

SeeQ®



connect

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Driving Cost Optimization and Operator Guidance Through AI and Machine Learning With SeeQ



Thai Plastic and Chemicals PCL. (TPC)

Speaker



Natchanon Naruesatyan

- Bachelor's Degree in Chemical Eng., KMUTNB
- 2014–2020, Production Engineer
 - 2014-2019 PVC Plant in Thailand
 - 2019-2020 PVC Plant in Vietnam
- 2021-Now, Focused Improvement Engineer

Gonjanart Koonsawaddikul

- Bachelor's Degree in Chemical Eng., KMUTT
- 2022-Now, Production Engineer
 - PVC Plant in Thailand

TPC Group's Company Profile



Established: since 1966

Thailand

Thai Plastic and Chemicals Plc (TPC)

PVC Resin	530,000	TPA
VCM	646,000	TPA
Hydrochloric Acid (18%)	70,500	TPA
EDC	None	TPA

TPC Paste Resin Co., LTD (TPR)

PVC Paste Resin	36,000	TPA
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Indonesia

PT. TPC Indo Plastic and Chemicals

PVC Resin	120,000	TPA
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Manufacturing Sites:

- VCM
- PVC Resin
- PVC Compound

Vietnam

TPC VINA Plastic and Chemical Corp., Ltd.

PVC Resin	200,000	TPA
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Viet-Thai Plastchem Co., Ltd.

PVC Compound	14,000	TPA
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Chemtech Co., Ltd.

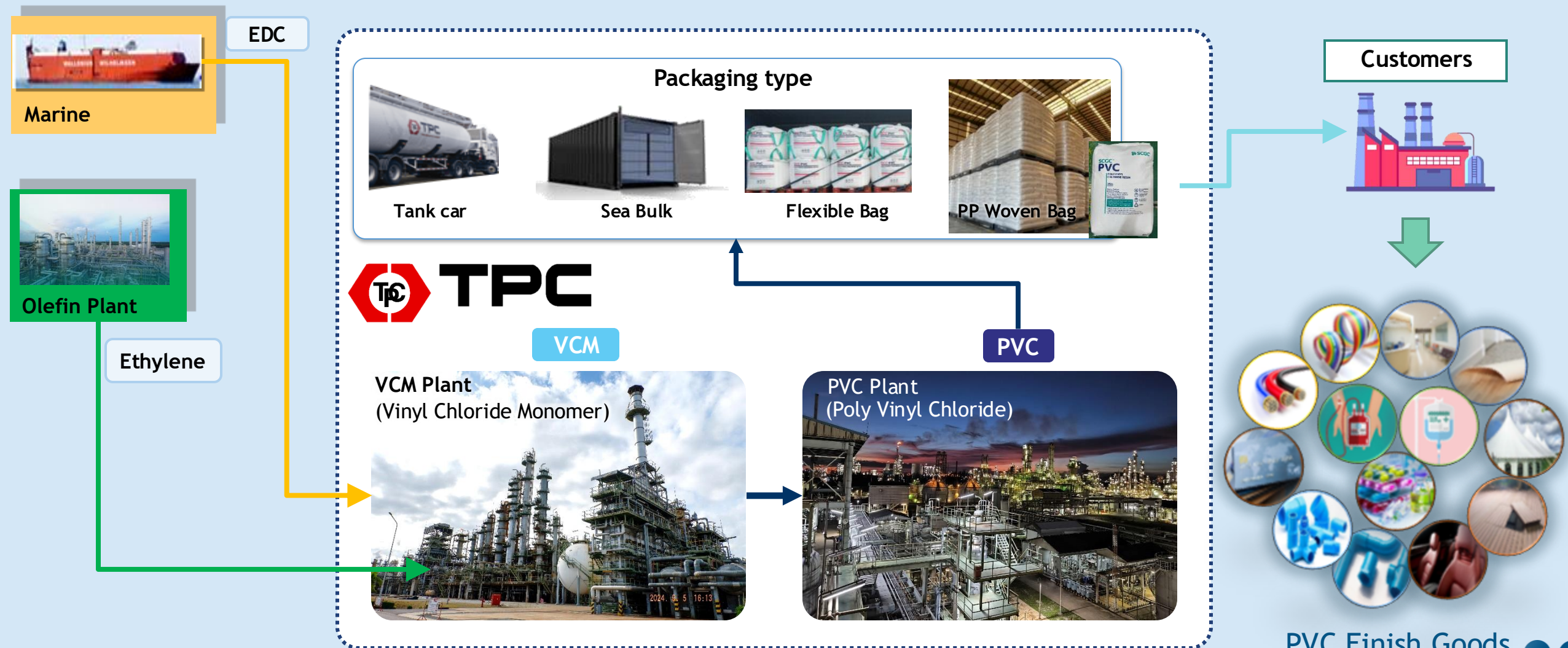
XLPE	12,000	TPA
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 **THAILAND**
PVC resin & VCM
Research center

 **VIETNAM**
PVC Resin
PVC compound

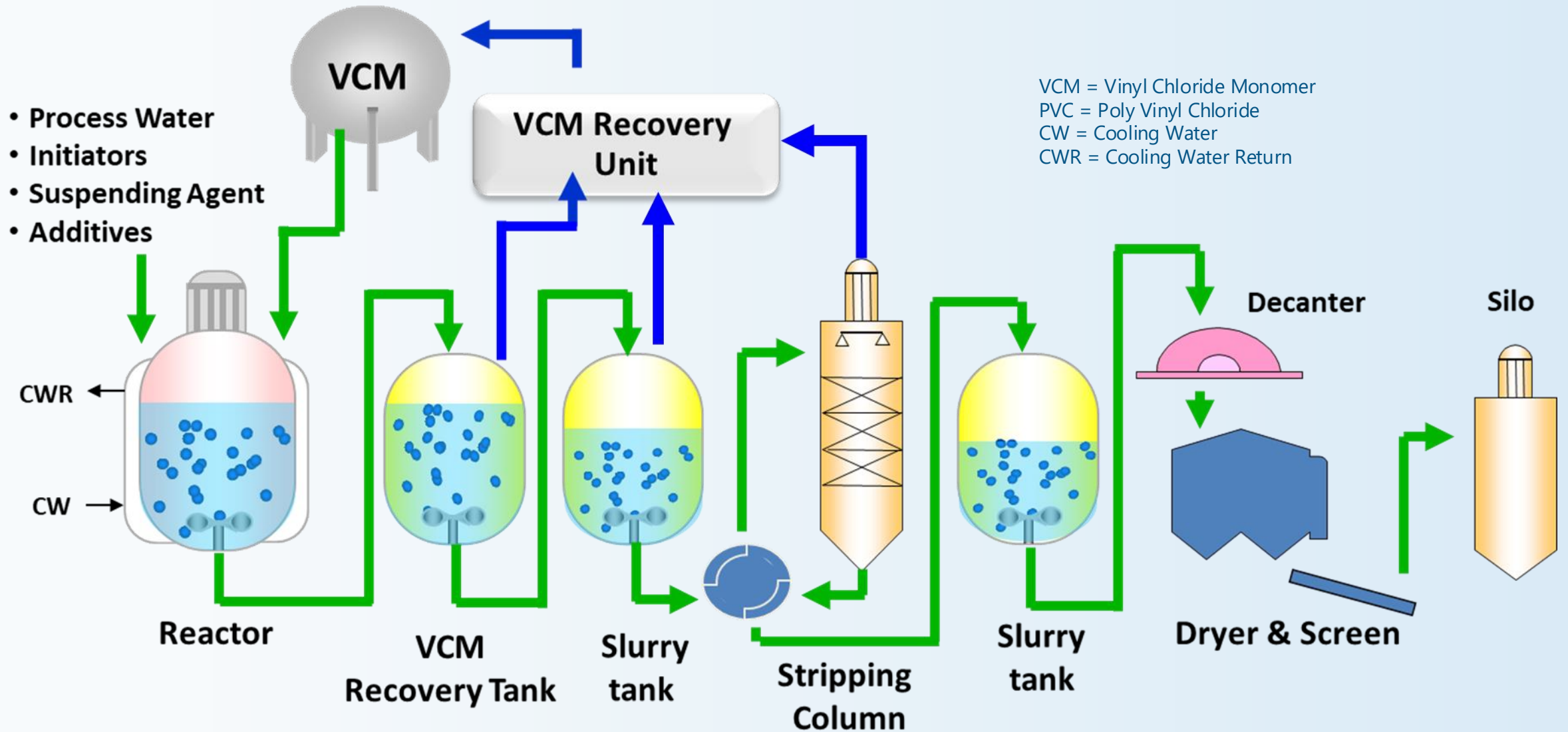
 **INDONESIA**
PVC Resin
Pipes & Fittings

TPC SUPPLY CHAIN DIAGRAM

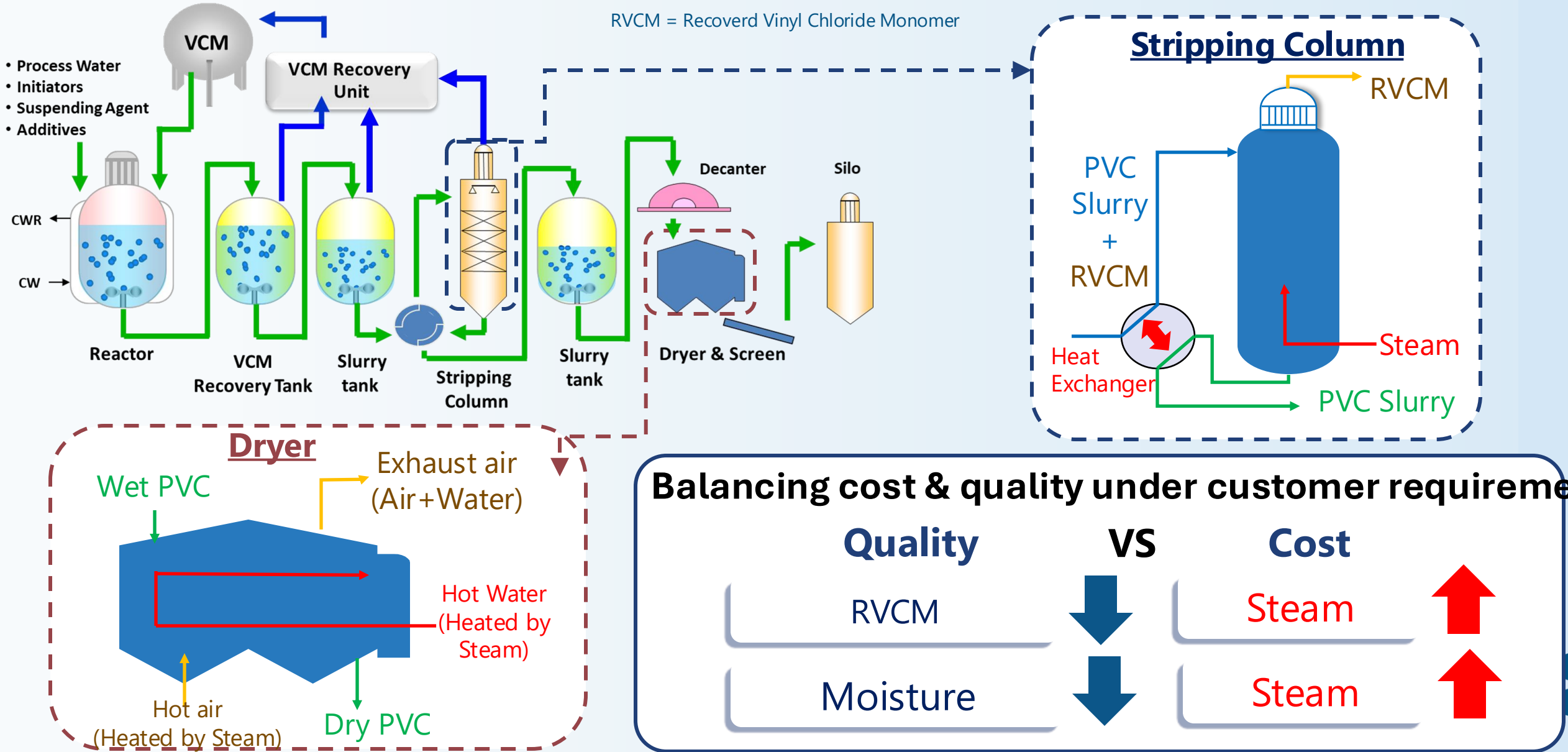


VCM = Vinyl Chloride Monomer
EDC = Ethylene Di-Chloride
HCl = Hydrogen Chloride
PVC = Poly Vinyl Chloride

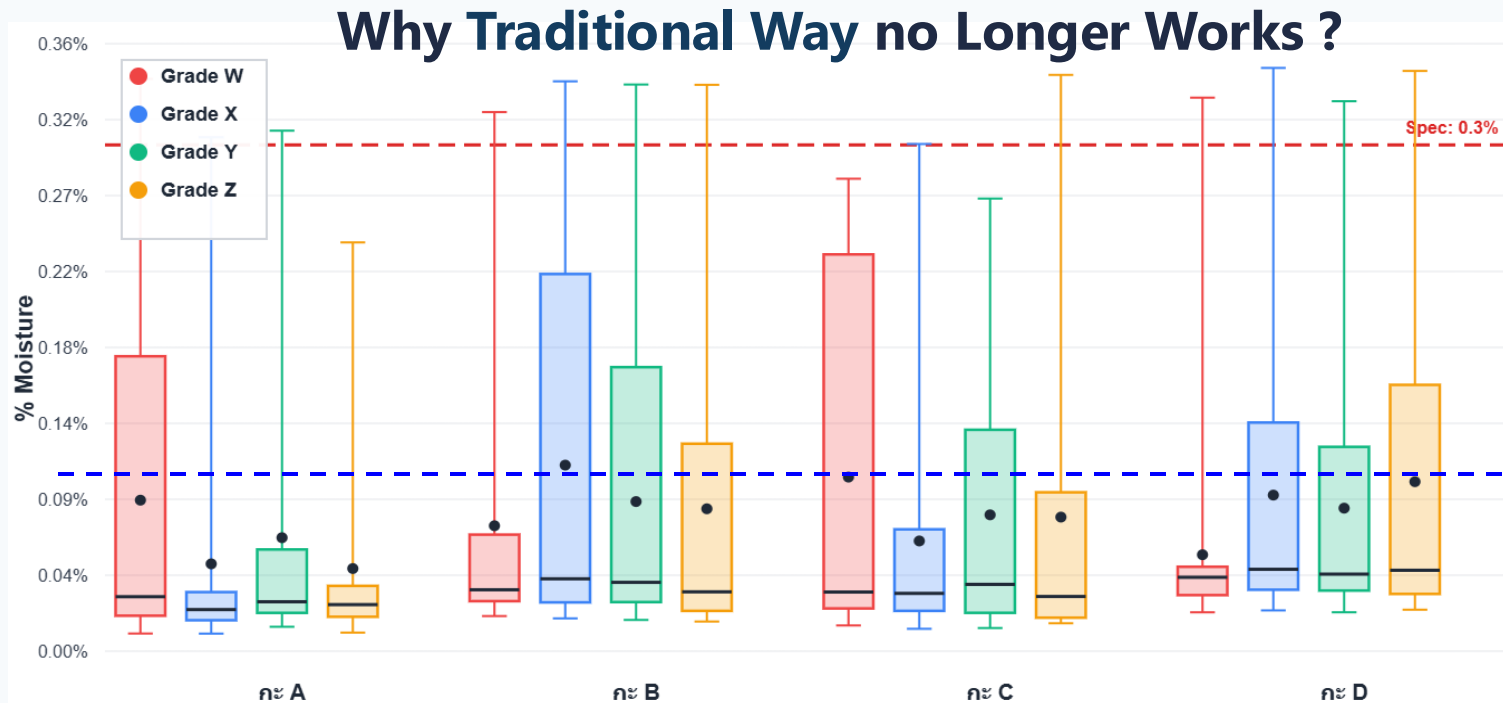
PROCESS OVERVIEW



OPERATIONAL CHALLENGE



OPERATIONAL CHALLENGE



“Quality Over Delivery”

→ **Customer Requirement = 0.3%**

→ **Internal Control = 0.1%**

Same spec, different operators & grades
→ uncontrolled variation

- **High Variety** : 50 Grades | 400 Customers | 1000 Req.
- **High Variation** : Built-in cost & energy buffer
- **High Dependency** : Experience-based operation
- **High Complexity** : 6 Plants | 4 Licensors | >20K Parameters

✗ Impossible to manually analyze at scale

✓ Requires data-driven intelligence

SOLUTION : ML-Soft Sensor & Optimization

INPUT

SeeQ WORKBENCH

Data Collection

10 M+

Data Points Collected

Constraints

- Specifications
- Economics Factors

Data Cleaning

- Remove outliers
- Handling NaN

CORE ENGINE

MACHINE LEARNING

SeeQ DATA LAB

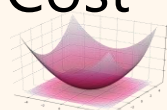
Feature Engineering

- Predictive feature
- Selection & scaling

ML-Soft Sensor

- Ridge Regression
- Prediction Model 

Optimization

Trade-off Quality & Cost
via **D.E. Optimizer** 

OUTPUT

SeeQ ORGANIZER

Deployment

- Real-Time guidance
- ML-Insight Report



ARCHITECTURE

Seeq WORKBENCH

DATA SOURCE



Plant Data



Lab Data



Customer Data



Open Data
Energy Price API



Seeq DATA LAB

ML PROCESSING

High-Low-No Code & AI Copilot



**Predictive &
Prescriptive Models**
**ML-Soft Sensor &
Optimization**



Seeq ORGANIZER

VISUALIZATION



UI Dashboard



AI Chat Widget



AI LLM DRIVEN

IMAP Trigger

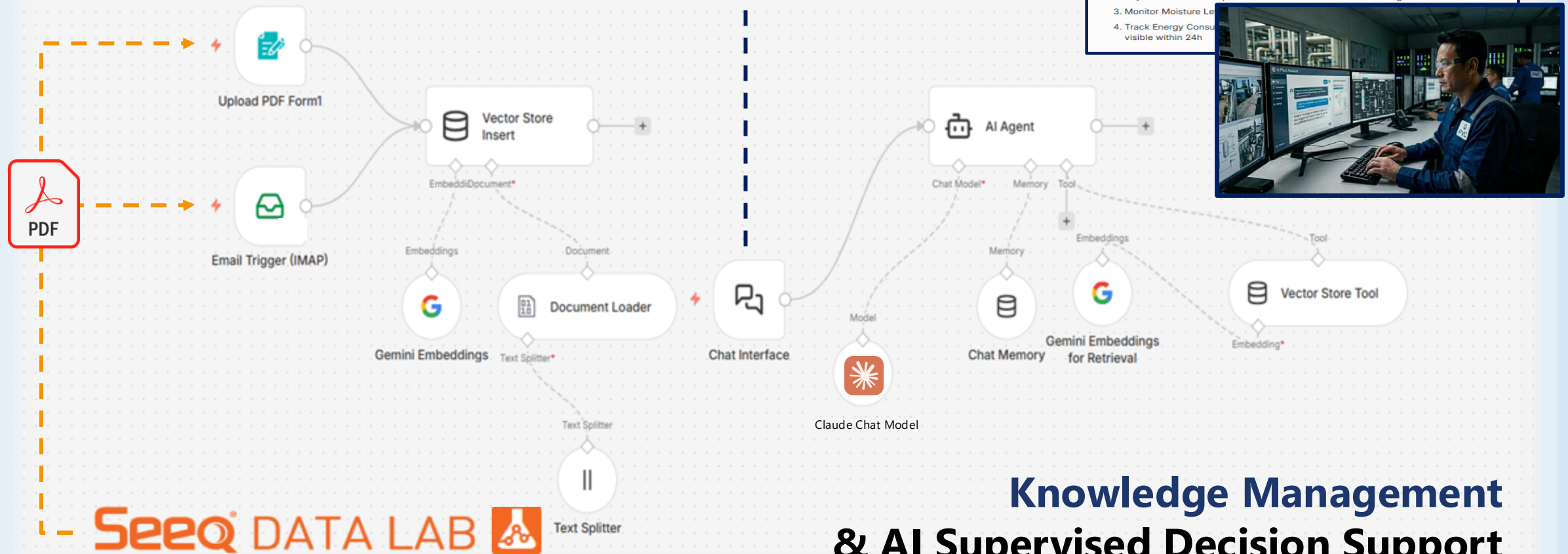
Format Output JSON API



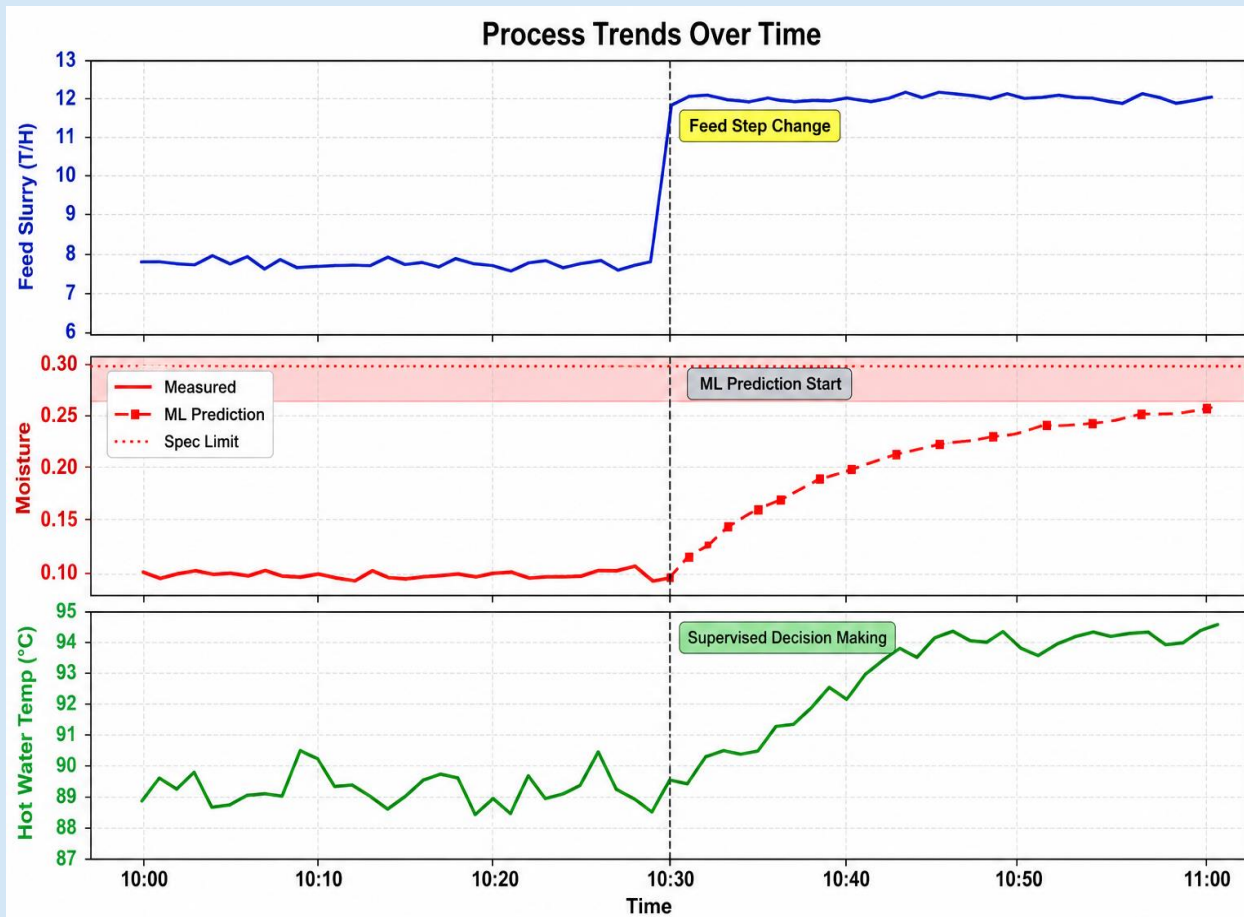
Gemini

INSIGHT GAIN : Real-Time AI Decision Support

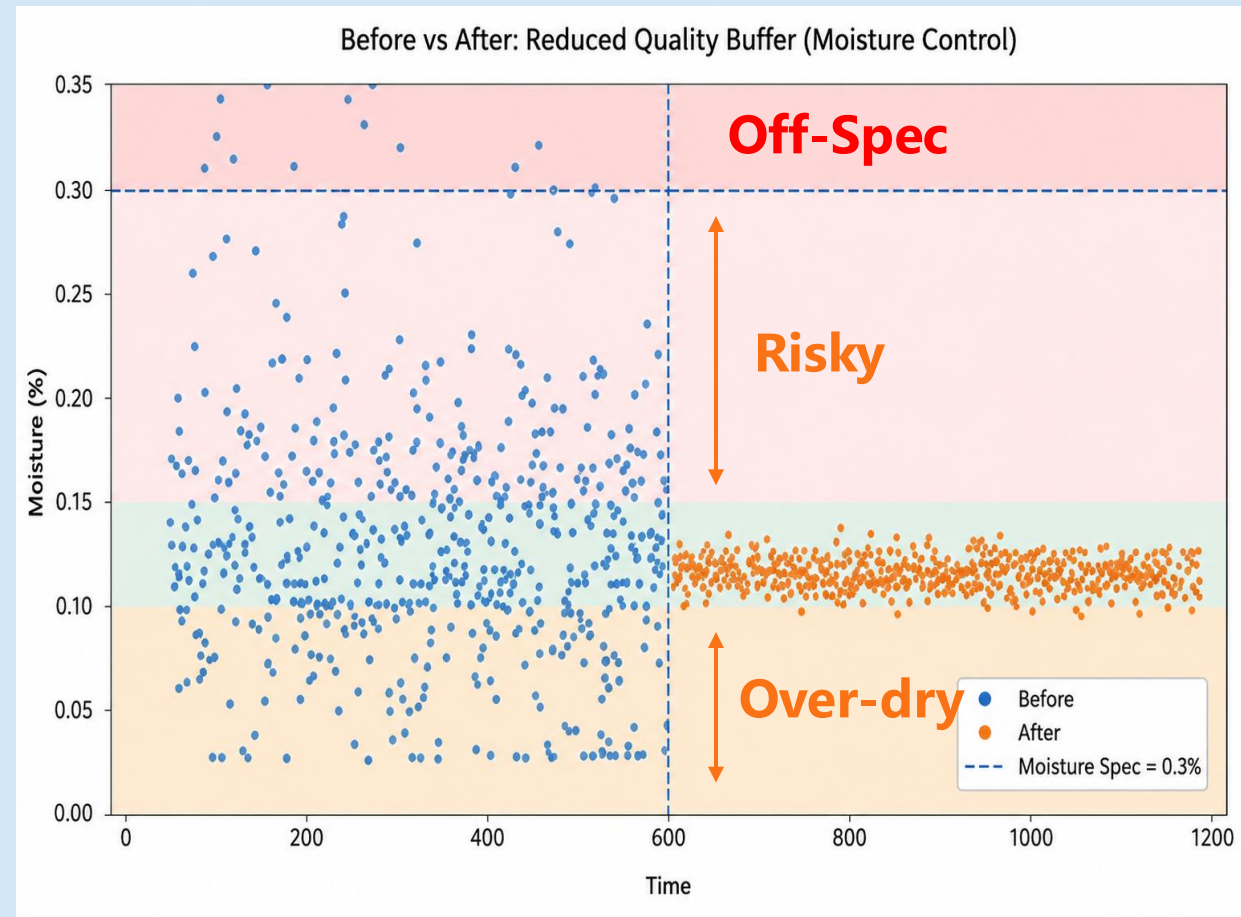
Sending Report Result from Run ML



RESULT : Reduce Variation & Ad-hoc guidance



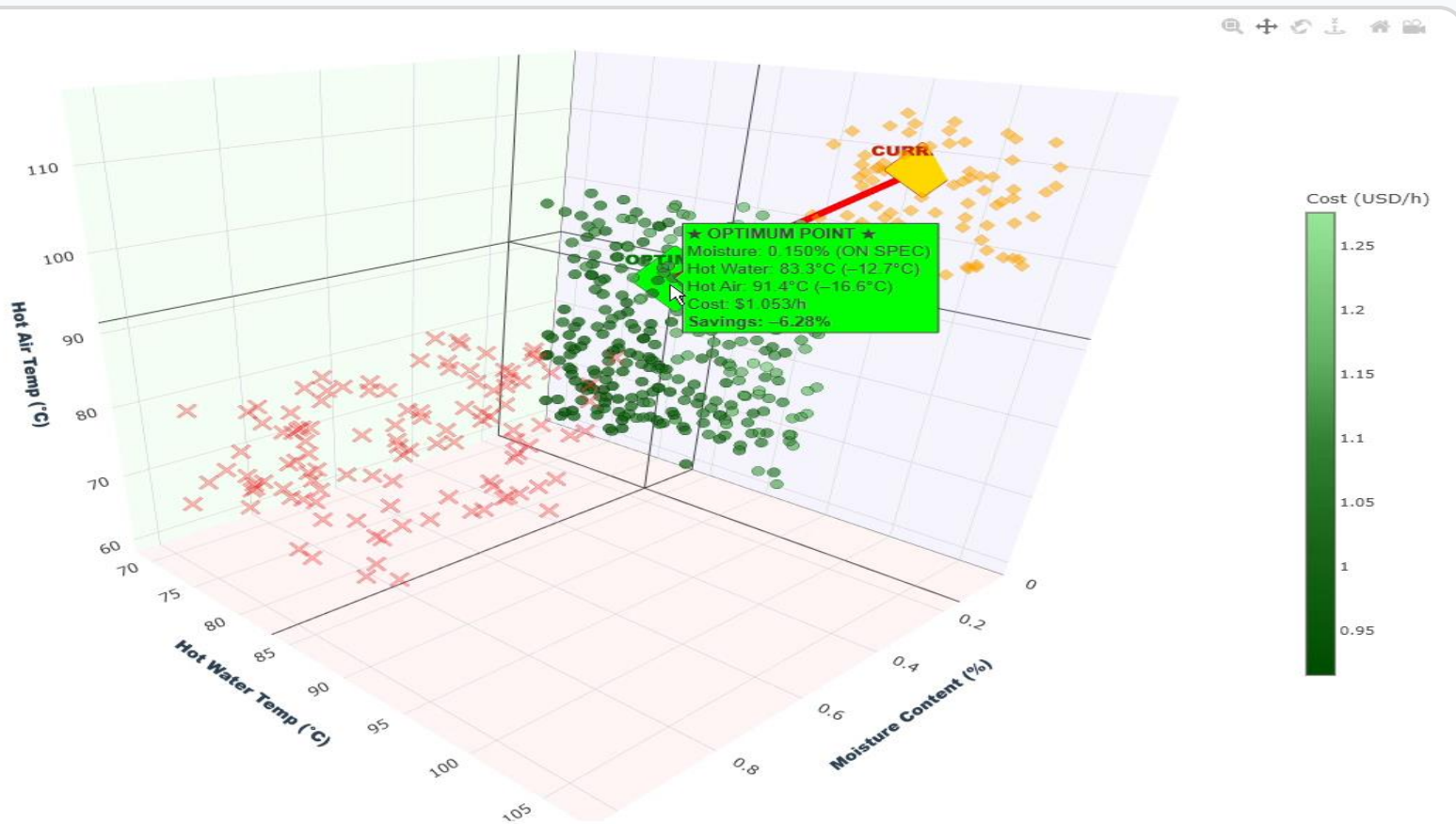
**ML Predict Quality from Feed Change,
Supervised Control Action**



**Reduce Variation
Reduce Excessive**

RESULT : Increase Cost Competitiveness

PVC Dryer Quality & Cost Optimization



Optimization Direction : Over-Dry Zone > Optimum Point

Differential Evolution Optimization

Identified a **Cost-Optimal** operating point

ON SPEC < 0.3%
Range Control

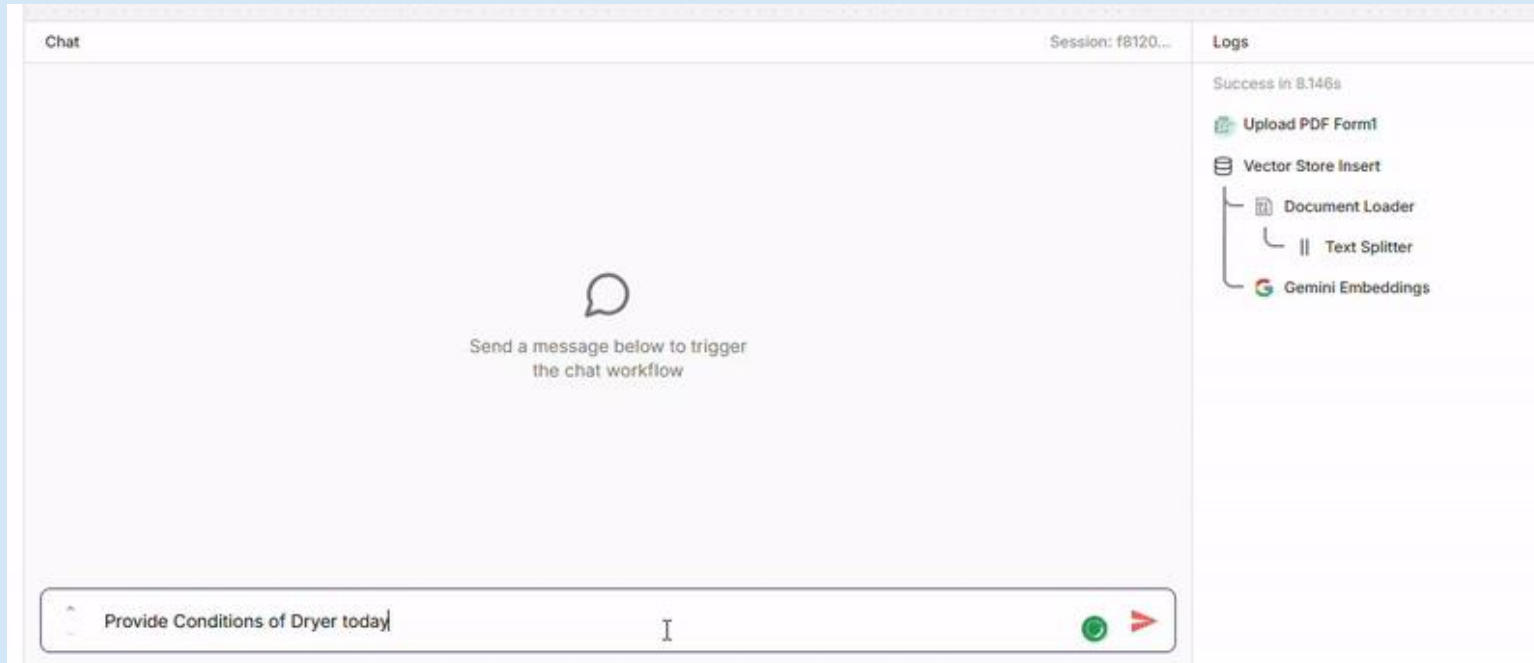
OFF SPEC > 0.3%
Too Wet

OVER-DRY < 0.1%
Waste of Energy

Saving - 6.28%
Operation Cost

RESULT : Knowledge Management by AI Driven Decision Support

AI LLM-powered prompting turns ML analysis reports into explicit, reusable knowledge, making expert-level insights accessible to every operator and engineer.



"**SeeQ** helped us turn **data** into **insight**, Insight into **action**, and action into **business value**"

BENEFIT & IMPACT TO VINYL BUSINESS

\$30K / Year Cost Saving – Proven

Achieved through optimized operating conditions and quality give-away reduction.

\$200K / Year Total Saving – Ongoing

Scalable deployment across 7 additional plants within the Vinyl business.

100% In-House Code

Faster iteration, lower long-term cost, and sustainable system ownership.

Production Cost Reduction

Strengthens competitiveness while protecting home-base customers with consistent quality.

Reduction in Decision Errors

Enabled by faster operator response in monitoring, analysis, and decision-making.

Tacit → Explicit Knowledge

Shift from experience-based actions to high-level, guided decision-making.

WHAT'S NEXT : GLOBAL EXPANSION

Phase 1 (New)

PVC Dryer & Stripping
Column optimization in
Thailand



Phase 2

Expansion to Reactors
and VCM Recovery
units



Phase 3

Cross-border
deployment



Future

One AI&ML Core for entire
TPC Supply Chain



KEY TAKEAWAYS



Amplify Subject Matter Expertise

Empower engineers to innovate independently with self-service tools, reducing dependency on external data scientists.



Navigate Business with Data Agility

Transform volatility into a competitive edge by using real-time analytics to protect market share in over-supplied markets.



Institutionalize Digital Knowledge

Turn tacit experience into explicit, scalable digital assets through the synergy of Seeq analytics and Generative AI.

“ Possibility, Powered by **Seeq®** & AI ”

 
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Q&A