

關鍵性設備預測保養

預測分析工具 PRiSM - Process Information Signal Monitor

科勝科技 x 薈智創新
Online Seminar

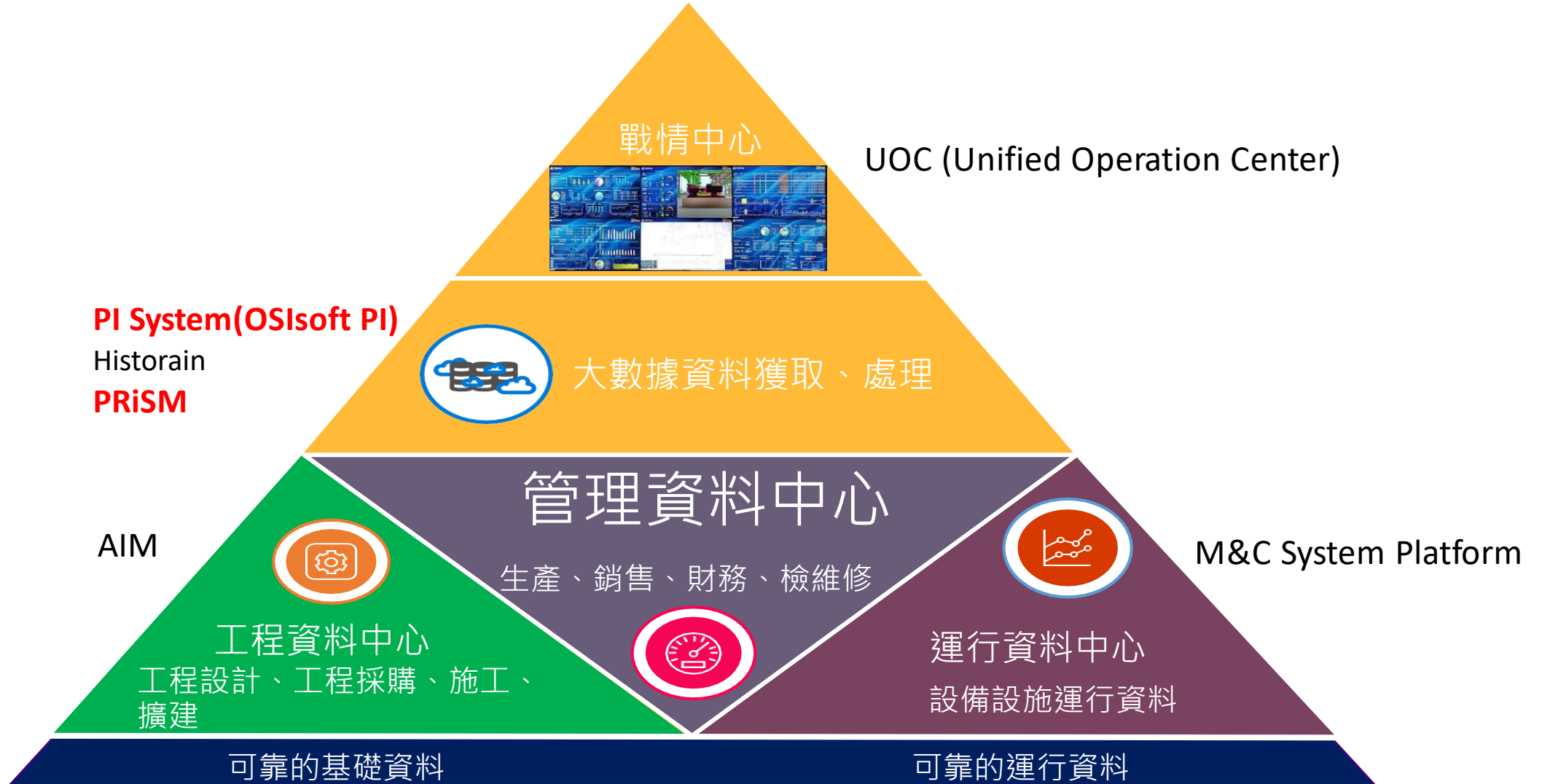
產品銷售服務處 吳昱賢 Eric



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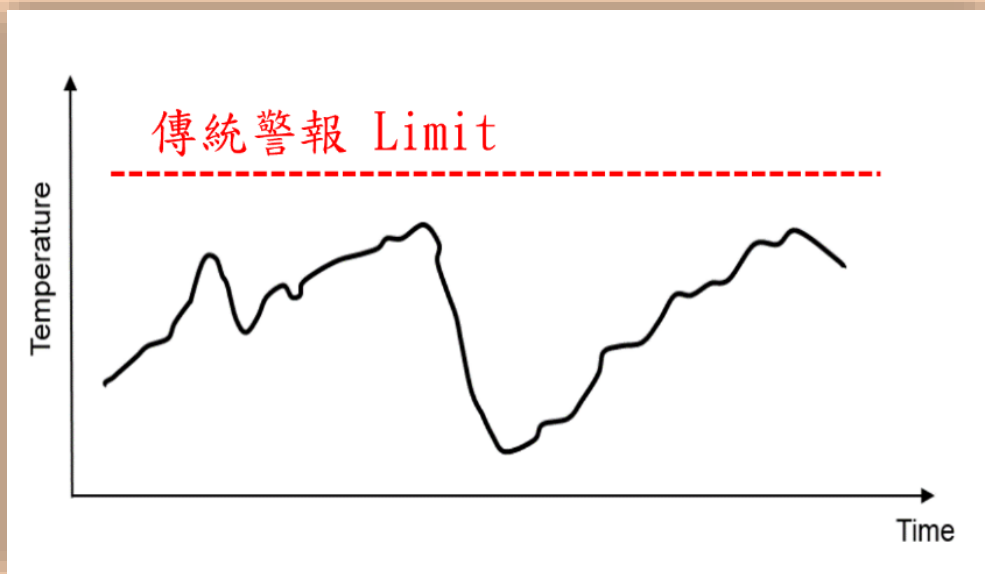
- 引敘
- PRiSM Concepts
- 應用情境與案例分享

AVEVA 數字化工廠 Total Solution



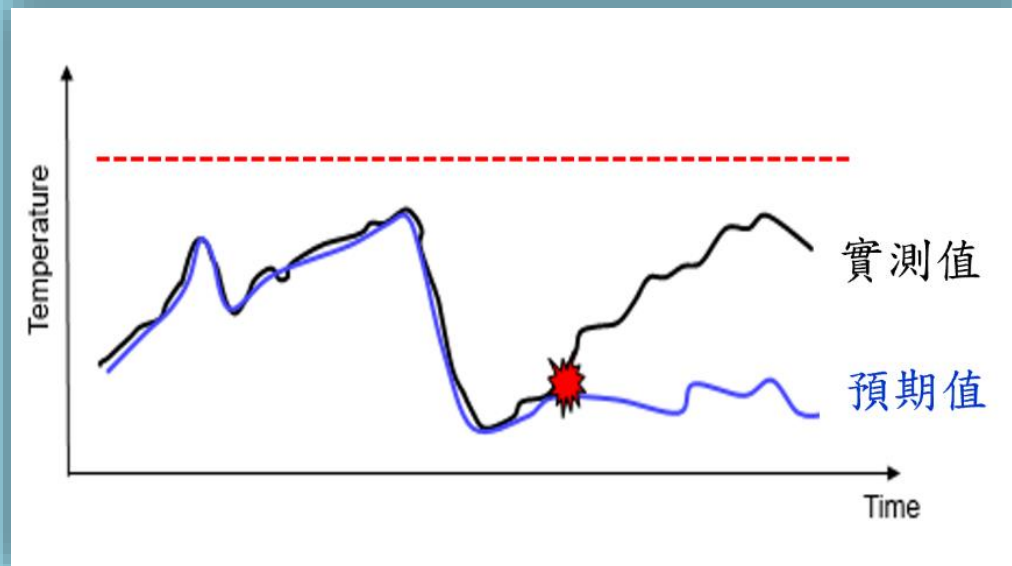
監測方法差異性

傳統監測



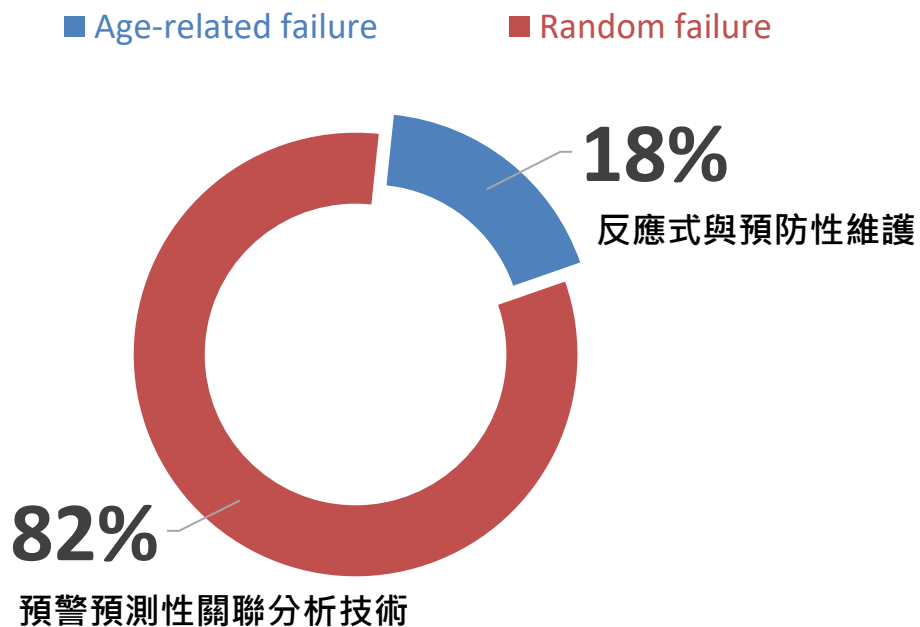
預測性監測

$$\text{實測值} - \text{預期值} = \text{偏移量}$$



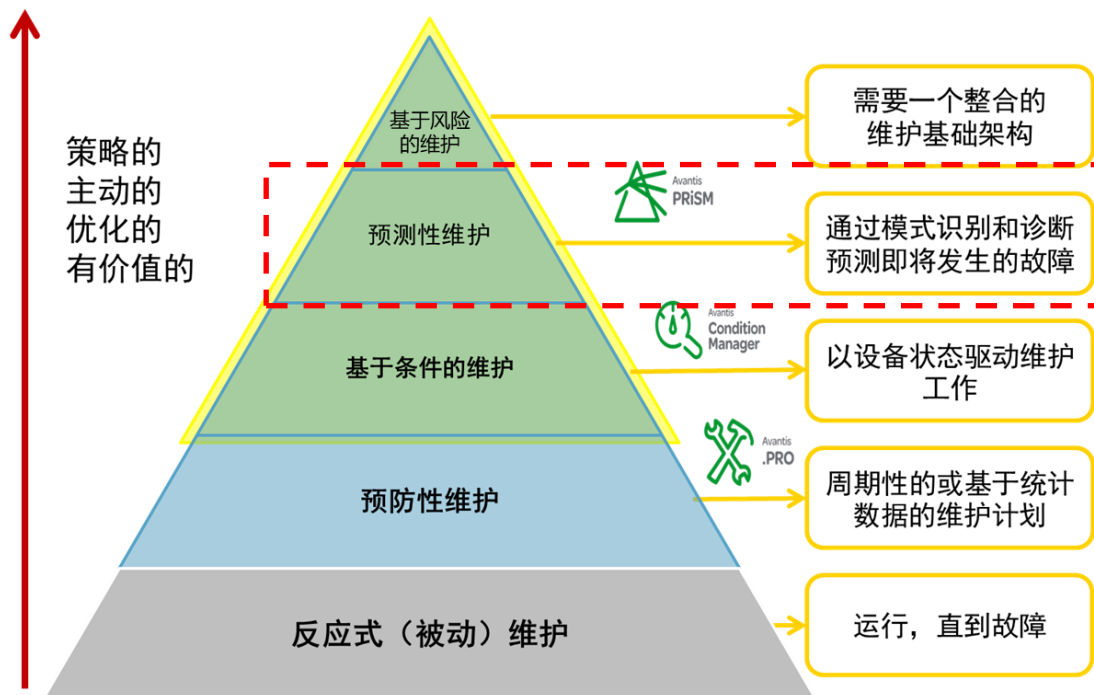
將傳統維護模式提升至預測性維護

設備故障模式

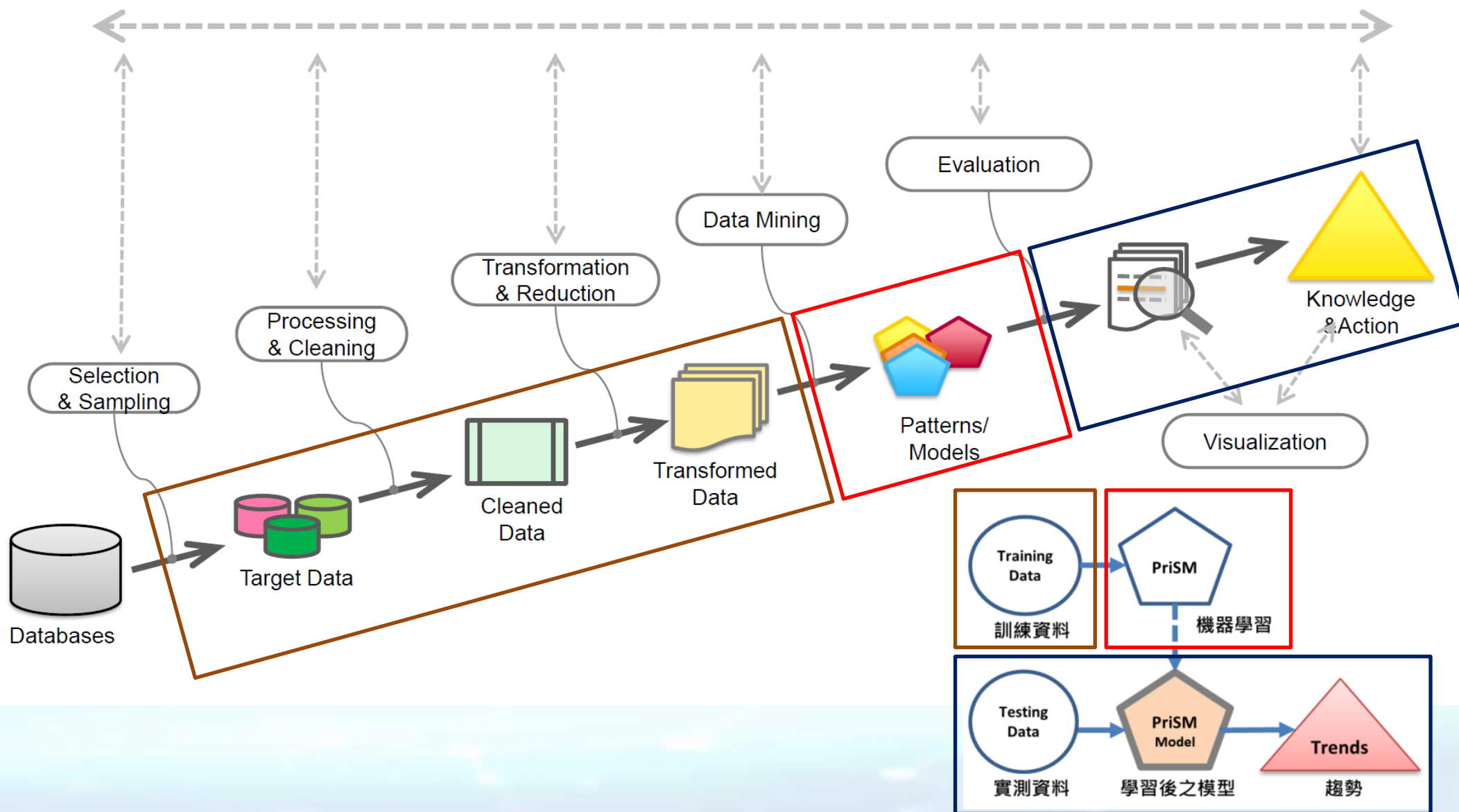


ARC studies show only 18% of asset failure is age-related. Based on these data, preventive maintenance provides a benefit for just 18 percent of assets, and monitoring for predictive maintenance is a recommended option for the rest. www.arcweb.com/Lists/Posts/Post.aspx?ID=260

運維金字塔



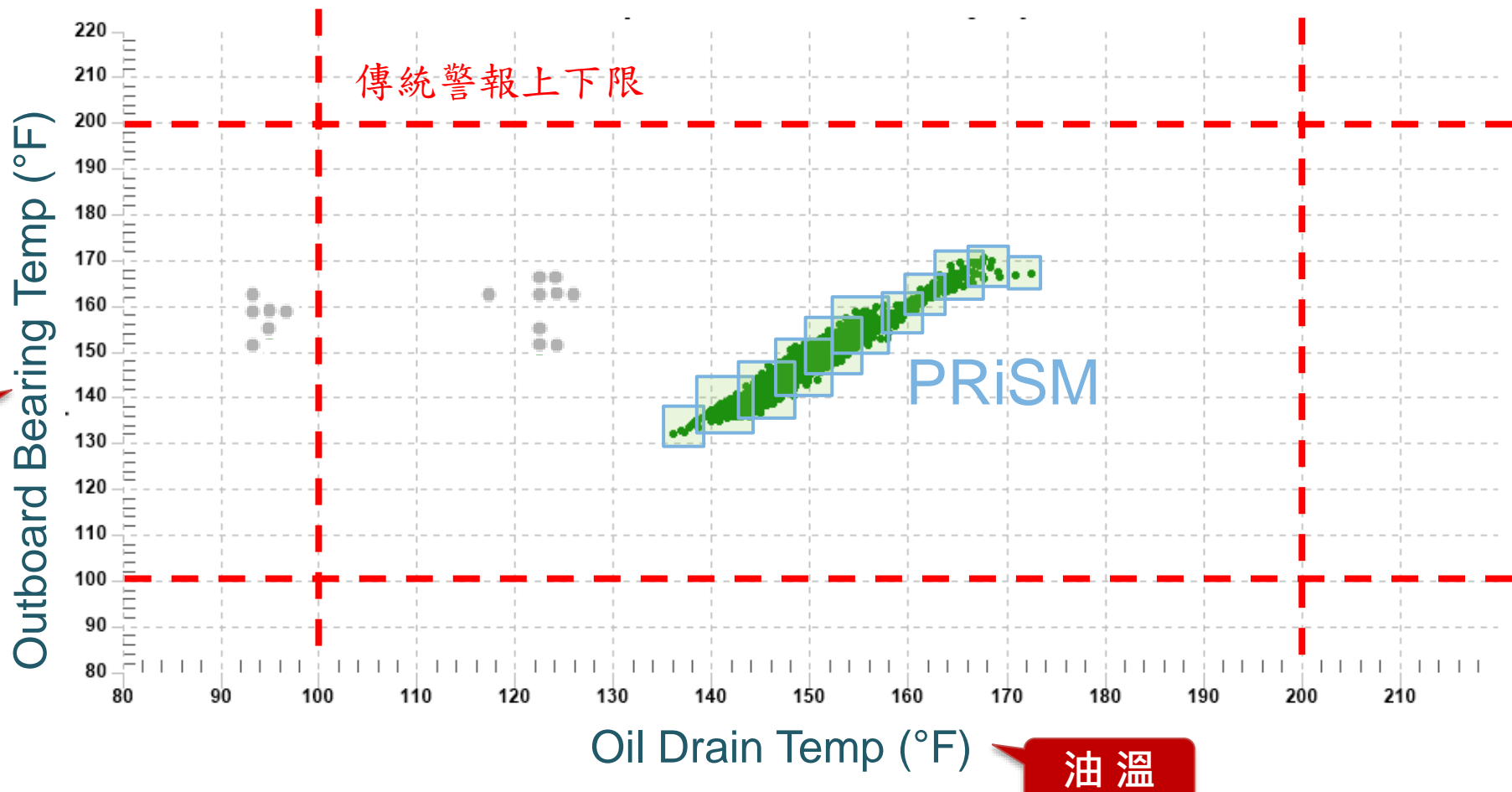
大數據資料探勘流程與PRiSM的對應



PRiSM Concepts

A hand is shown interacting with a transparent 3D cube on a grid background. The hand is positioned as if it is about to touch or has just touched the cube. The background is a dark blue grid with a teal diagonal shape in the bottom right corner. The text 'PRiSM Concepts' is centered in white.

模型概念

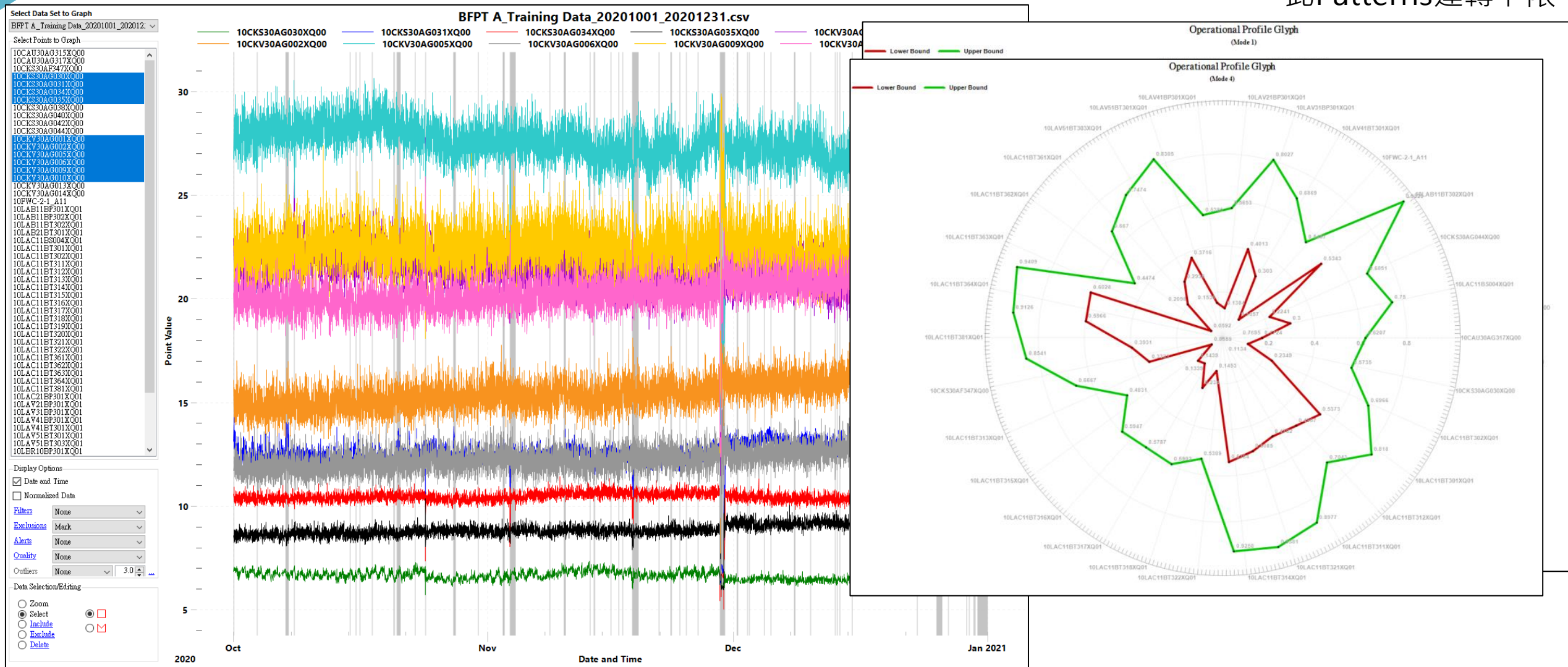


先清洗不合理、離散數據，保留正常運行的數據，再建立模型

Advanced Pattern Recognition

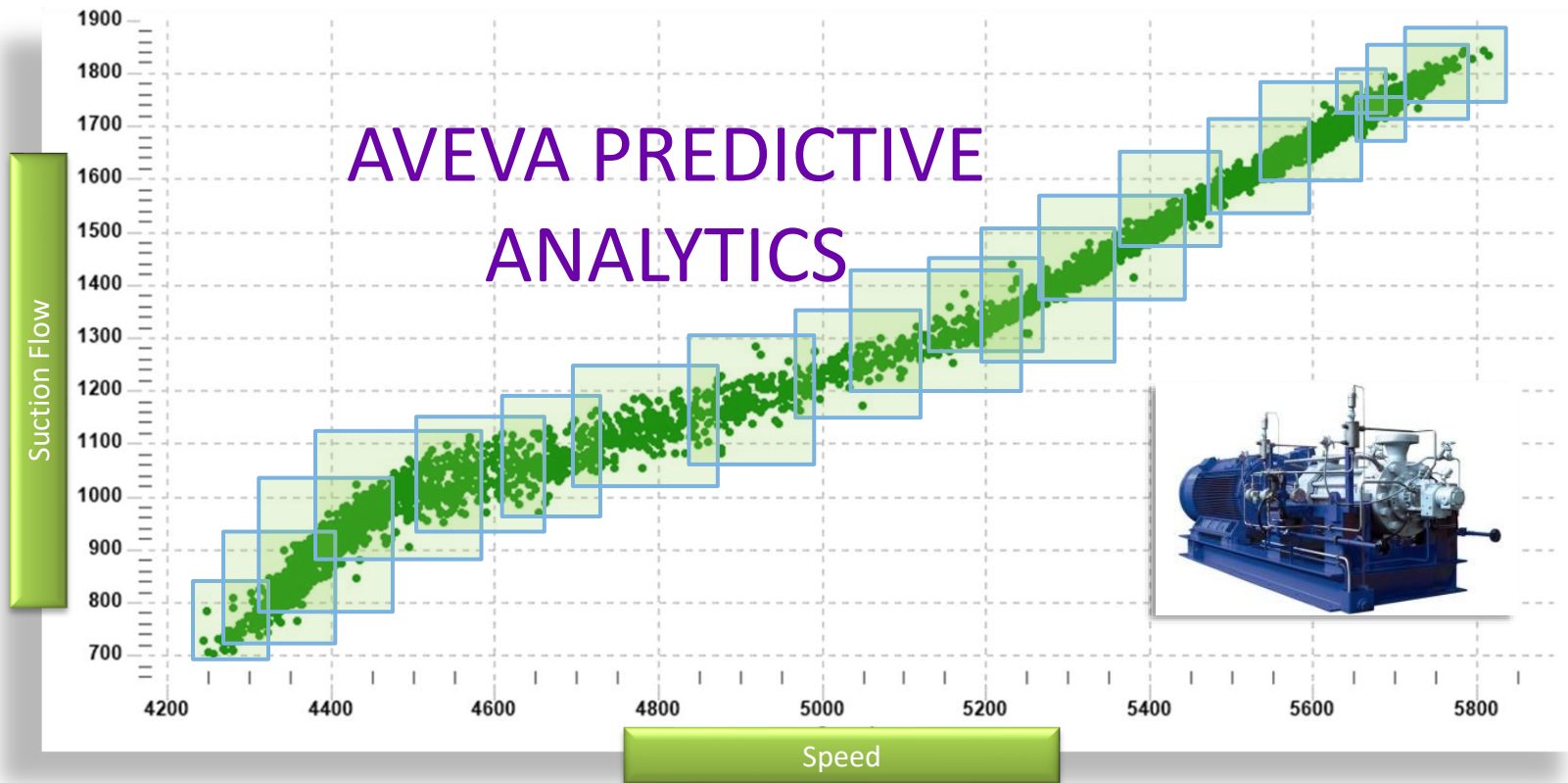
透過演算法，單一Model可生成數十到數百個Patterns。

— 此Patterns運轉上限
— 此Patterns運轉下限



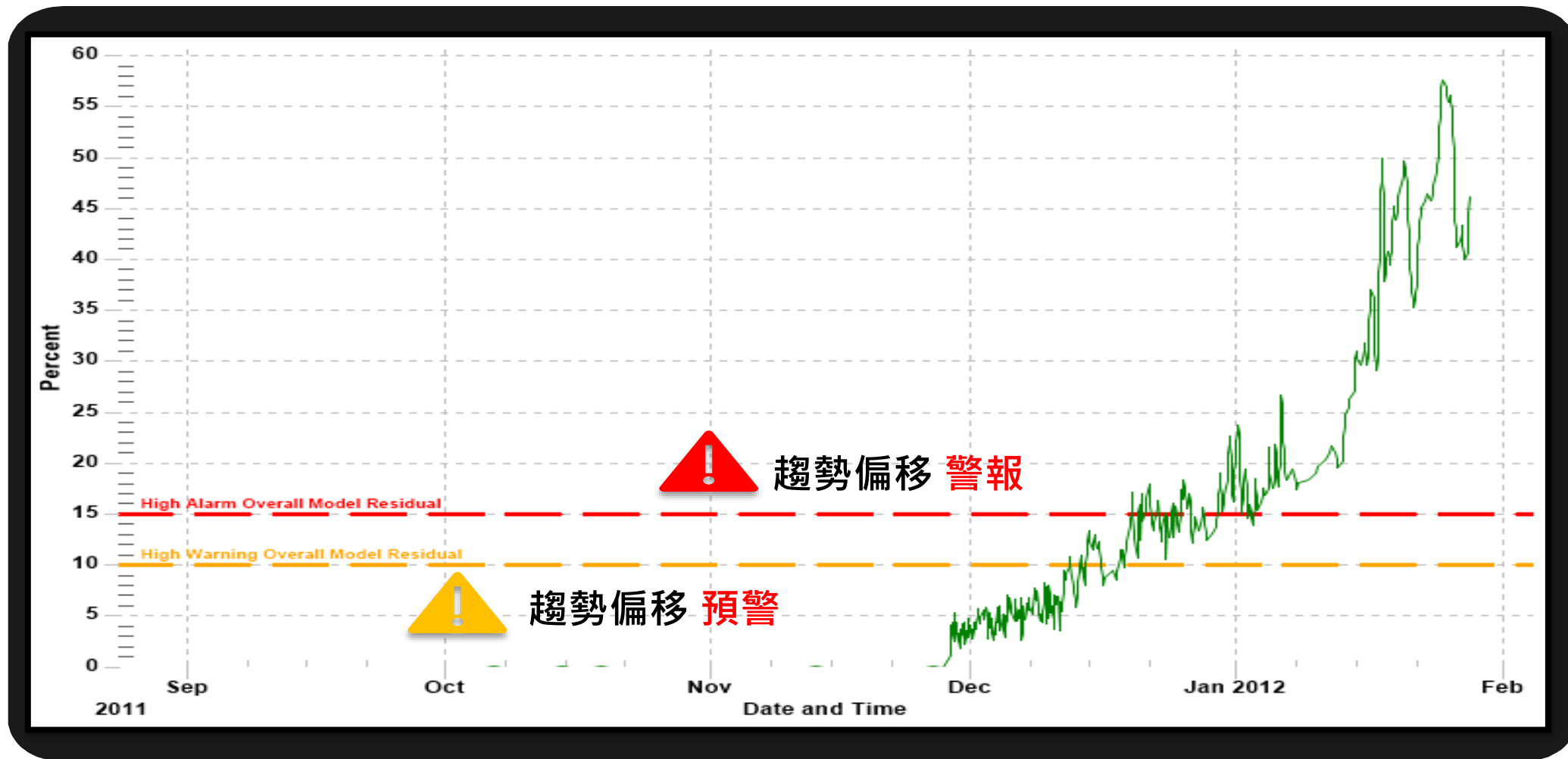
AVEVA Predictive Analytics – How Does It Work?

Data Clustering



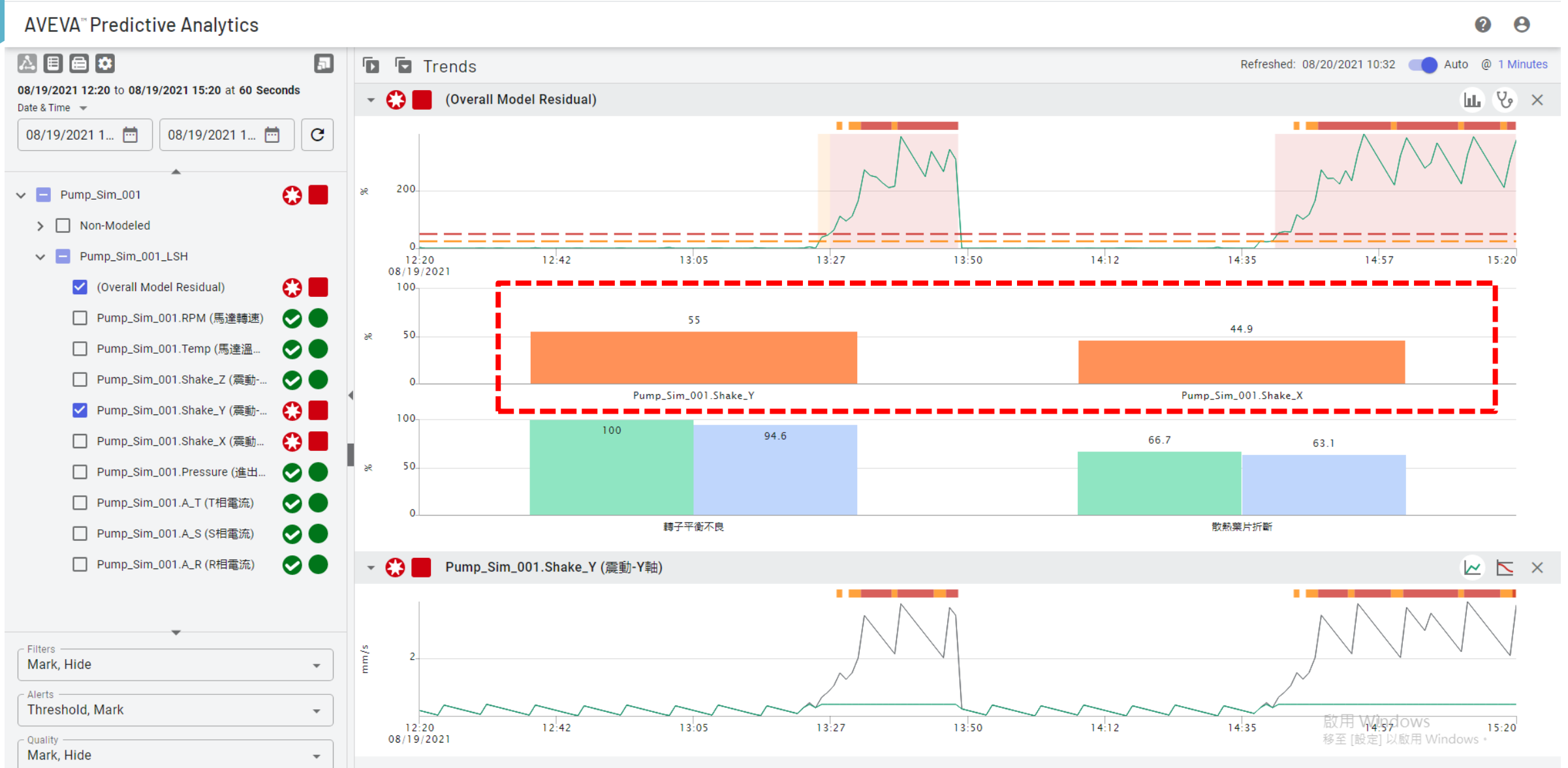
- Asset historical data is encoded using data clustering algorithms
- Clusters describe known relationships in data across N sensor dimension
- New data is compared against clusters to detect deviations in behavior in real-time
- Algorithm computes magnitude of deviations and which sensor(s) are contributors

整體趨勢偏移量 Overall Model Residual



整體偏移量 (Overall Model Residual)

Predictive Analytic Indicators



故障診斷知識庫配置

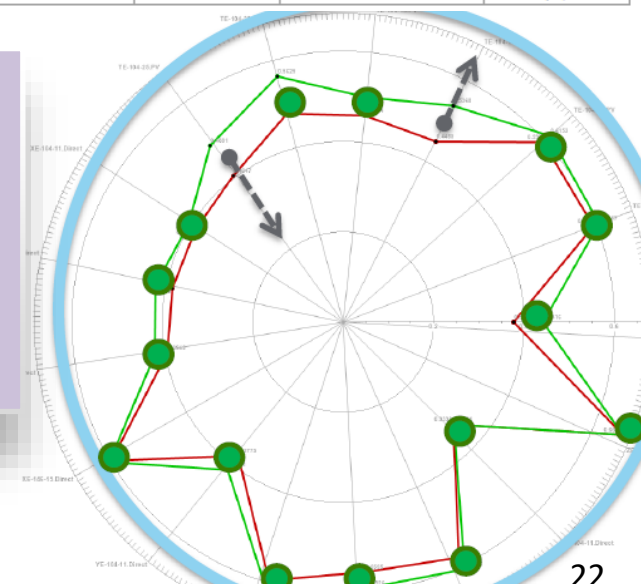
Fault Diagnostics Overview

Faults

Name	Minimum OMR	AIR COMP 1STG BRG TEMP	AIR COMP 1STG BRG VIB	AIR COMP 2STG BRG TEMP	AIR COMP 2STG BRG VIB	AIR COMP 3STG BRG TEMP	AIR COMP 3STG BRG VIB	AIR COMP 4STG BRG TEMP	AIR COMP 4STG BRG VIB	AIR COMP LUBE OIL SPLY TEMP	AIR COMP MTR DE BRG TEMP	AIR COMP MTR NDE BRG TEMP	AIR COMP POWER CONSUMPTION	AIR COMP THRUST BRG AXIAL MVMT
Bearing Temperature Problem 1-2 STG	5	↑		↑						-				
Bearing Temperature Problem 3-4 STG	5					↑		↑		-				
Bearing Vibration Issue 1-2 STG	5	-	↑↓	-	↑↓									
Bearing Vibration Issue 3-4 STG	5					-	↑↓	-	↑↓					
Motor Bearing Temperature Issue	5									-	↑	↑		
Thrust Bearing Issue	5												-	↑↓

結合現場維保經驗

- 可使用現場歷史故障數據 反推各測項走向
- 產出屬於自家的知識，逐漸演進成為設備醫生、設備專家系統
- 方便維護人員，做**設備失效原因診斷**縮短查修、待料、修復時間



Predictive Analytic Indicators

AVEVA™ Predictive Analytics



08/19/2021 12:20 to 08/19/2021 15:20 at 60 Seconds

Date & Time

08/19/2021 1... 08/19/2021 1...

▼ Pump_Sim_001

> Non-Modeled

▼ Pump_Sim_001_LSH

(Overall Model Residual)

Pump_Sim_001.RPM (馬達轉速)

Pump_Sim_001.Temp (馬達溫...)

Pump_Sim_001.Shake_Z (震動...)

Pump_Sim_001.Shake_Y (震動...)

Pump_Sim_001.Shake_X (震動...)

Pump_Sim_001.Pressure (進出...)

Pump_Sim_001.A_T (T相電流)

Pump_Sim_001.A_S (S相電流)

Pump_Sim_001.A_R (R相電流)

Filters

Mark, Hide

Alerts

Threshold, Mark

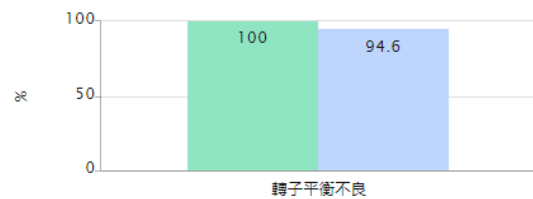
Quality

Mark, Hide

Fault Diagnostics Overview

Faults

Name	Minimum OMR	馬達溫度	震動-Z軸	震動-Y軸	震動-X軸	進出差壓	T相電流	S相電流	R相電流
離心葉片磨損	10		↑			↓	↑	↑	↑
轉子平衡不良	10			↑	↑				
散熱葉片折斷	10	↑		↑	↑				



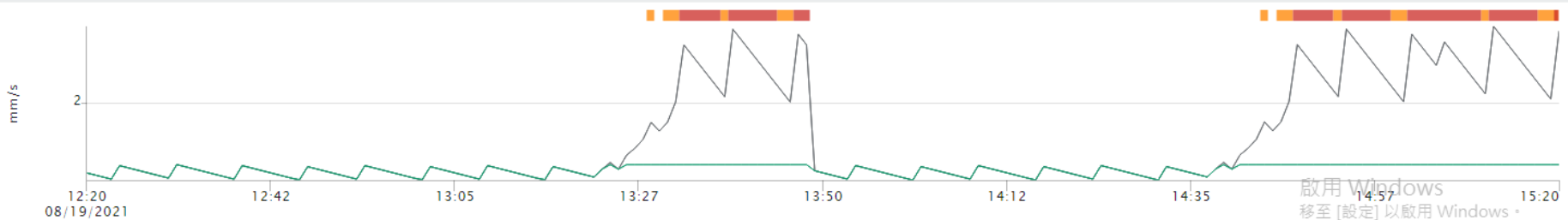
DESCRIPTION

轉子平衡不良

NEXT STEPS

- Step1: 將設備停機、斷電、掛牌。
- Step2: 進行設備檢修
- Step3: 試平衡、試運轉
- Step4: 設備恢復、送電

▼ Pump_Sim_001.Shake_Y (震動-Y軸)



啟用 Windows
移至 [設定] 以啟用 Windows







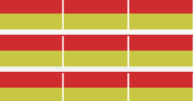















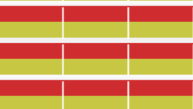














Web Client 即時監看設備狀態

05-21-2015 16:51:55

Clear Filters





Auto Refresh

Hierarchical View ▾

Name	Alarm State	Current Status	Alarms	Earliest Alarm	Latest Alarm	Warnings	5 Day Event History (days)
<ul style="list-style-type: none"> New Escalation Test - New Escalation Test - Pending 	  	  	258 129 129	05-18-2015 15:59:09 05-18-2015 15:59:14 05-18-2015 15:59:09	05-21-2015 16:51:10 05-21-2015 16:51:09 05-21-2015 16:51:10	514 257 257	
<ul style="list-style-type: none"> Sensor Escalation Test - Sensor Increased Escalation Test - Sensor Normal Escalation Test - Sensor Pending 	   	   	387 129 129 129	05-18-2015 15:59:09 05-18-2015 15:59:09 05-18-2015 15:59:09 05-18-2015 15:59:09	05-21-2015 16:51:10 05-21-2015 16:51:10 05-21-2015 16:51:10 05-21-2015 16:51:10	762 254 254 254	
<ul style="list-style-type: none"> Rollup Two Acknowledge Escalation Test - Acknowledge 	  	  	516 129 129	05-18-2015 15:59:09 05-18-2015 15:59:14 05-18-2015 15:59:14	05-21-2015 16:51:10 05-21-2015 16:51:09 05-21-2015 16:51:09	1,028 254 254	
<ul style="list-style-type: none"> Model Escalation Test - Model Increased Escalation Test - Model Normal Escalation Test - Model Pending 	   	   	387 129 129 129	05-18-2015 15:59:09 05-18-2015 15:59:09 05-18-2015 15:59:09 05-18-2015 15:59:09	05-21-2015 16:51:10 05-21-2015 16:51:10 05-21-2015 16:51:10 05-21-2015 16:51:10	774 258 258 258	
<ul style="list-style-type: none"> Transformers Transformer 1 	 	 	14 14	05-11-2015 14:25:50 05-11-2015 14:25:50	05-21-2015 16:50:54 05-21-2015 16:50:54	15 15	

Transformer 1

Clear Alarms

Description	Name	Alarm Criticality	Alarm Status	Current Status	Alarms	Earliest Alarm	Latest Alarm	Warnings
Transformer 1 Overall Model Residual	PETER.ARCHIVE.2148OMR				14	05-11-2015 14:25:50	05-21-2015 16:50:54	14
Acetylene	PETER.CALCTEST.C2H2							1

應用情境與案例分享

The background features a hand holding a transparent cube. A line graph with an upward-trending arrow is overlaid on the cube. The overall theme is data analysis and application.

PRiSM APPLICATION ON PROCESS EQUIPMENT

Furnaces

- PRiSM應用範疇：
 - 效率監測
 - 管線積垢或焦化預警
(Tube fouling / coking)
 - 管線裂縫預警
(Tube crack)

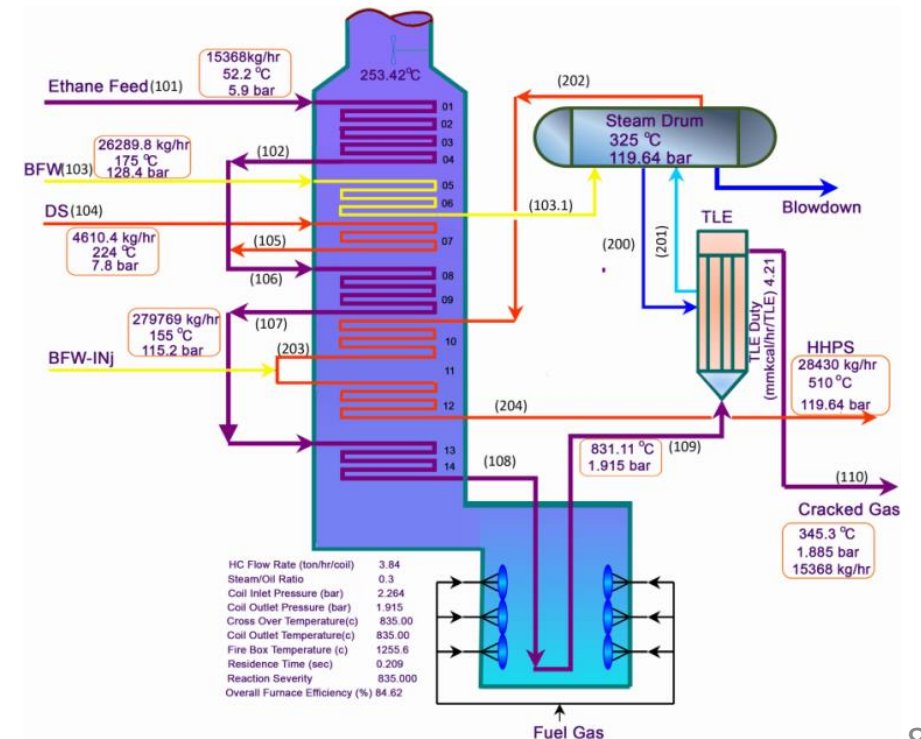


PRiSM APPLICATION ON PROCESS EQUIPMENT

Ethylene Cracking Furnace

- Ethylene Cracking Furnace

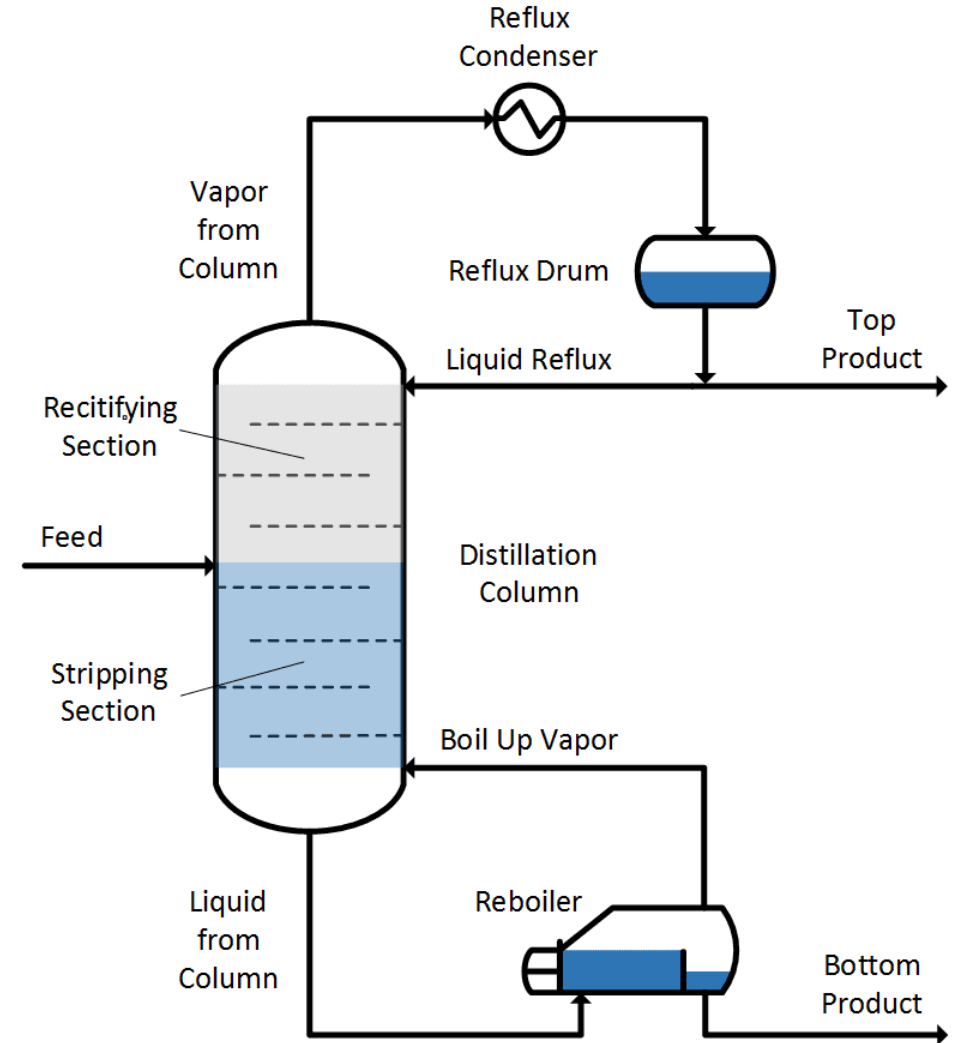
- Thermal efficiency monitoring
- Tube performance monitoring, abnormal coking rate early warning
- Tube crack early warning
- Burner performance monitoring



PRiSM APPLICATION ON PROCESS EQUIPMENT

蒸餾塔(Distillation columns)

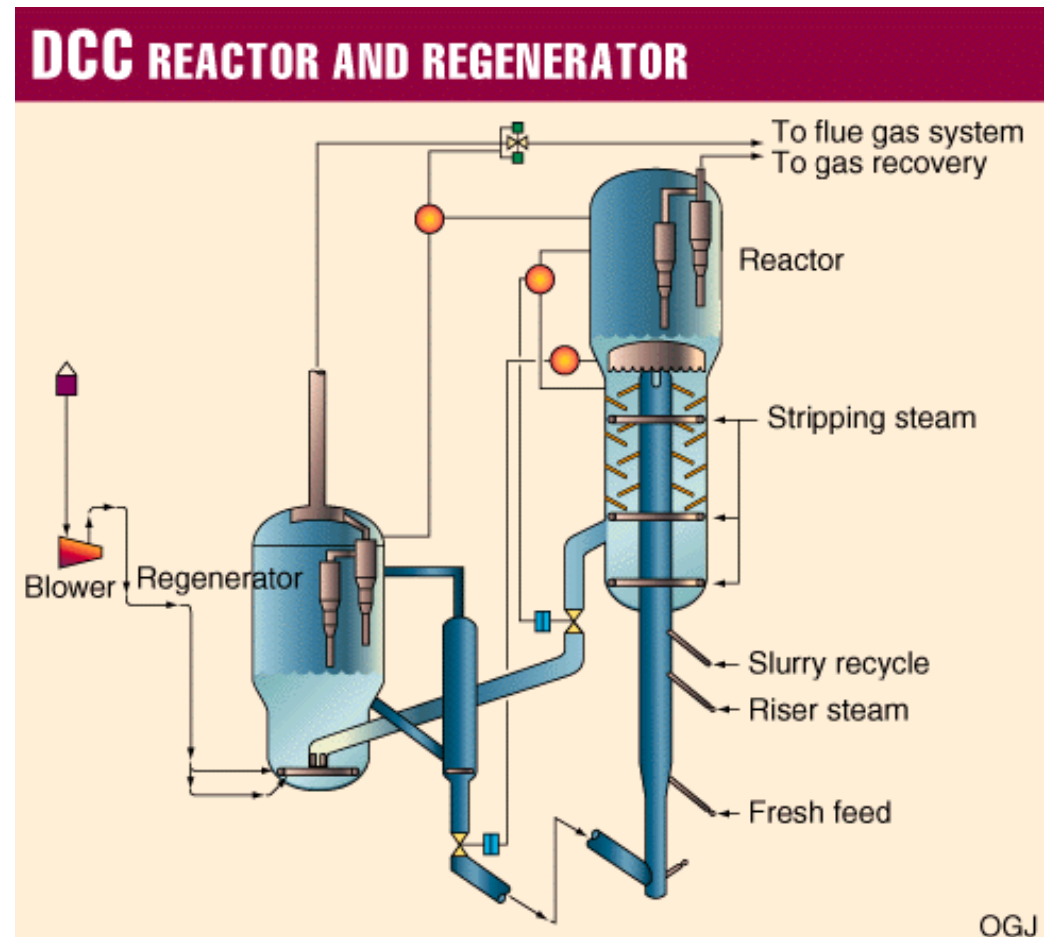
- PRiSM應用範疇：
 - Tray 效率監測
 - 阻塞預警
 - 渠流預警(Channeling)
 - 溢流/起泡/液漏預警
(Flooding / foaming / weeping)



PRiSM APPLICATION ON PROCESS EQUIPMENT

反應器(Reactor)

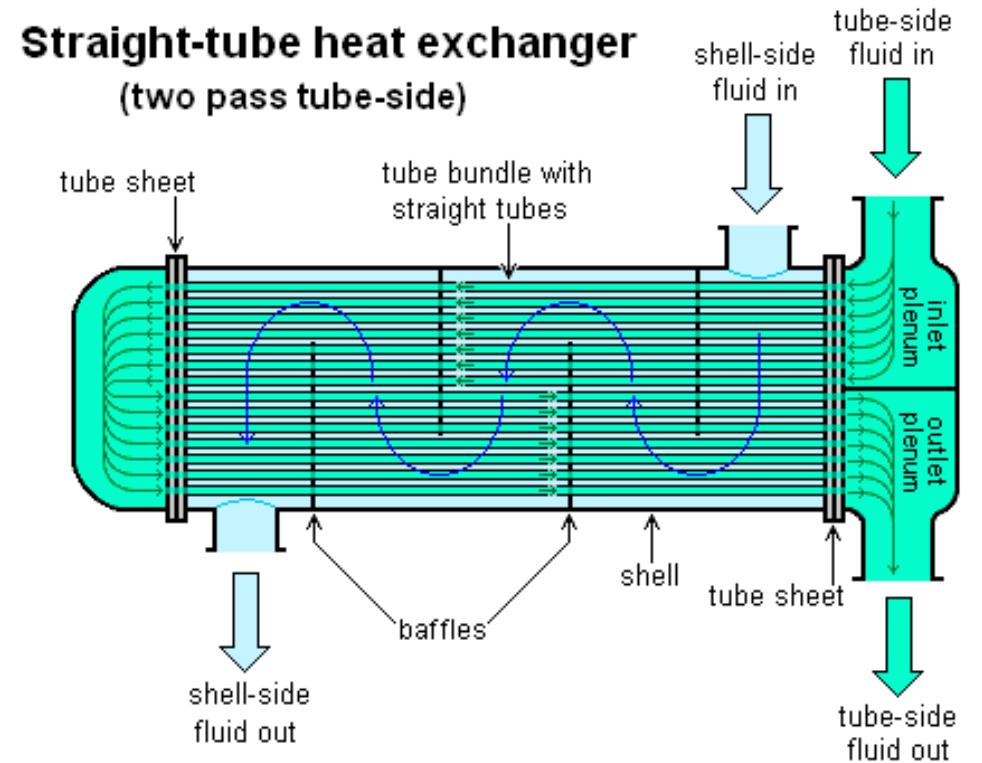
- PRiSM應用範疇：
 - 觸媒中毒/失活預測
(Catalyst poison / deactivation)
 - 整體性能監測
(Overall performance monitor)



PRiSM APPLICATION ON PROCESS EQUIPMENT

鍋爐 / HXs / WHR

- PRiSM應用範疇：
 - 阻塞預測(Fouling prediction)
 - 洩漏檢測(Leak detection)



PTT Global Chemical -Thailand

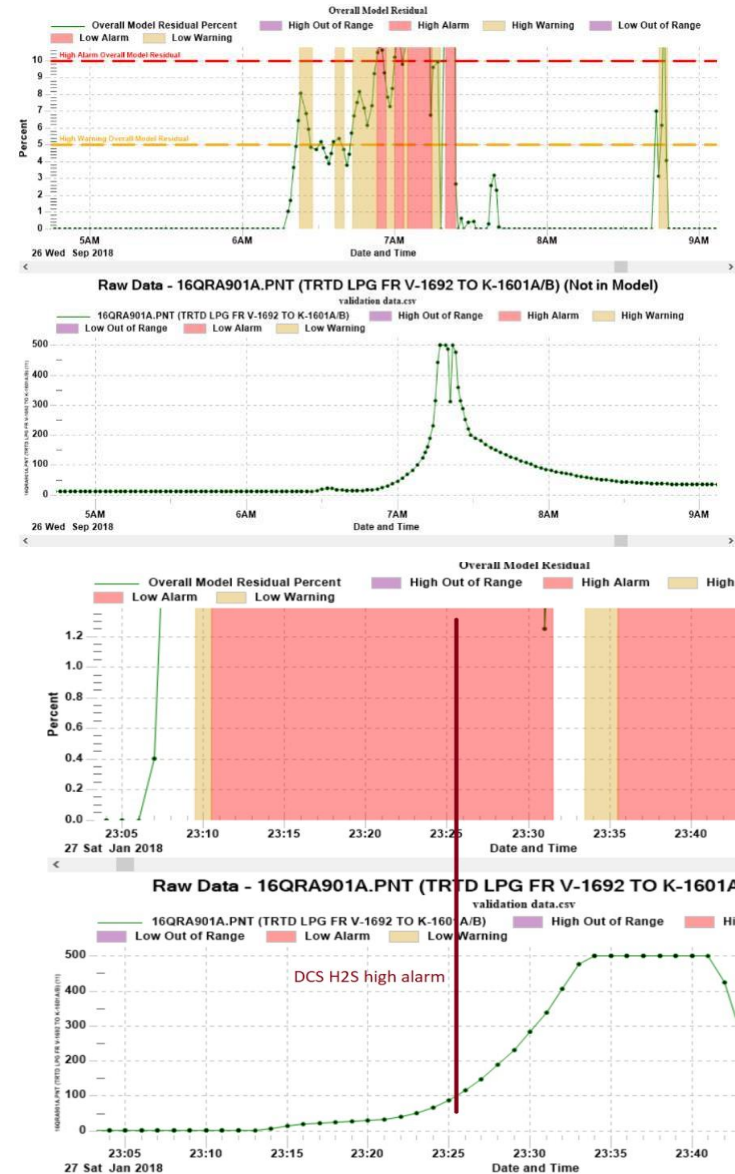
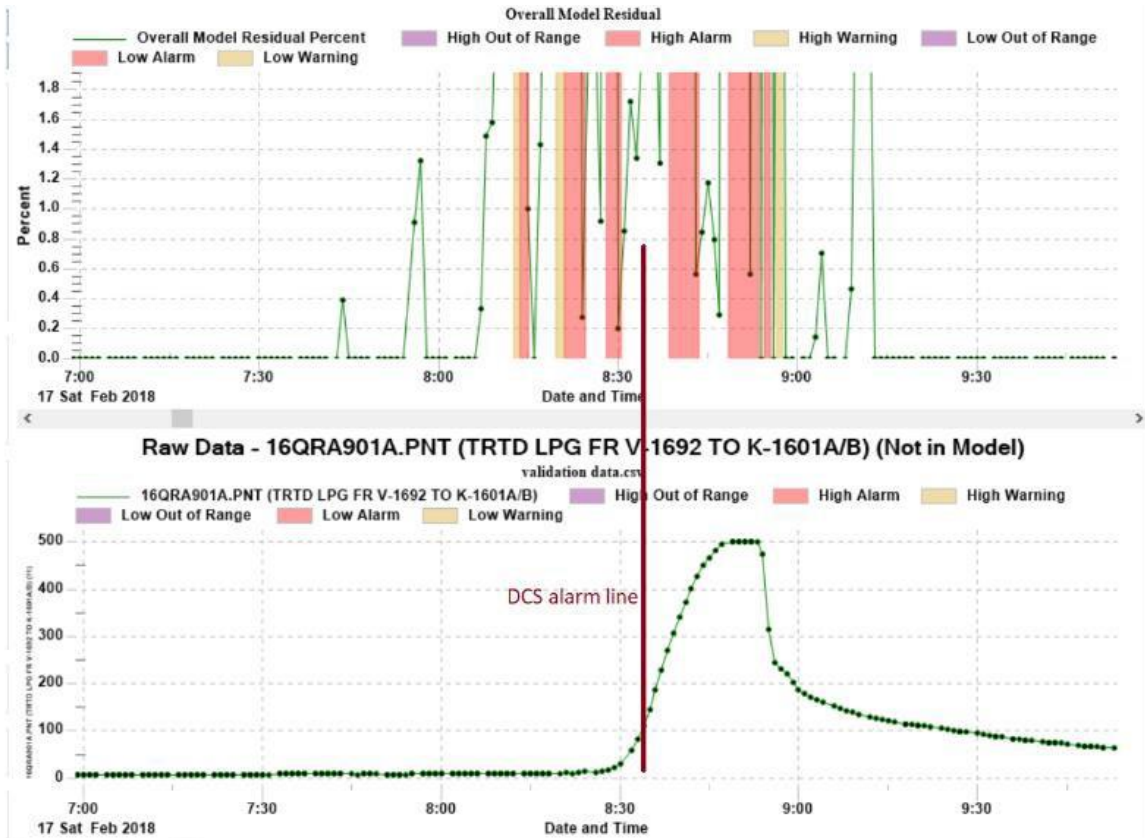
Plant	No. of Models	Equipment
[Redacted]	10	Centrifugal Compressor
		Steam Turbine
[Redacted]	10	Reciprocating Compressor
		Electric Motor
[Redacted]	30	GE FR5 GT
		GE FR6 GT
		Steam Turbine
[Redacted]	30	1xReactor
		2xCentrifuge
		1xAir Compressor
[Redacted]	60	3xCentrifugal Compressor
		2xRecip Compressor
		Centrifugal Blower
		Centrifugal Pump
		Gas Turbine
		Steam Turbine

PTT Global Chemical -Thailand



Result:

PRiSM is able to predict foaming before H₂S alarm registered in DCS

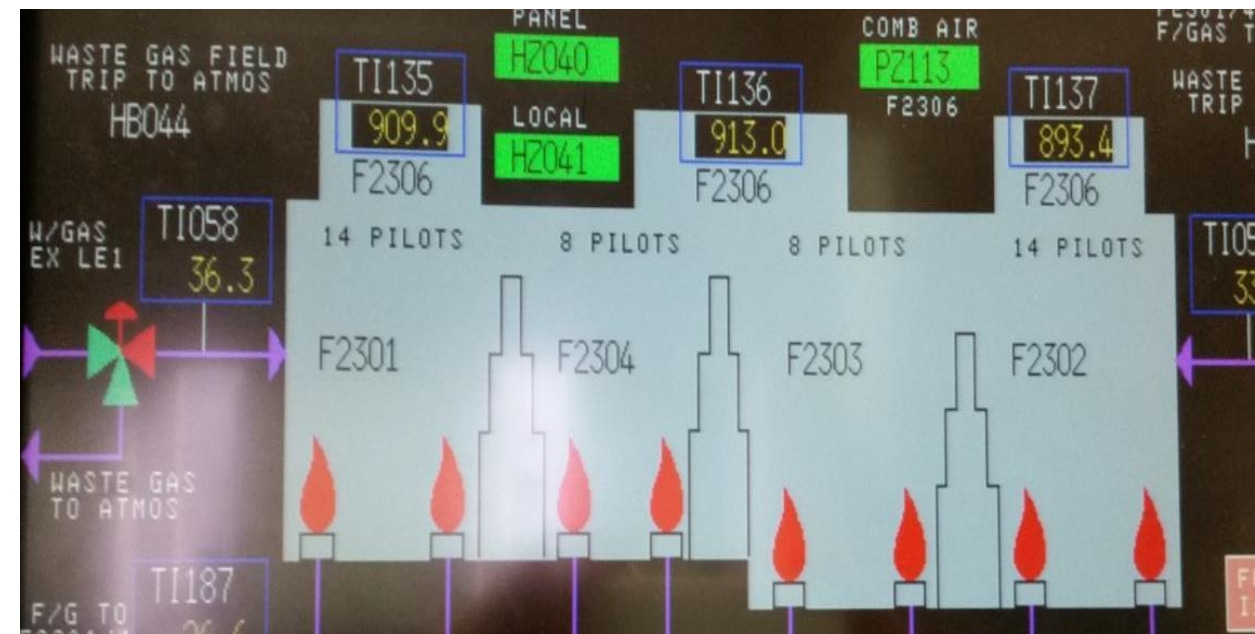


VIVA Energy (Refinery) - Australia



Project summary:

- 第一階段包括以下設備：
 - 5 furnaces (4 CCR reactor heating, 1 MF reboiler)
 - CCR main fractionator
 - Shell and tube heat exchanger
 - Fin fan heat exchanger
 - Cooling water heat exchanger
 - Texas tower heat exchanger

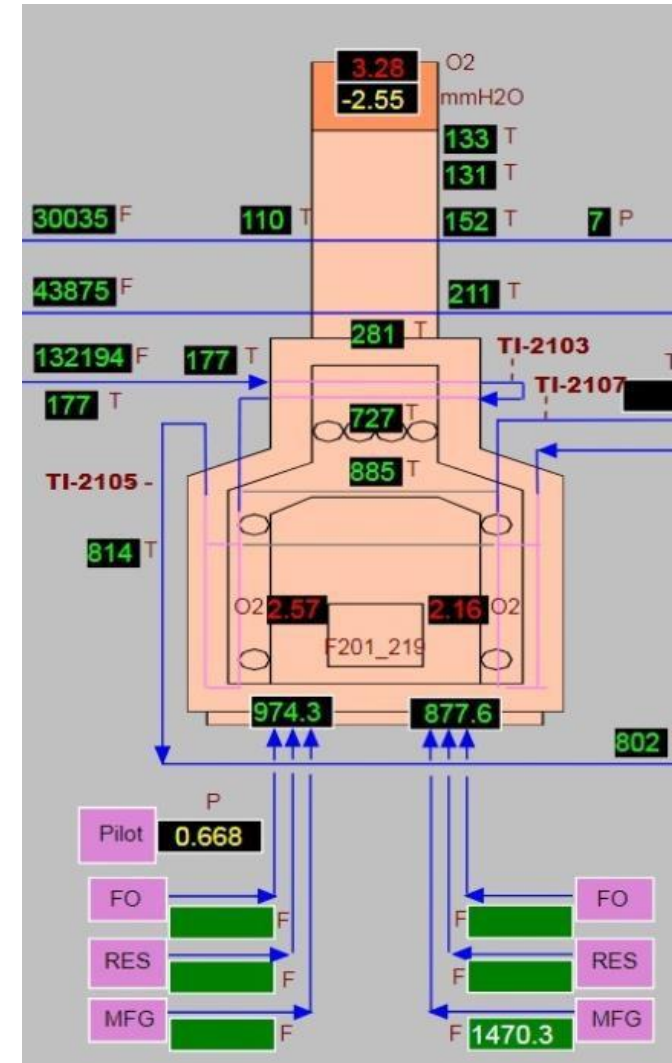
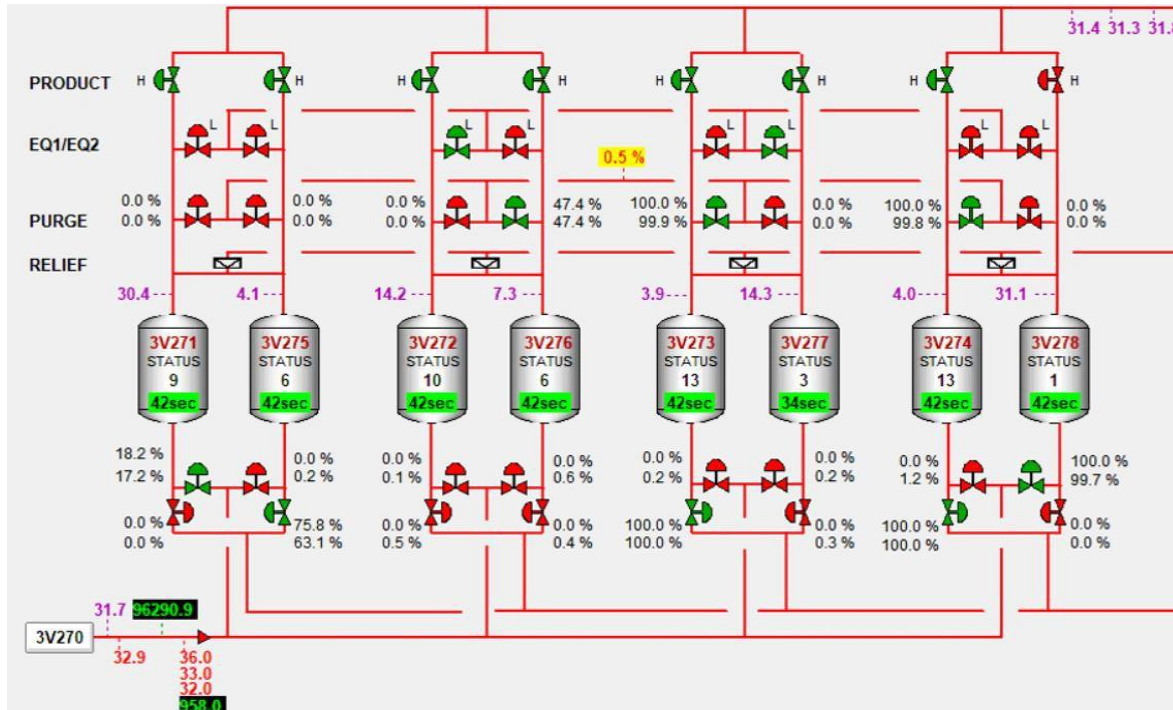


Formosa Petrochemical Group – Taiwan



台塑企業
FORMOSA PLASTICS GROUP

- 2019 年 3 月初啟動 Pilot Project
- 8 項資產 30 模型
- 2 furnaces included in the scope
- UOP PSA included in the scope



業界認可的技術



業界認可的技術

監測全球超過 480,000 MW 的發電機組容量與 20,000+ 套資產



核電系統
2 項TIP & 技術轉移獎項
17 套機組



電力系統
超過 12,000個 燃氣、燃
煤、核電、可再生系統
的模型 ;191 套機組



發電系統
5 套800MW
超臨界機組



核電系統監控
國內首套
2 套機組



電力系統
76 個燃煤電廠
15 套燃氣機組



發電系統的監控
燃煤、燃氣
46 套機組

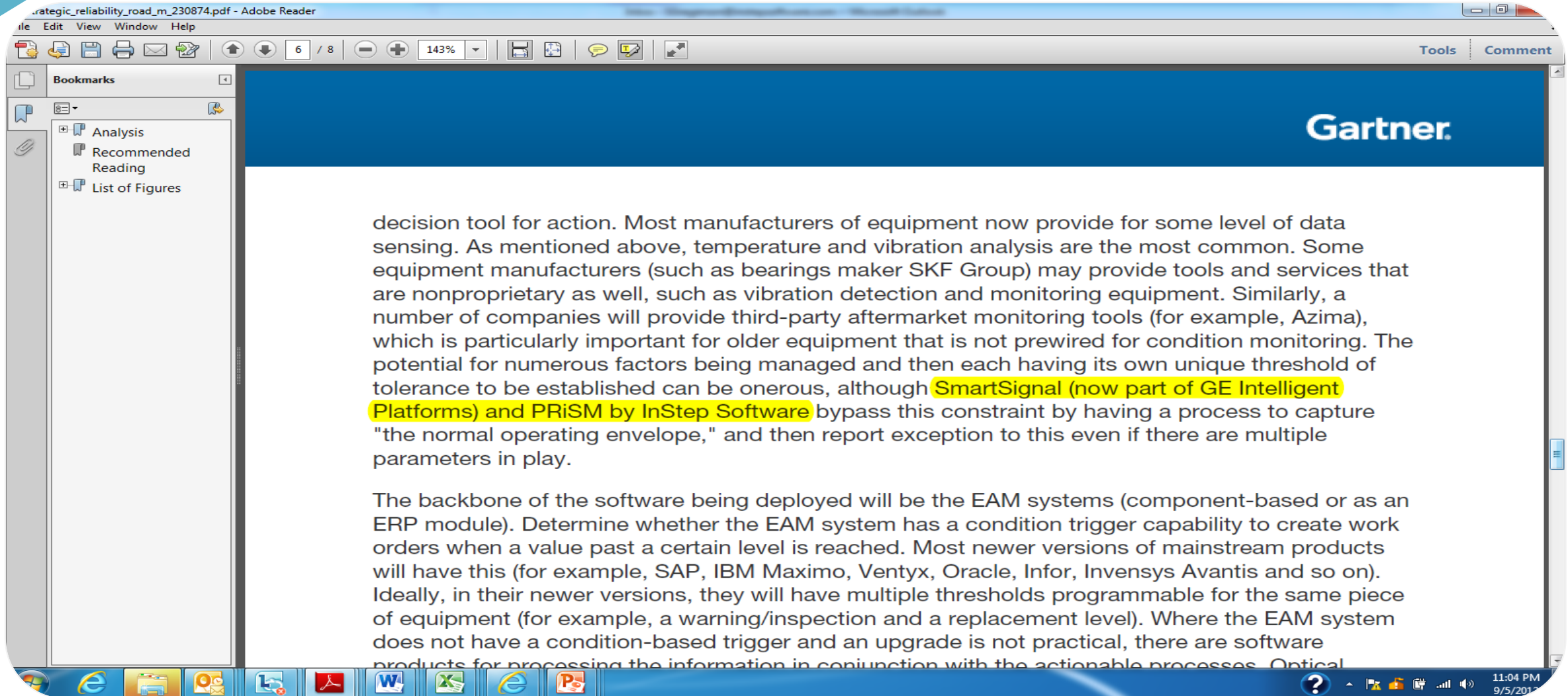


電力系統
燃氣輪機, 水電與核電監控
76 套機組



電力系統
燃煤機組
10個設備

領先諮詢企業的認可



Gartner 調查報告 (全球最具權威的IT研究與顧問諮詢公司): 工業市場內僅有兩個可以提供預測性主動運維策略的軟體

PRiSM 特色與效益

不須撰寫
程式能力

提供REST API

Web
即時監看設備狀態

PRiSM使用優點

資料來源多樣化
視覺化關聯數據清洗

內建演算法，快速建模
(效能模型、機械模型)

數據回測、驗證模型並將偏
移原因進行分析(故障診斷)

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UTITECH TECHNOLOGY CO.,LTD.

**TFab Inc**
薈智創新科技股份有限公司



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