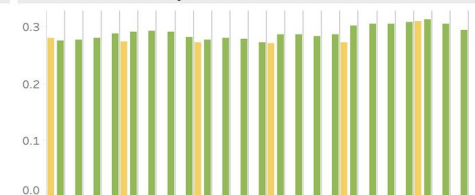
Weekly Actual Vs Calculated 4CBA



Current 4CBA Calculated Value (%)



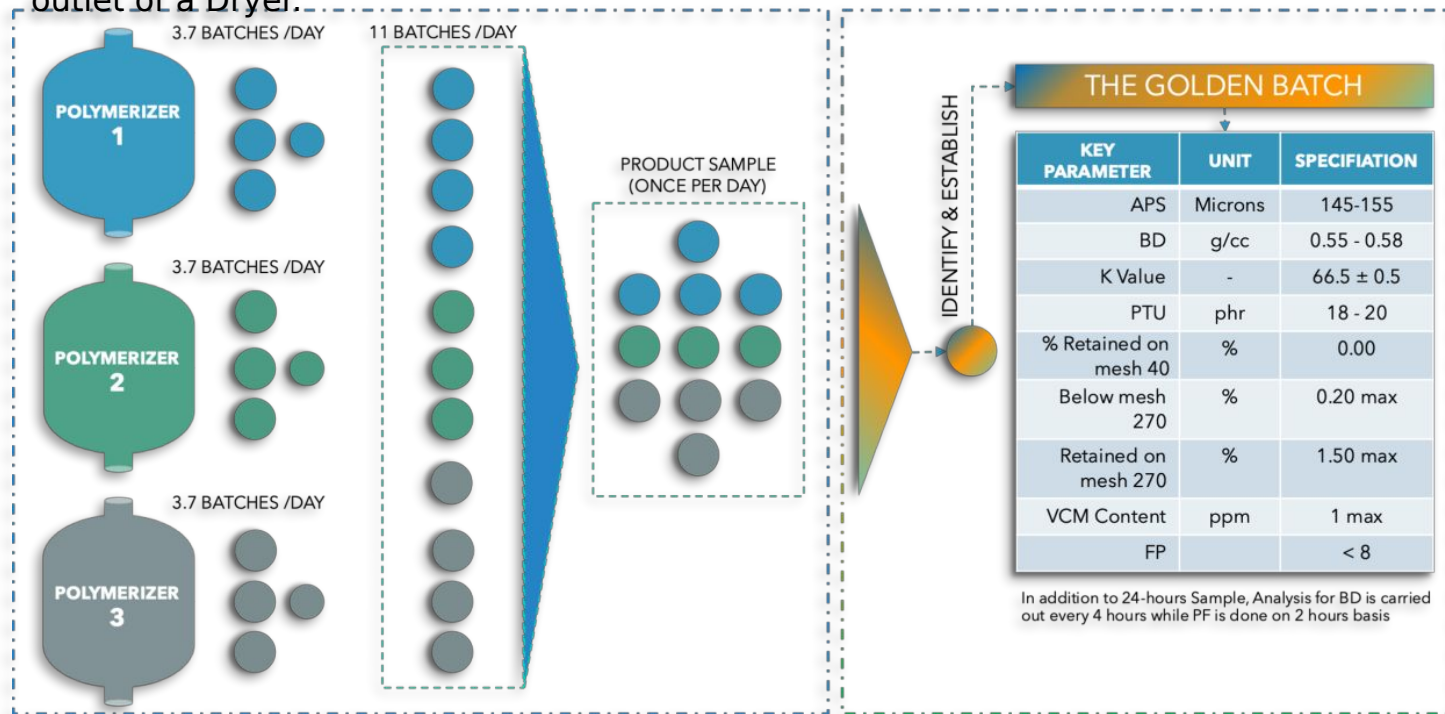
Hourly Actual Vs Calculated 4CBA

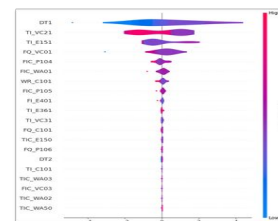
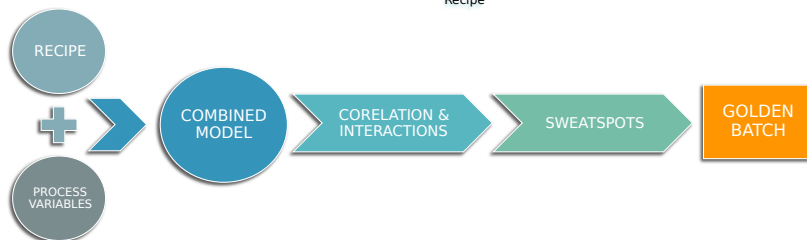
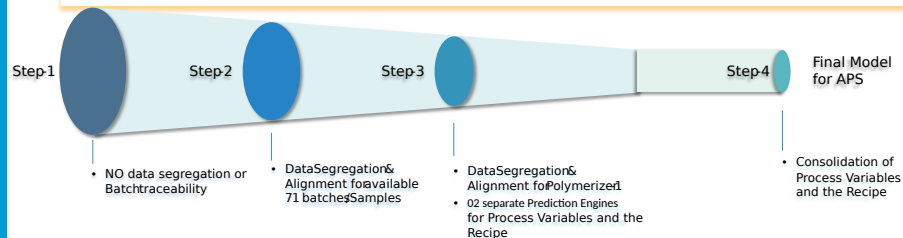
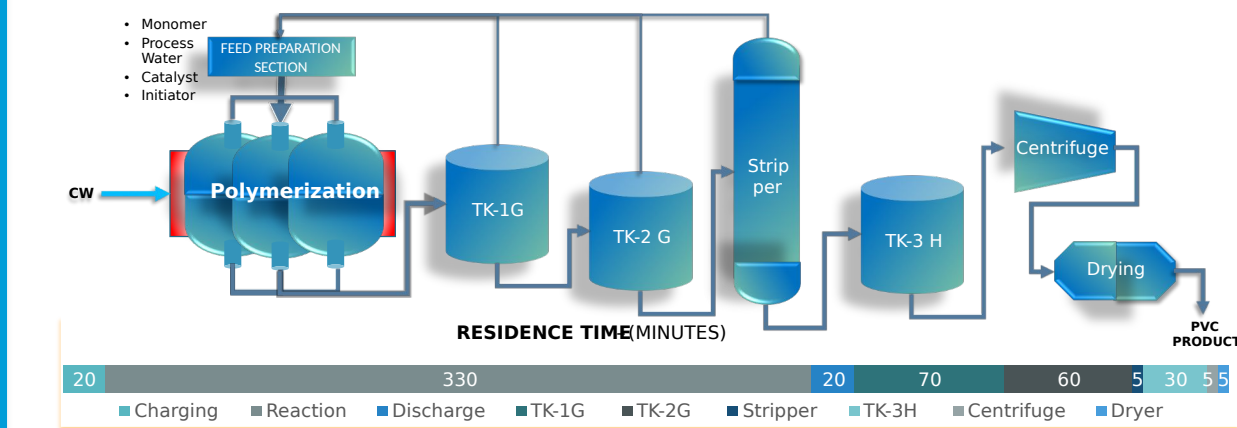


A/BESPOKE -
REACTOR OUTLET
SOFT SENSOR

PVC-2 BATCH QUALITY CONTROL

PVC-2 Polymerizers producing about 11 batches a day collectively. Analysis for all the Key Quality Parameters of a Product Sample is carried out once in 24 hours at the outlet of a Dryer.





Recipe + Process Variables

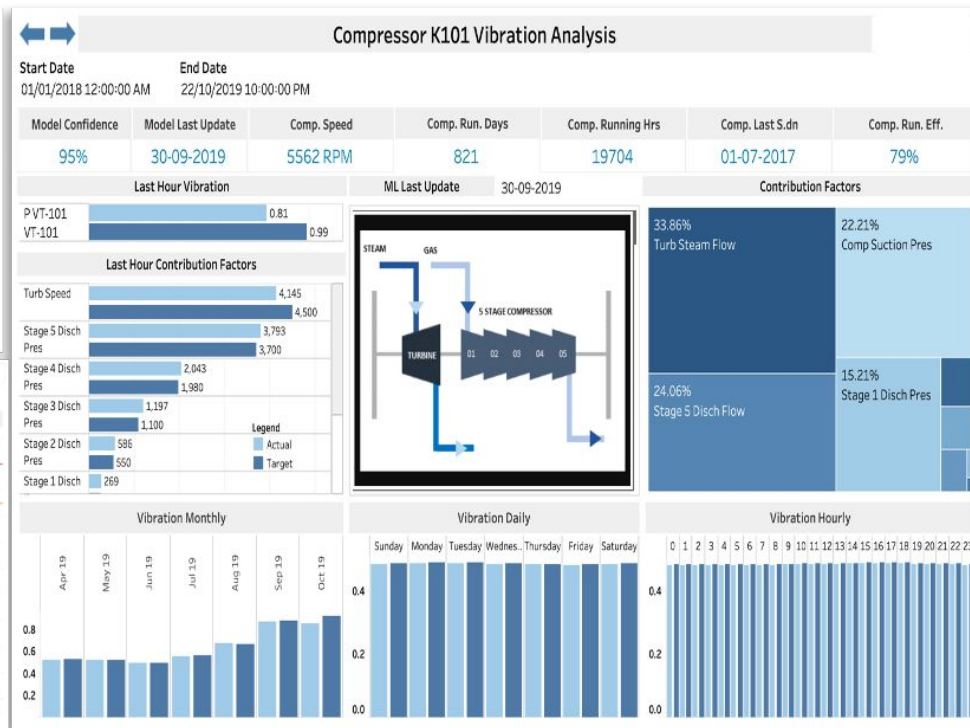
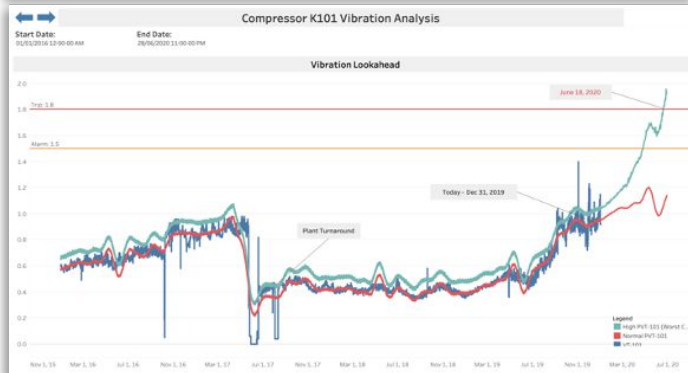
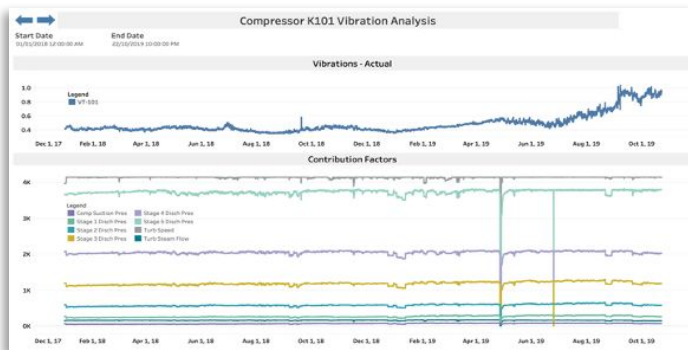
GOLDEN

SWEETSPOTS POLYMERIZER

SR.#	TAG	DESCRIPTION	VALUE	UOM
1	FIC_WA01	PW to Poly	28.66t/h	
2	FQ_VC01	VCM to Poly Totalizer	24.72t	
3	DT2 (WR_E101)	Dispersant2 Weight	122.25Kg	
4	DT1 (WR_E101)	Dispersant1 Weight	239.66Kg	
5	FI_E401	Modifier (CH18) Flow to poly	2.35Kg/h	
6	WR_C101	Catalyst (Initiator) Weight	76.10Kg	
7	FIJ_P104	Inj. Water to Poly	5.04t/h	
8	FIC_P105	Flushwater Bottom Poly-1	0.60t/h	
9	FQ_P106	VSP#115 Flush Water to Poly-1	0.07t	
10	TIC_WA50	PW Hot Water Tank (T#B) Temp Controller	87.86Deg C	
11	TIC_WA02	PW Hot Water Tank Temp (T#B) Controller	83.06Deg C	
12	TIC_WA03	PW Temp. controller to Poly	71.17Deg C	
13	TI_WA04	PW Temp. to Poly	50.00Deg C	
14	TI_VC31	TK-3B (RVCM) temp.	25.85Deg C	
15	TI_VC21	TK-8B (Fresh VCM) Temp.	27.44Deg C	
16	FIC_VC03	TK-8B VCM Flow Controller	6.37t/h	
17	TI_VC01	VCM to poly Temp.	29.14t/h	
18	FIC_VC01	VCM Flow to Poly	0.00t/h	
19	TI_E151	DT-1 Storage Tank (TK-5C) Temp.	18.25Deg C	
20	FQ_C101	Spray Water (Catalyst Flushing) Totalizer	0.01t	
21	TI_E361	DT-2 storage tank temp	30.92Deg C	
22	TIC_E150	Dispersant M/Up Water Tank (T#C) Temp	27.57Deg C	
23	TI_C101	TK-8C Catalyst Solution Temp.	10.96Deg C	

PREDICTED AP 147.96Microns

FAILURE PREDICTION & FORECAST



A/BESPOKE - COMPRESSOR VIBRATIONS PREDICTION MODEL FOR S/DN PLANING

THANK YOU