

APPLICATION OF AI-BASED APPROACH IN PAPERMAKING PROCESS

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INTRODUCTION TO WET TENSILE STRENGTH

Wet Tensile Strength

Wet strength refers to a paper's ability to retain a portion of its dry strength when saturated with water. A paper is considered to have wet strength if it maintains at least 10% of its original dry strength after complete water immersion.

Importance

Enhances paper durability against moisture, maintaining strength even when wet, crucial for applications like packaging, tissue and print base paper

CONCERNS WITH TRADITIONAL APPROACH

	Manual Control	Advanced Proces Control	Artificial Intelligence
Real Time Data	✗	✓	✓
Automated Control	✗	✓	✓
Higher Accuracy	✗	✓	✓
Continuous Learning	✗	✗	✓
Scalability	✗	✗	✓

ABOUT AI

Artificial Intelligence (AI) can simulate human-like intelligence and decision-making by using data, algorithms, and computational power to perform tasks autonomously, learn from experience, and improve over time.

“ 70% of manufacturers say they've implemented some form of AI into their operations and 82% have plans to increase their AI budgets in 2024.*

*Forbes report

APPROACH

01

Identification

Identifying the major parameter affecting the WSR value

02

Data Collection

Mined three months of Time-Series data

03

Data Cleaning & Study

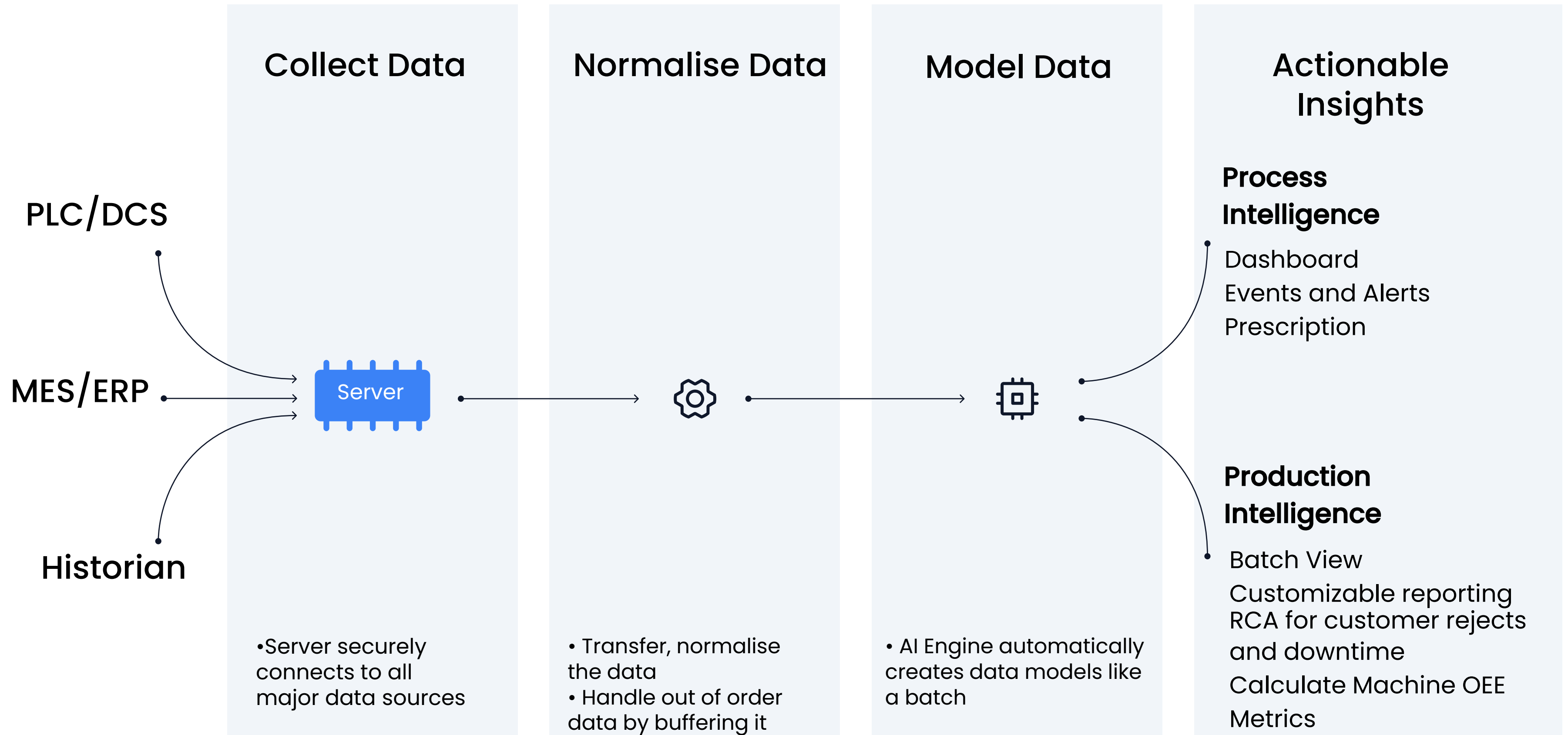
Analyzed multi-dimensionality of relevant parameters

04

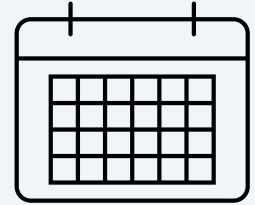
Model Building

Engineered WSR dosage model, based on the analysis of data collection

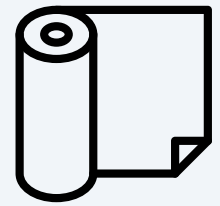
HABER SOLUTION : eLIXA-MT.FUJI



SYSTEM INFORMATION



90 day study



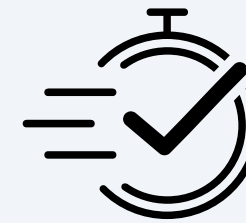
>20 speciality grades



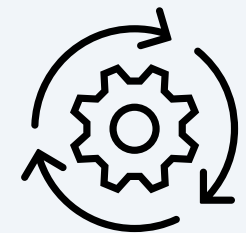
40-100 g/m²



20-40% filler variation

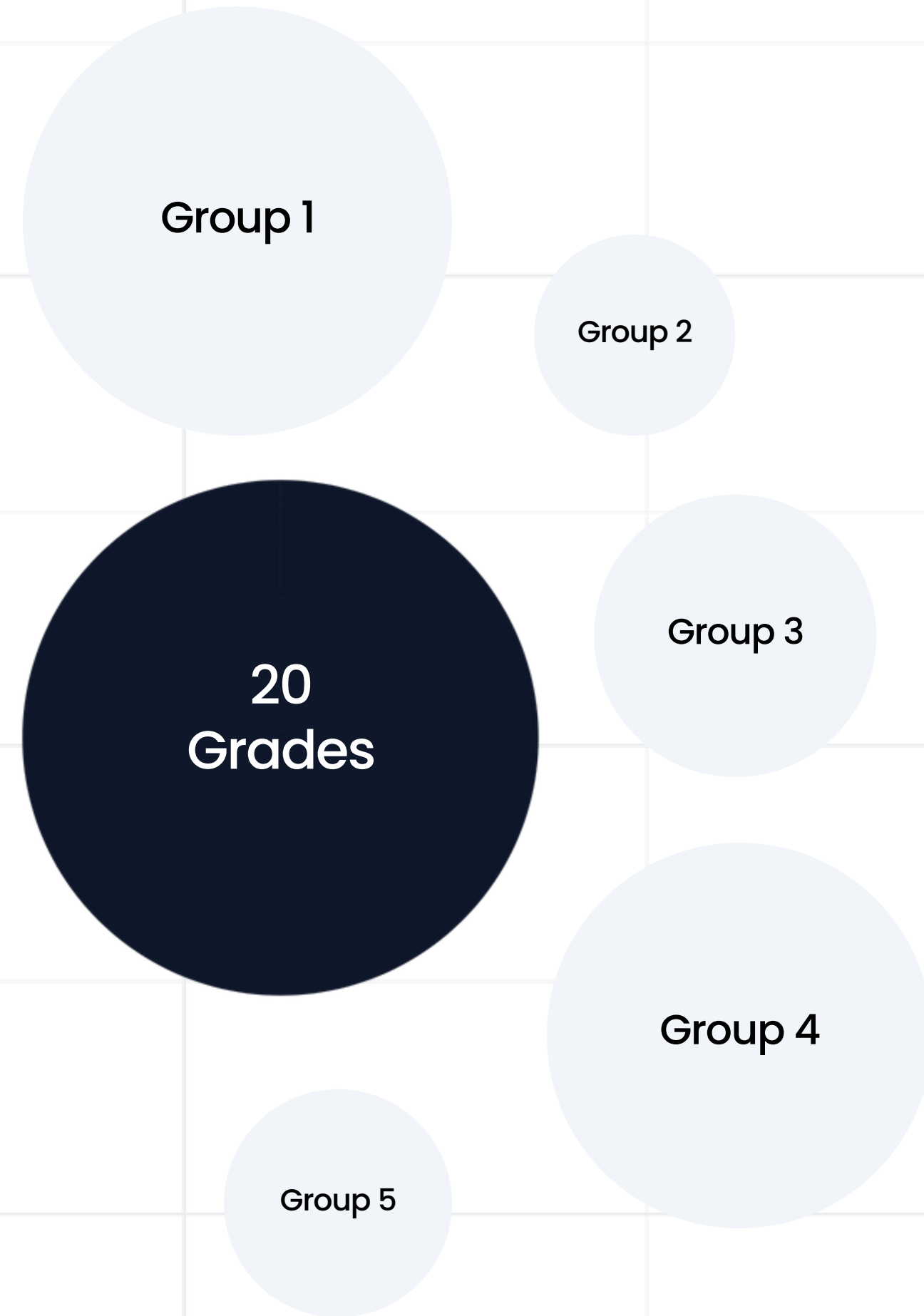


325-375 m/min

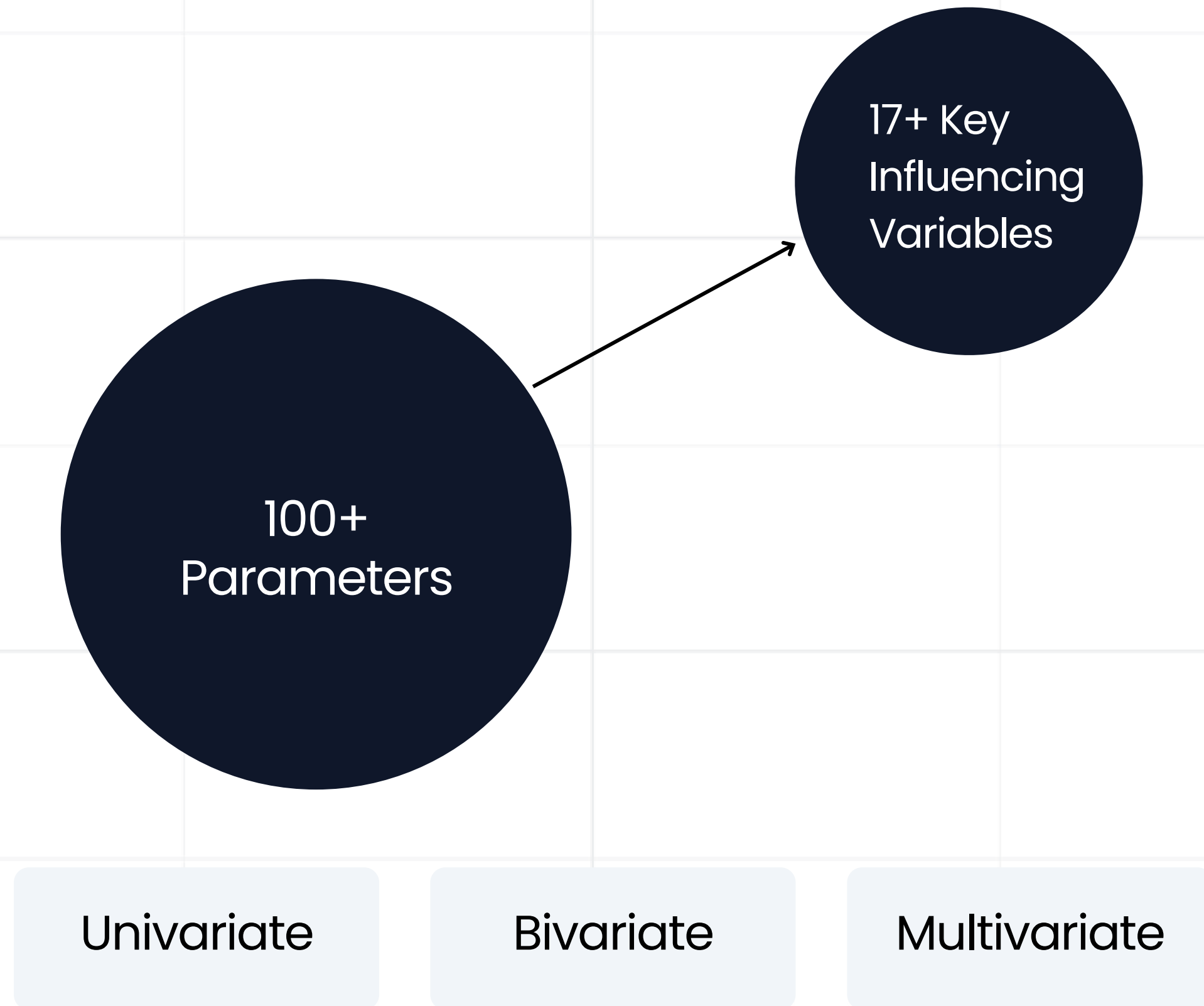


80-90 MT per day

HABER APPROACH



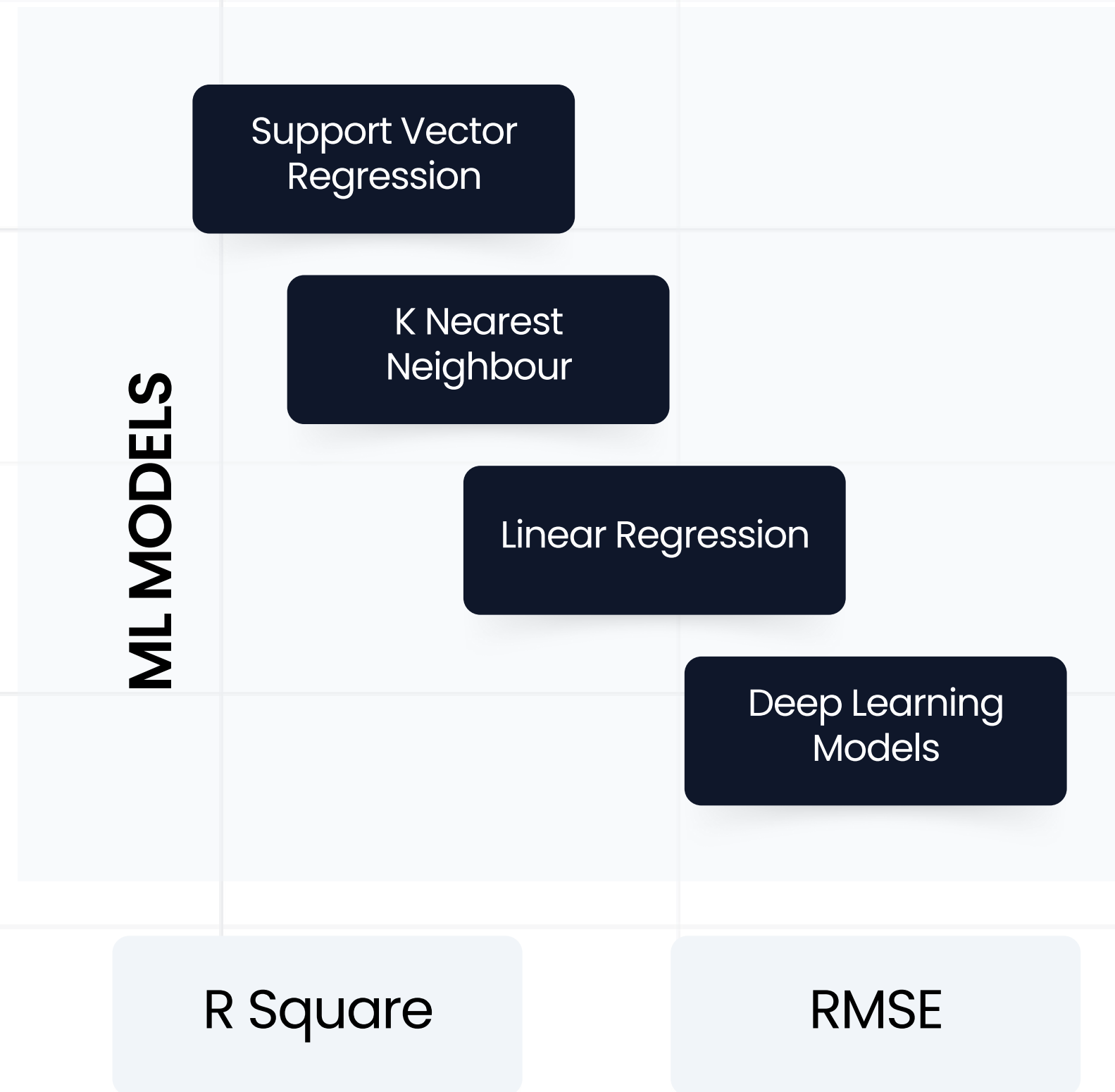
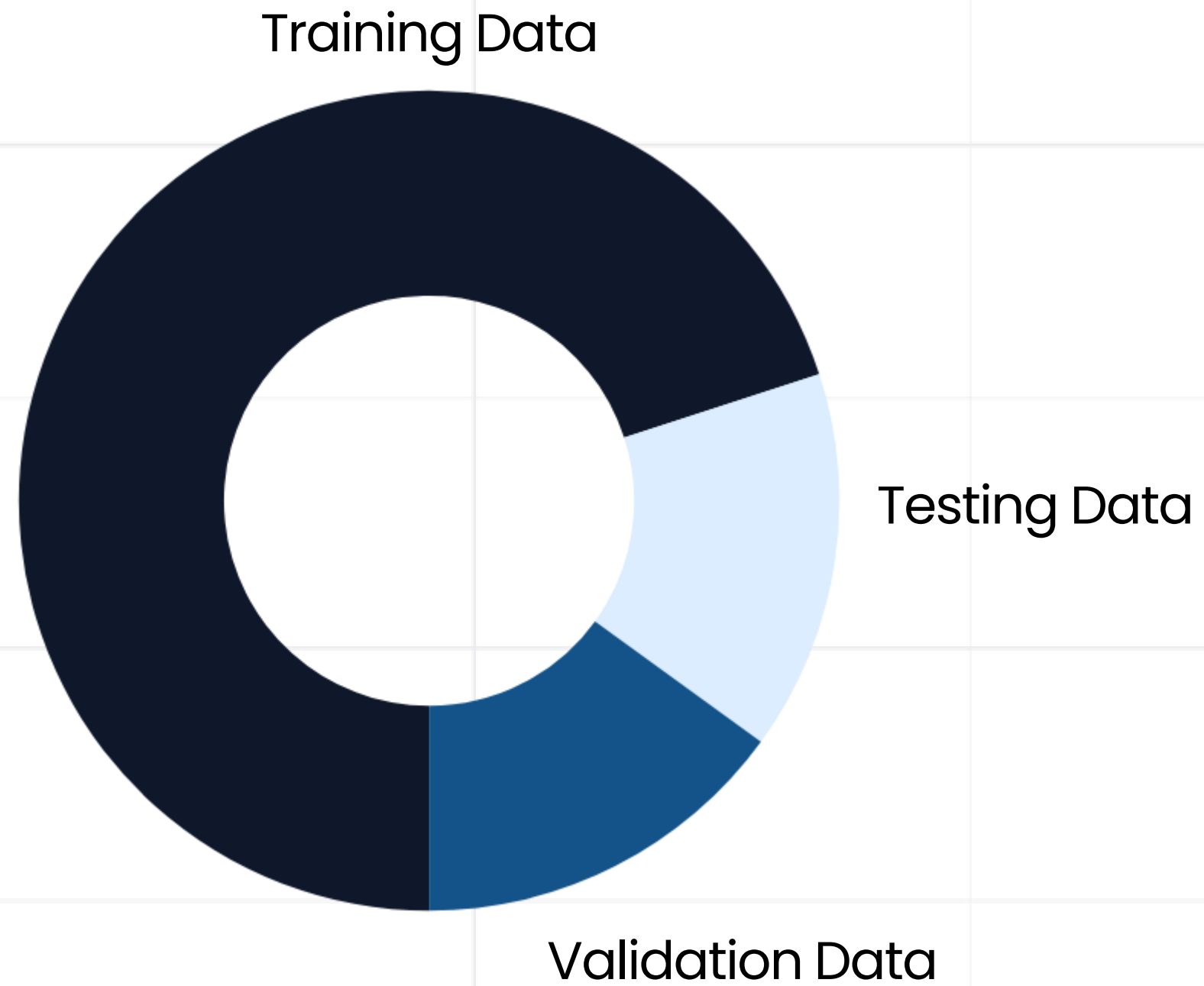
DATA ANALYSIS



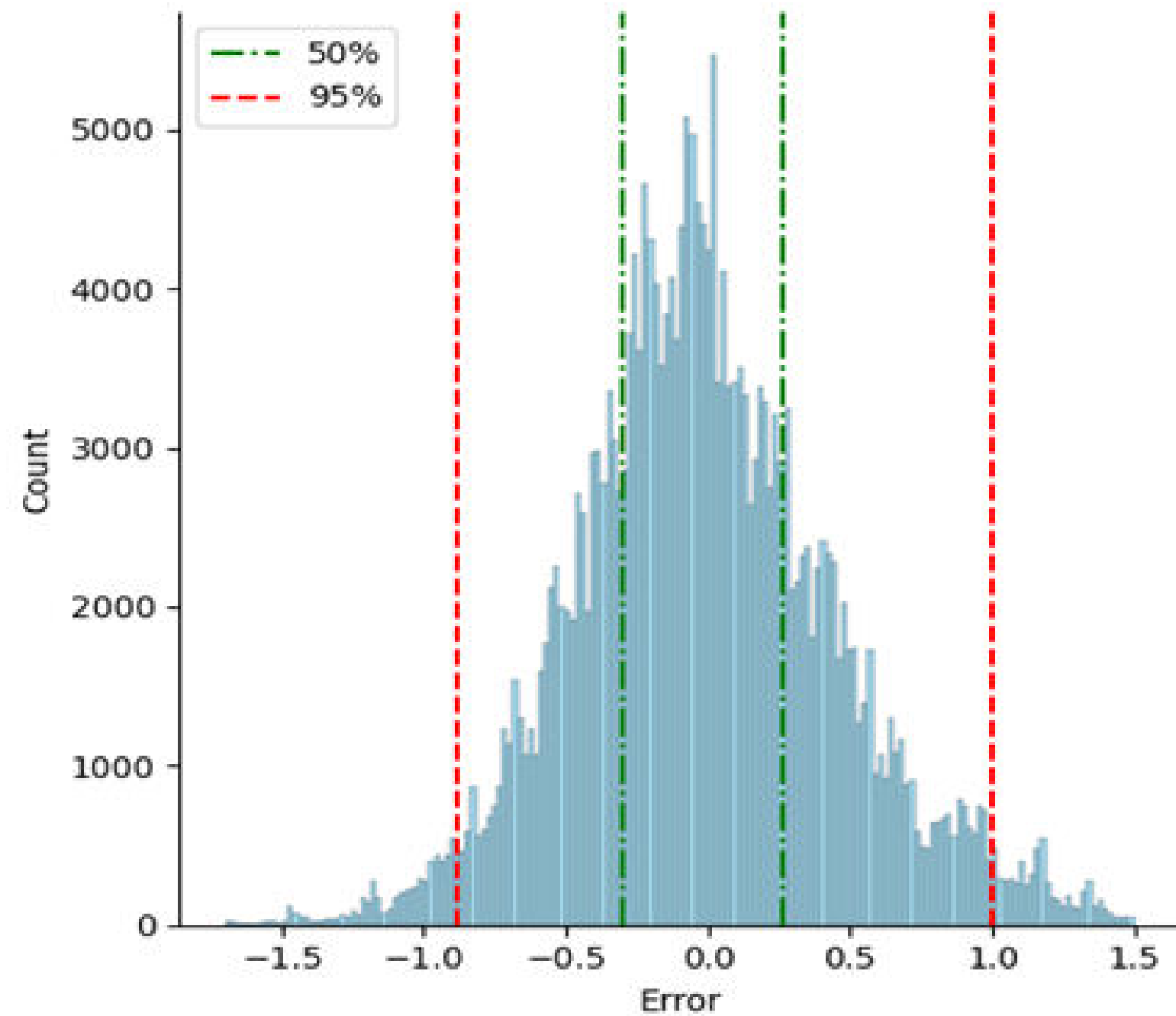
Some of the key variables are:

- Sheet Ash
- pH
- Grammage
- WSR Dosage
- Degree of Refining
- White water Consistency (fiber and filler)
- Fresh water Hardness

MODEL DEVELOPMENT & EVALUATION



LAB VS PREDICTED WET TENSILE STRENGTH



R Square

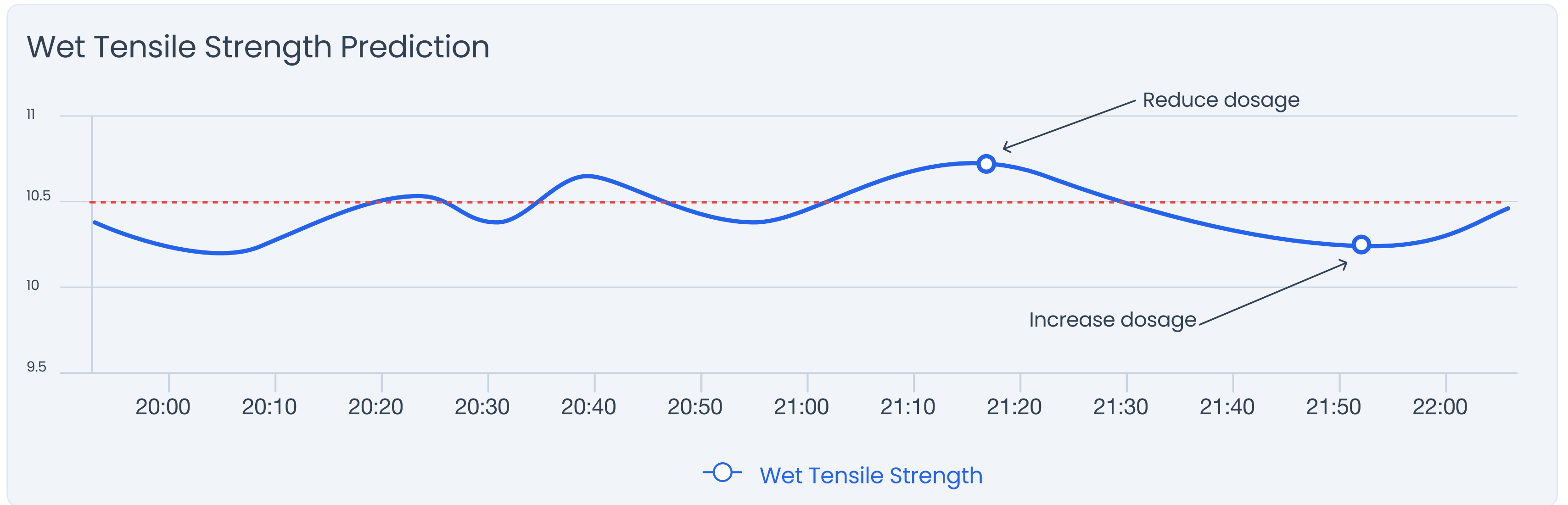
0.94

“

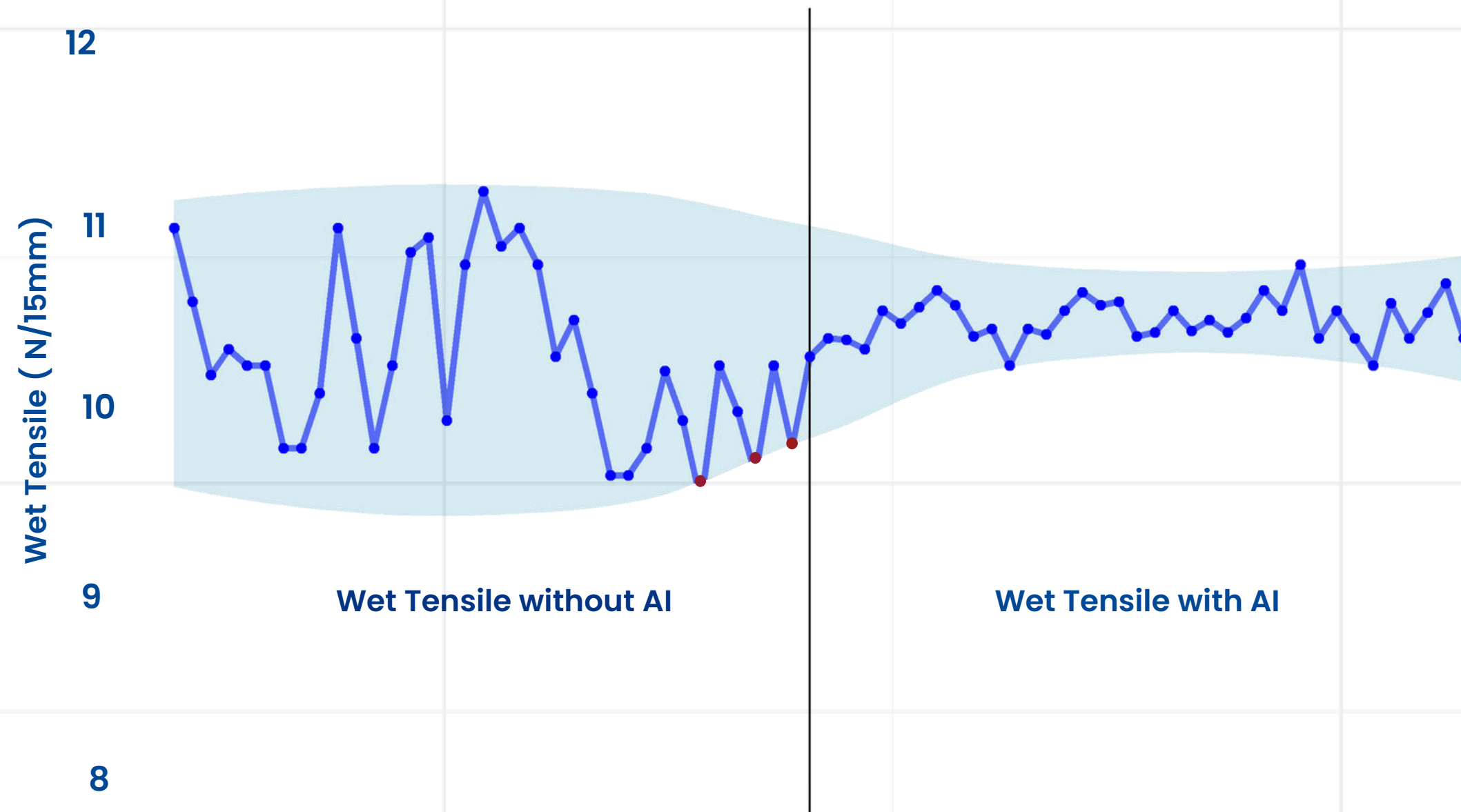
95% of the variation between the lab wet tensile strength and predicted wet tensile strength falling within the range of -1 to 1

”

MODEL PREDICTION

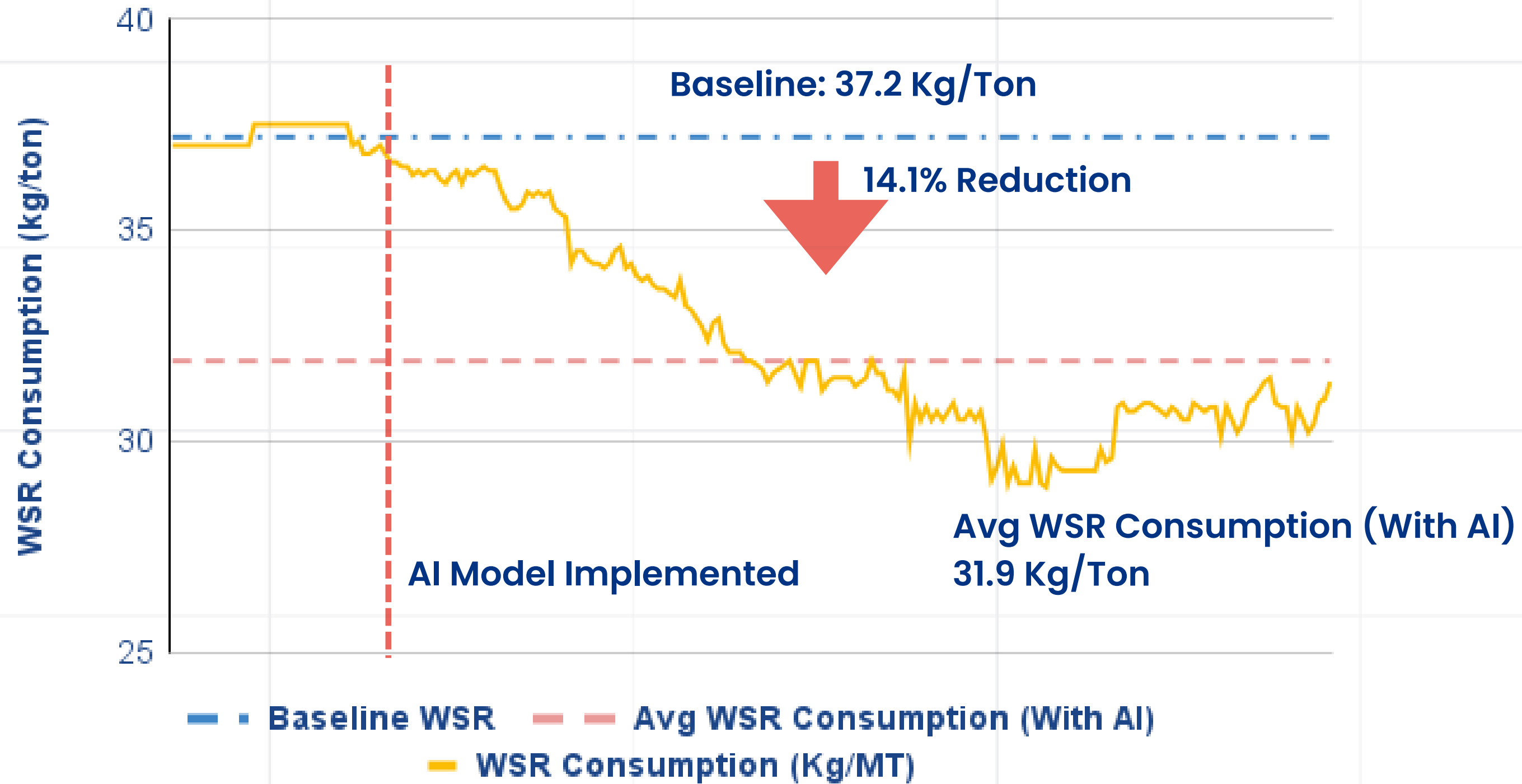


WET TENSILE STRENGTH DEVIATION



	Without AI	With AI
Std Dev	0.46	0.12
Average	10.28	10.40
Target	10.5	10.5

LOWER WET STRENGTH RESIN DOSAGE



CONCLUSION

The specialty-grade manufacturer could reduce wet tensile variation while optimising wet strength resin dosage in real time:

- **Consistent Wet Tensile**
Standard deviation of 0.1 2 (80% improvement)
- **Lower Off-quality Production**
1.5% rejection during grade change (70% improvement)
- **Reduce Wet Strength Resin Dosage**
Avg of 31.9 Kg/Mt (14% reduction)

THANK YOU!

