PREDICT
SHEET BREAKS
USING BIG-AI

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TURILYTIX.AI

PTIPID CONSULTING

BIG DATA HELPS IN PREDICTING SHEET BREAKS

INDUSTRY CHALLENGES

Frequent Sheet Breaks → Cause downtime, material waste, and financial losses.

Reactive Maintenance → Operators rely on manual troubleshooting, leading to delays.

Complex Process Interdependencies → Hard to predict root causes due to moisture, draw, and vacuum variations.

Limited Real-Time Insights → Existing systems fail to provide early warnings.
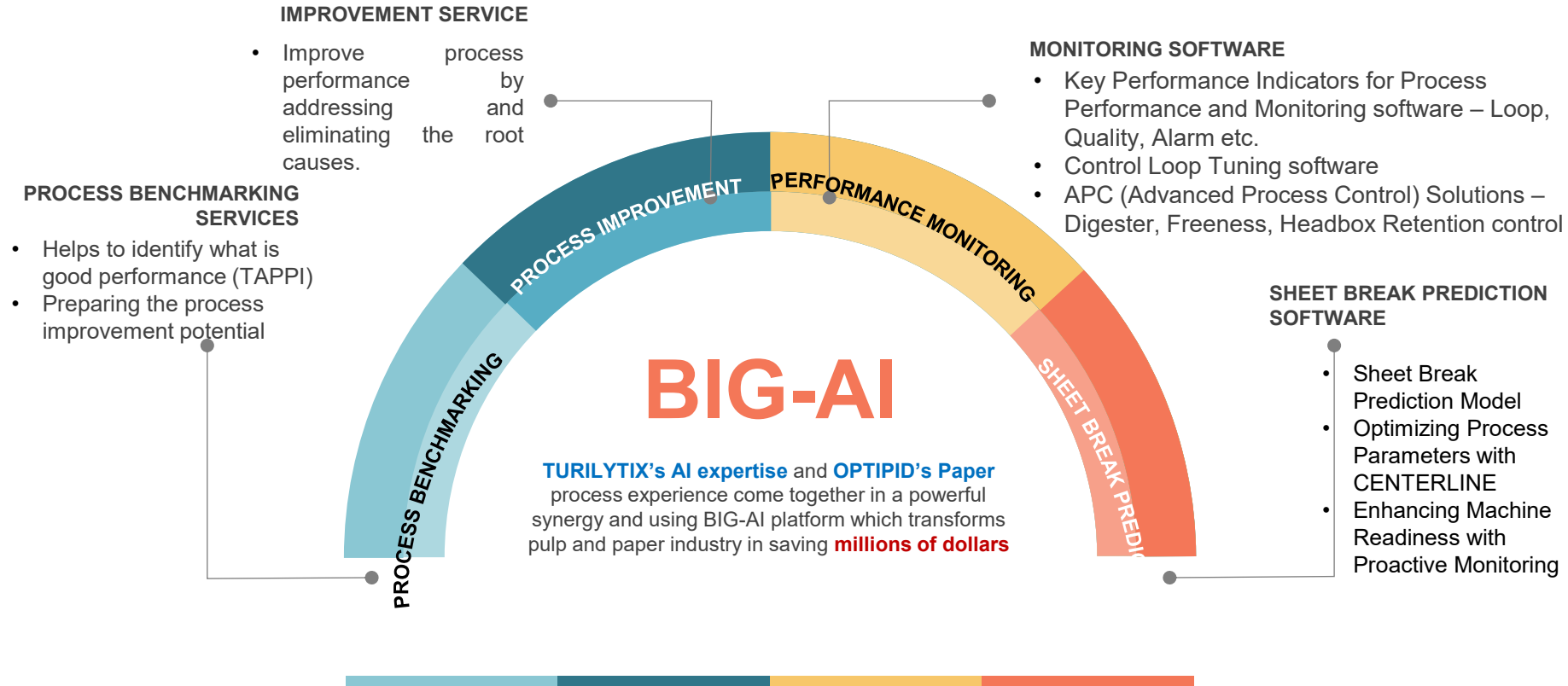
PROPOSED SOLUTION

AI-Powered Early Warnings → Predicts sheet breaks 30 minutes in advance.

Real-Time Data Analysis → Monitors QCS, DCS, and machine sensors continuously.
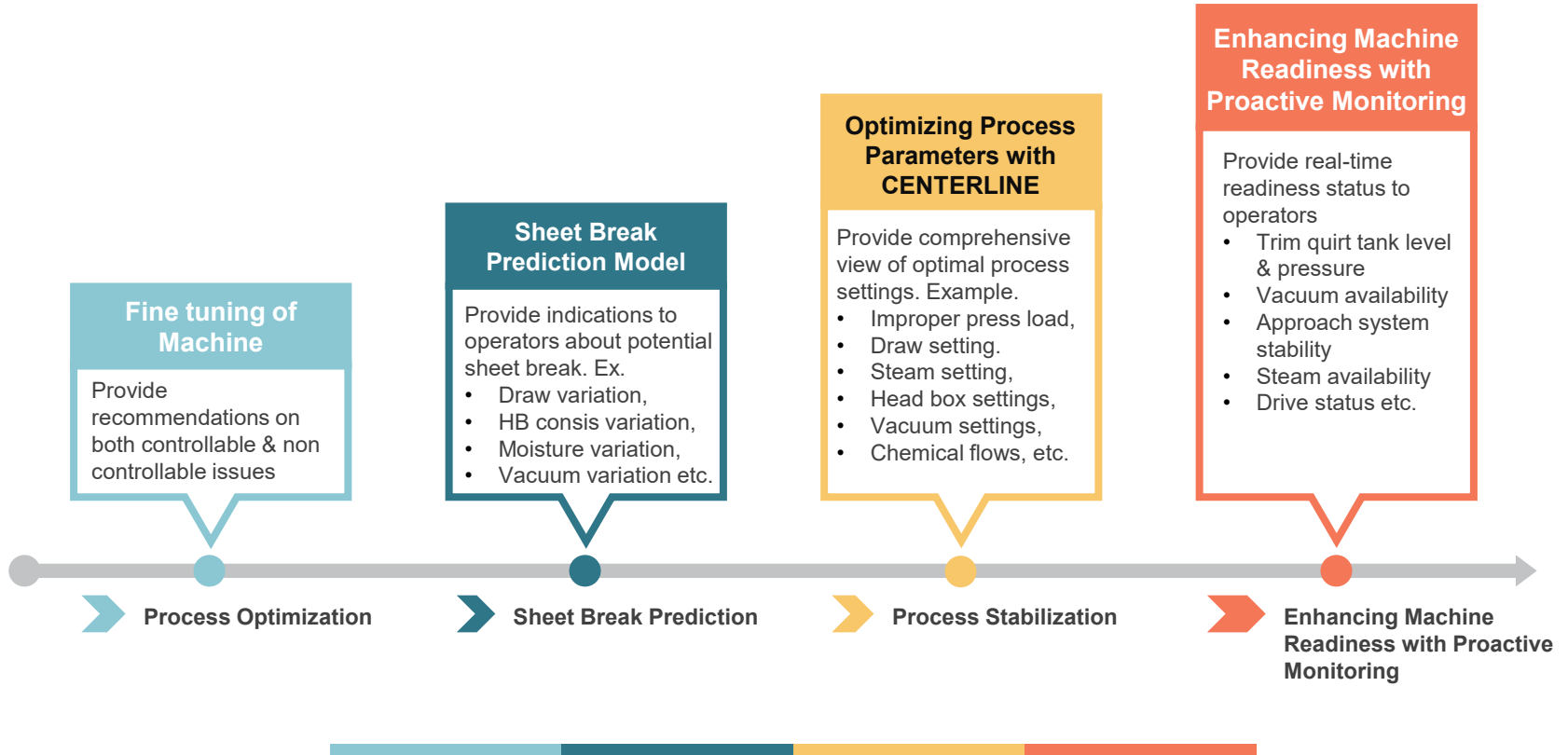
Machine Learning Insights → Uses ensemble learning & deep feature analysis.

Proactive Decision-Making → Reduces downtime, optimizes production, and minimizes waste.

GEN-AI HELPS IN OPTIMIZING THE PAPER MACHINE

IMPROVEMENT SERVICE

- Improve process performance by addressing and eliminating the root causes.

PROCESS BENCHMARKING SERVICES

- Helps to identify what is good performance (TAPPI)
- Preparing the process improvement potential

MONITORING SOFTWARE

- Key Performance Indicators for Process Performance and Monitoring software – Loop, Quality, Alarm etc.
- Control Loop Tuning software
- APC (Advanced Process Control) Solutions – Digester, Freeness, Headbox Retention control

SHEET BREAK PREDICTION SOFTWARE

- Sheet Break Prediction Model
- Optimizing Process Parameters with CENTERLINE
- Enhancing Machine Readiness with Proactive Monitoring

PROCESS IMPROVEMENT

PERFORMANCE MONITORING

PROCESS BENCHMARKING

SHEET BREAK PREDICTION

BIG-AI

TURILYTIX's AI expertise and **OPTIPID's Paper** process experience come together in a powerful synergy and using BIG-AI platform which transforms pulp and paper industry in saving **millions of dollars**

ROAD MAP TOWARDS PROACTIVE ACTIONS

Fine tuning of Machine

Provide recommendations on both controllable & non controllable issues

Sheet Break Prediction Model

Provide indications to operators about potential sheet break. Ex.
• Draw variation,
• HB consis variation,
• Moisture variation,
• Vacuum variation etc.

Optimizing Process Parameters with CENTERLINE

Provide comprehensive view of optimal process settings. Example.
• Improper press load,
• Draw setting.
• Steam setting,
• Head box settings,
• Vacuum settings,
• Chemical flows, etc.

Enhancing Machine Readiness with Proactive Monitoring

Provide real-time readiness status to operators
• Trim quirt tank level & pressure
• Vacuum availability
• Approach system stability
• Steam availability
• Drive status etc.

Process Optimization

Sheet Break Prediction

Process Stabilization

Enhancing Machine Readiness with Proactive Monitoring

REAL WORLD EXAMPLE

	Month1		Month2		Month 3		Month 4		Total	
	Mins	%	Mins	%	Mins	%	Mins	%	Mins	%
Process	2310	77.34	1357	87.21	1775	86.63	1915	93.37	7357	85.12
Equipment	464	15.53	165	10.6	107	5.22	117	5.70	853	9.86
PBIP	213	7.13	0	0	115	5.61	0	0	328	3.79
Service	0	0	34	2.19	22	1.07	19	0.93	75	0.86
No. Breaks	95		74		72		110		351	
Total Break Mins	2987		1556		2049		2051		8643	
Break Hours	49.78		25.93		34.15		34.18		144.05	
Total Available Hours	600		618.1		599.8		553.7		2371.59	
Break Hour % (3% Target)	8.20%		4.20%		5.69%		6.17%		6.07%	
Mins Per Break	31.44		21.03		28.46		18.65		24.62	

HOW BIG-AI WORKS
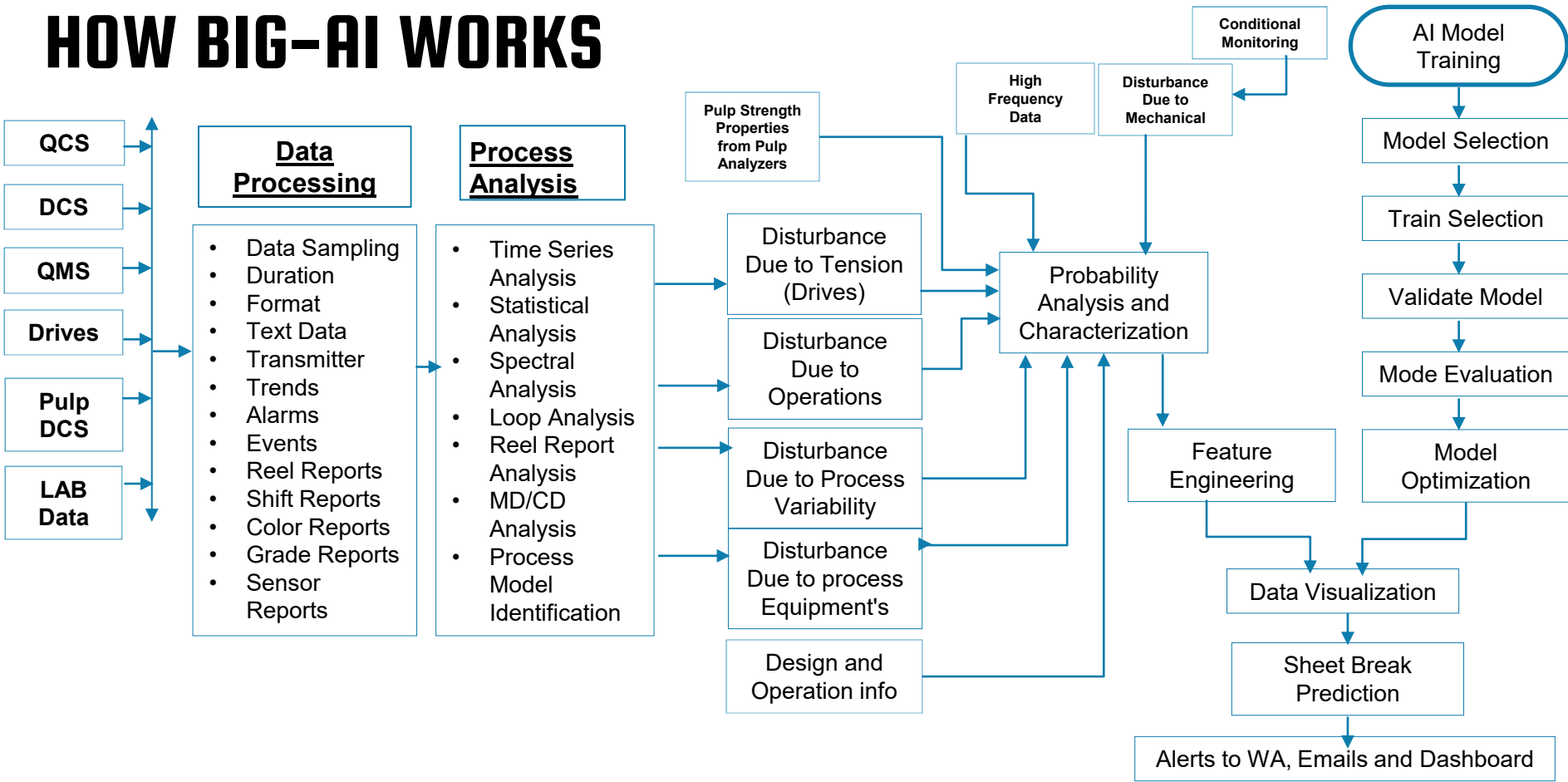
INFLUENCER OF BREAKS

SHEET BREAK

Steam

Short Circulation

Vacuum

PIC6607 – DG2

Total Head Fluctuation

FI6681 – Hood Air

PI9924 -Transfer Roll Vac

CC Pressure Variations
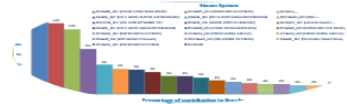
PIC6624 – DG3

Cause 7

FFIC6801 – TP Bentonite

Refiner operation

FFIC6803 – BP Bentonite

Furnish Changes

Back Water
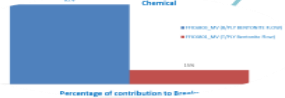
Broke Operation

Chemical

Stock Prep

REAL WORLD EXAMPLE

CASE STUDY

INDUSTRY
Pulp & Paper

LOCATION
SAPPI

CUSTOMER NEED
Less breaks
Reduction in rejects
Improvement in paper quality

IMPROVEMNT
Reduced Sheet Breaks
Reduced Rejects
Improved Paper Quality

CUSTOMER BENEFITS
- 45 Days of Testing Data
- Prediction Accuracy: 83.53%
- Reduction in Sheet Breaks: 35%
- Downtime Reduction: 28%
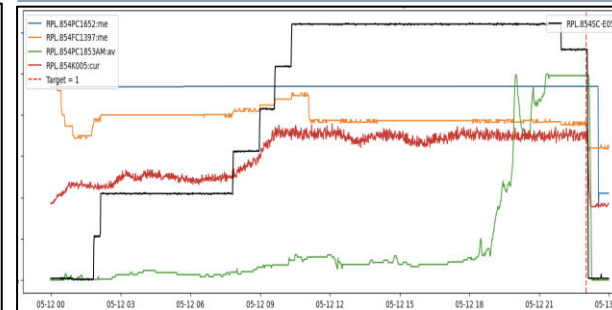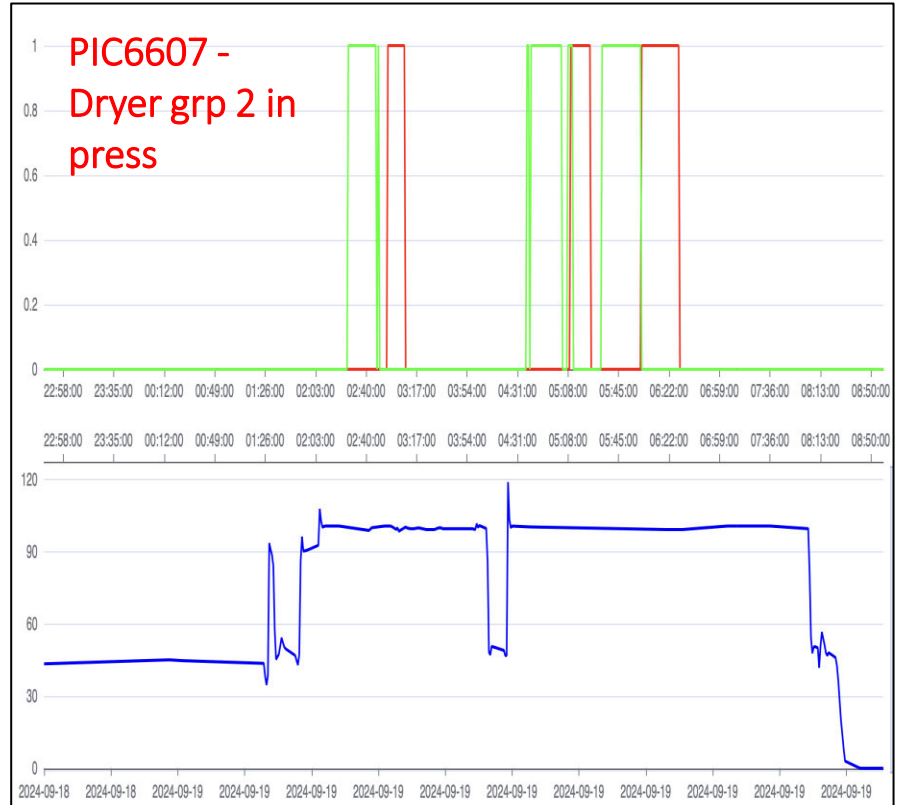- Material Waste Reduction: 15%
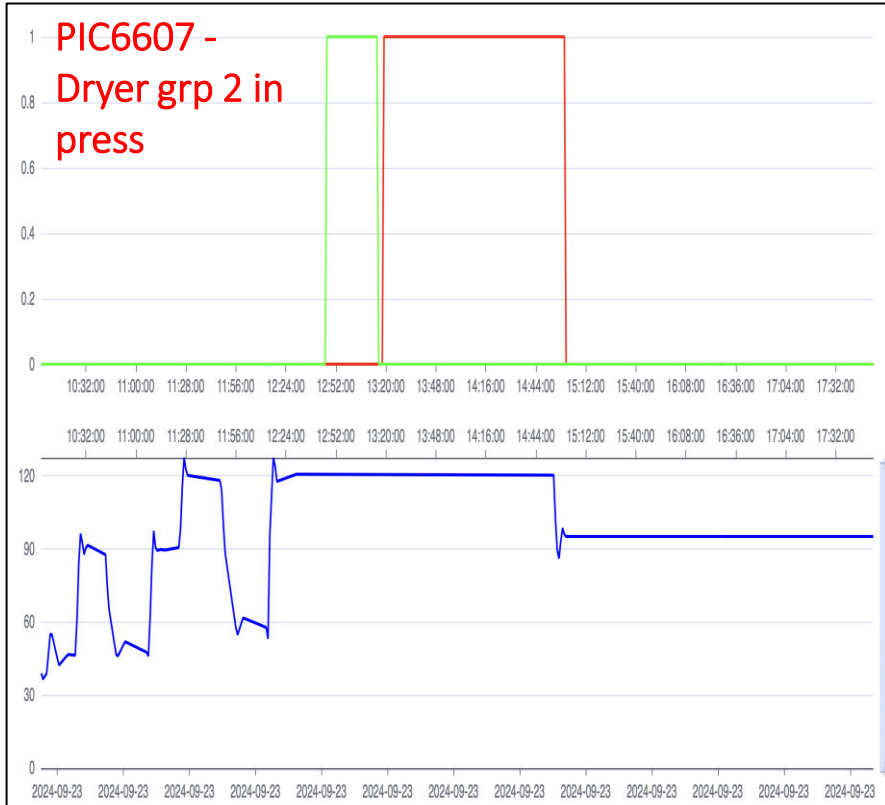
DASH BOARD
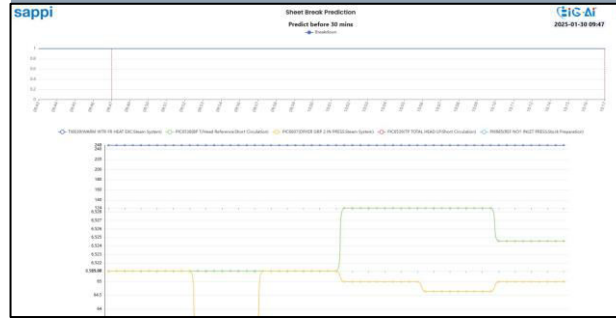
SHEET BREAK ANALYZER

AREA WISE BREAKS
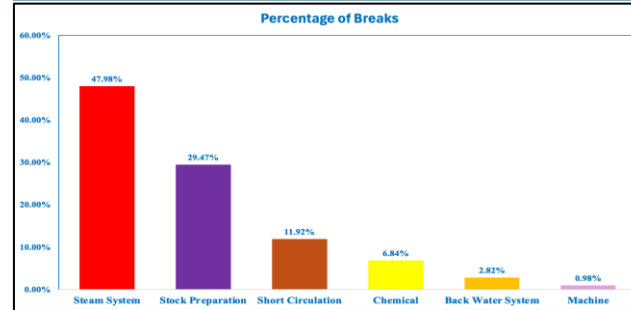
AI COMPUTES COMPLEX COMBINATION

SHEET BREAK ANALYZER

PIC6607 -
Dryer grp 2 in
press

PIC6607 -
Dryer grp 2 in
press

BUSINESS VALUE TO CUSTOMER

Annual Profit Increase $

Sheet Break Savings in $

| | Minimum Savings (15%) | Achieved Savings (30%) | Best Case Savings(50%) |

Fishbone chart values: No Info, $80,424, $210,750, $274,414

Labels: Reject Reduction, Upset Recovery reduction, Speed Increase, Sheet Break Reduction
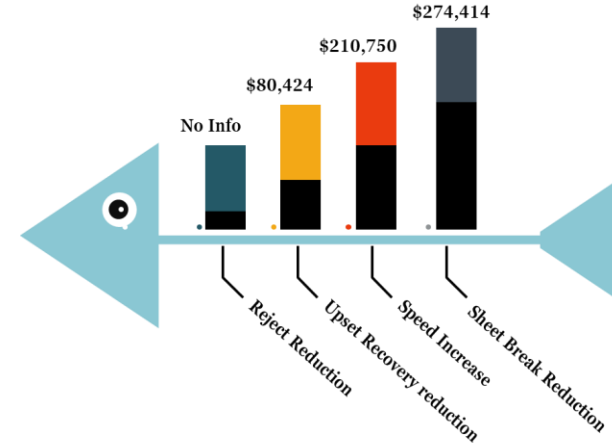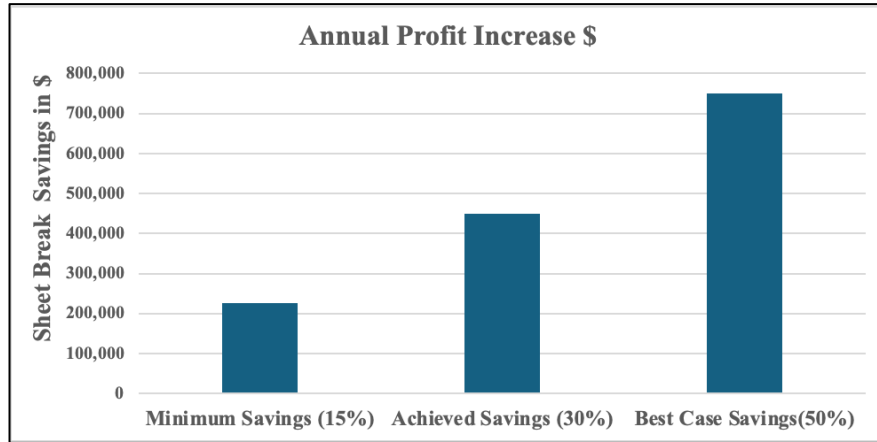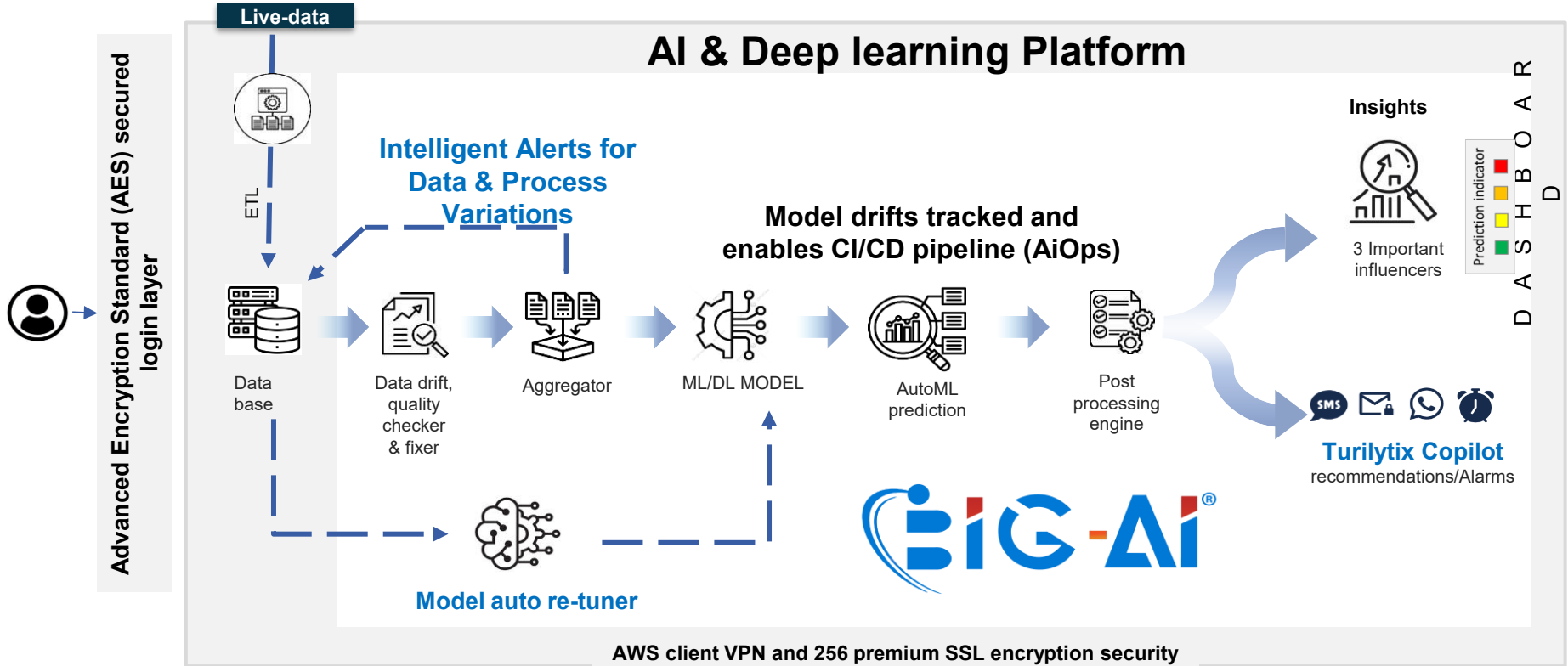
➢ **Tangible Benefits**
  ➢ Reduced sheet break by 50% (Accuracy 83.3%)
  ➢ Speed Increased by 1%
  ➢ Recovery time reduction by 50%

➢ **Intangible Benefits**
  ➢ Rejects reduced due to break
  ➢ Reduced Customer Compliments
  ➢ Winder runnability improvement
  ➢ Target Shift possibility
  ➢ Improved operator work satisfaction

ARCHITECTURE

QUOTE'S FROM CUSTOMER

" …able to retrieve all important hidden information's from paper machine"

- Nerita Singh, Production Manager, SAPPI

" ….happy to sign annual optimization contract, it will be a regular check up for paper machine"

- Kelly Glen, Manager, SAPPI

" ….We never thought there are potential to reduce sheet breaks in this machine"

- Philani, Mill Director, SAPPI

OUT COMMITMENT

BIG AI

Enhanced Hybrid Models
Work together to create hybrid models with extra data, like camera information, to boost predictions.

Accuracy Enhancement
Strive to raise sheet break prediction to an impressive >50%, ensuring timely alerts.

Flexible Alerts:
Send alerts via various channels - emails, WhatsApp, and SMS - for immediate operator attention.

Parameter Insights:
Equip operators with insights on possible sheet breaks by highlighting variations in parameters like Draw variation, HB cy variation, Moisture variation, Vacuum variation, etc. This empowers operators to quickly investigate and proactively prevent sheet breaks.