

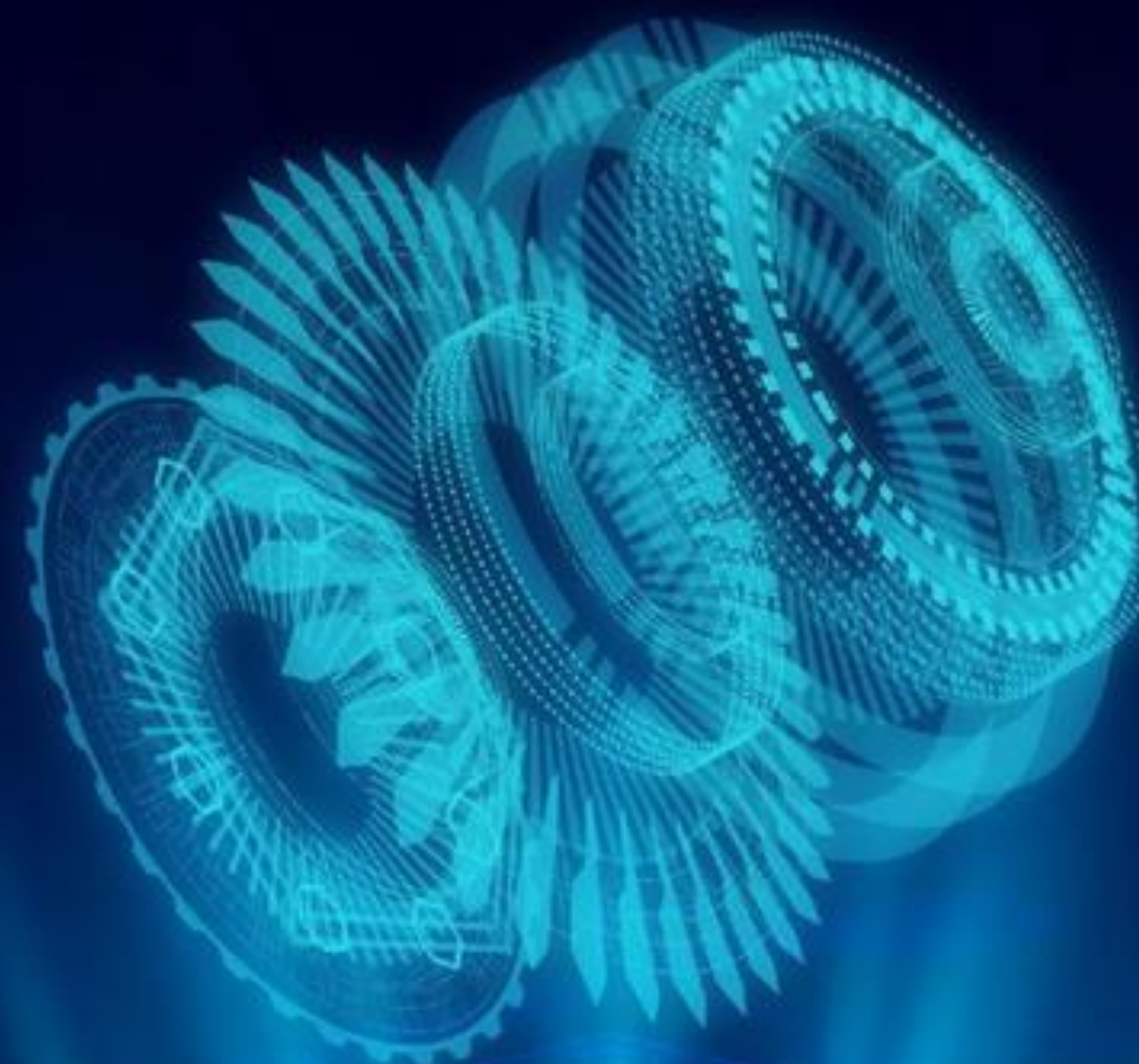


A subsidiary of PTT Plc.

THE SOOTHSAYER

"Your Asset Reliability Partner"

PREDICTIVE MAINTENANCE
AND MACHINE MONITORING SOLUTION



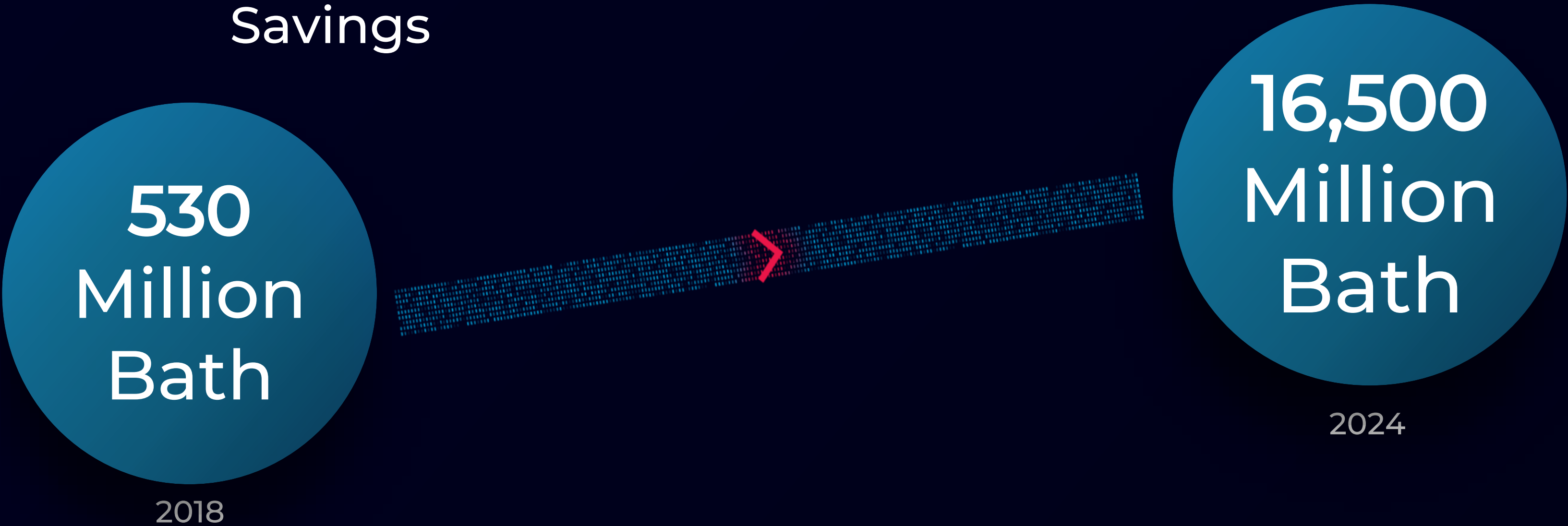
HarvardX



Predictive Maintenance initiatives saved organization

GLOBAL ANNUAL
COST AVOIDANCE

Global Predictive Maintenance
Savings



Driven by parallel advances in many fields, namely:

Advance sensing technologies

Improved IoT architectures

New Connectivity options

Cutting edge data science, machine learning & artificial intelligence techniques



PATIPHAT SUMRONGTHONG
General Manager



CHAIWAT CHATIYANON
Chief Technology Officer



NATTAPONG SIRALAPPANICH
Associate Vice President of Technology Development.



SASIS SAWARTSUT
Data Scientist



SATHIDPORN CHANCHAROEN
Data Scientist

JITSIRI ROONG-IN
UX/UI Developer



SARAN JAIUA
Chief Operation Officer



PONGPITAK PUANGKAMLAI
Rotating equipment engineer



ARKOM SUTTHIBORIBAN
Rotating equipment engineer



PIYAWAT SUETRONG
Data Scientist



NATTASIT HUANKRAJAI
Data Scientist



NUTYATIP SUKSAWASD
Chief Business Development Officer



MATURADA JINACHIT
Technical Sales Engineer



PROMPORN PROMWUNGKWA
Technical Sales Engineer



SARA HENNIKER
Sales support

OUR CLIENTS



Machines

on our system and monitoring services

GAS TURBINE (41 Unit)

SIEMENS

Solar Turbines
A Caterpillar Company



COMPRESSOR (43 Unit)



GEARBOX (10 Unit)

VOITH

FLENDER

GENERATOR (13 Unit)

ABB

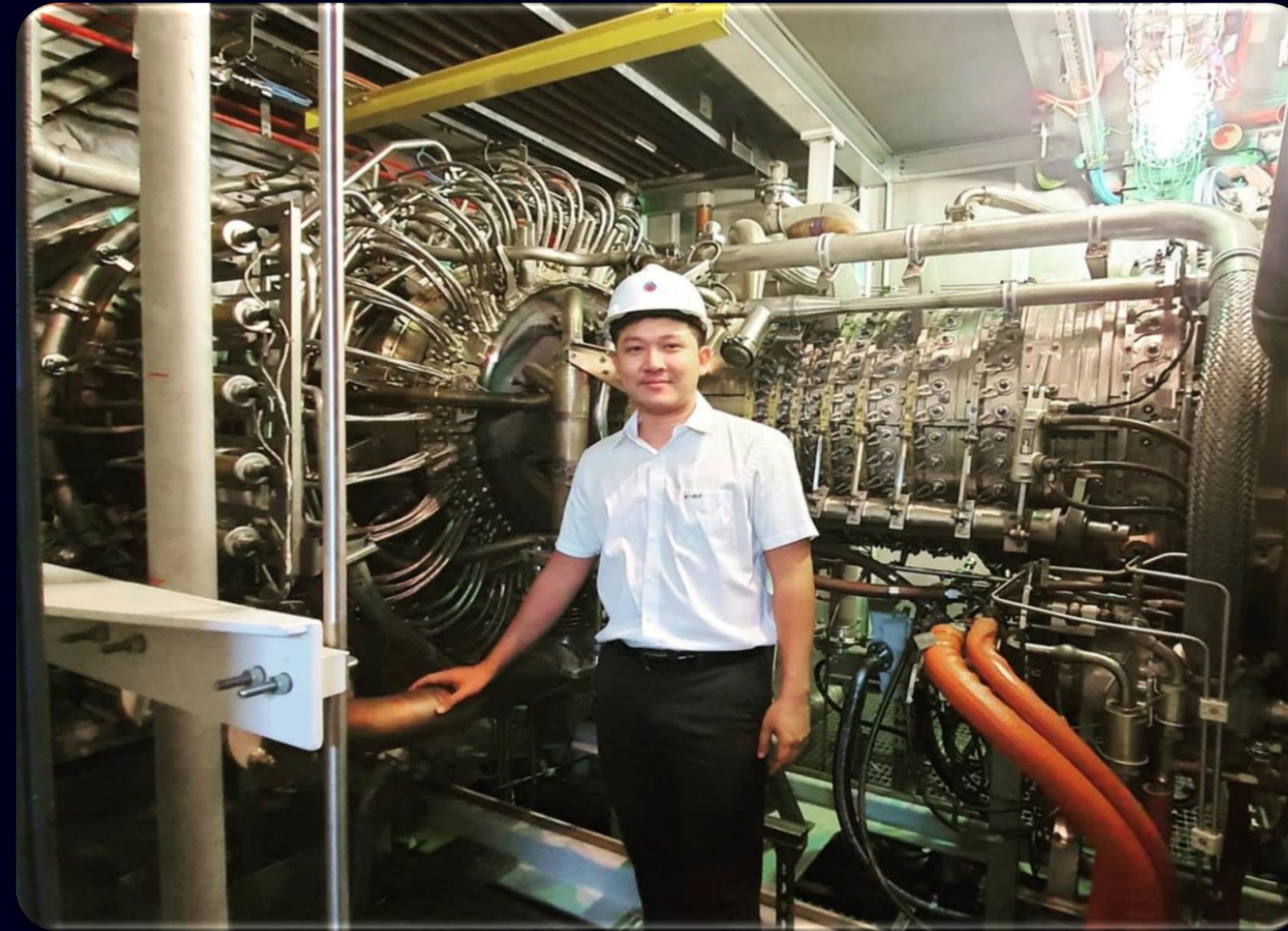


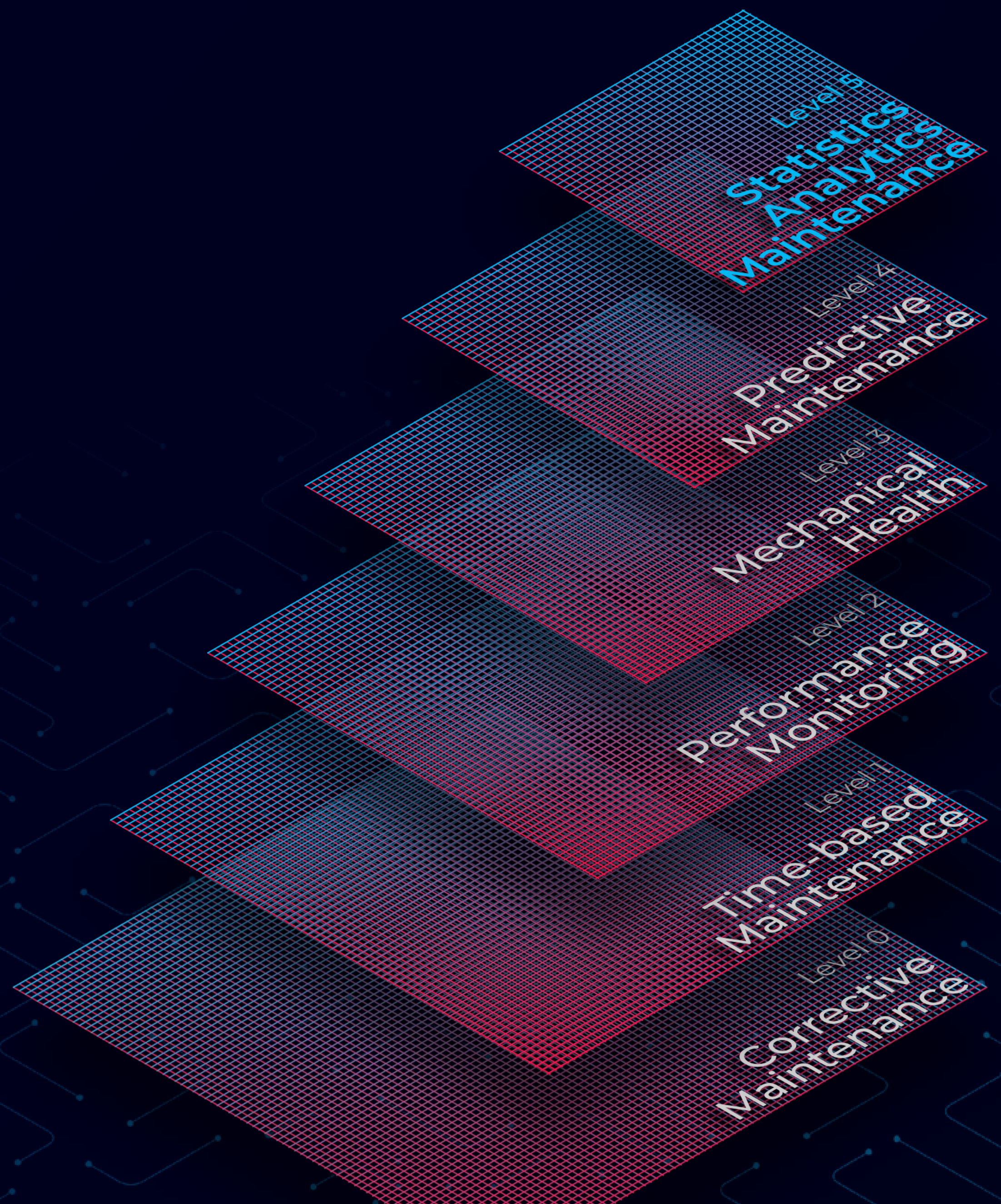
PUMP (7 Unit)

SULZER



OUR Experience



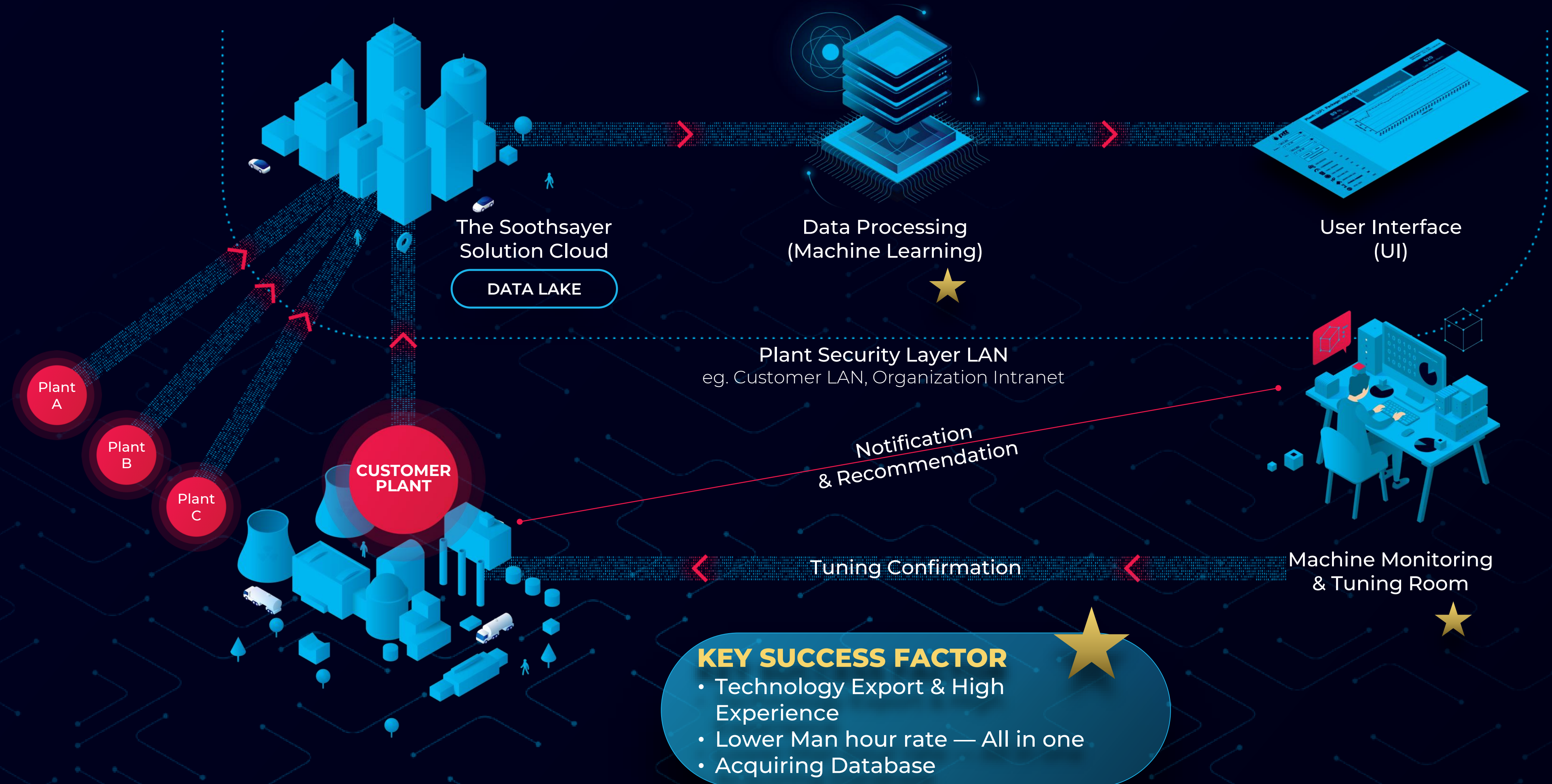


**THE
SOOTHSAYER**
"Your Asset Reliability Partner"

Since 2014, The Soothsayer has effectively saved clients
more than THB 2,000 Million
and prevented weeks of unplanned shutdown.

THE SOOTHSAYER **HOSTED SOLUTION**

1. THE SOOTHSAYER PREDICTIVE MAINTENANCE SOLUTION



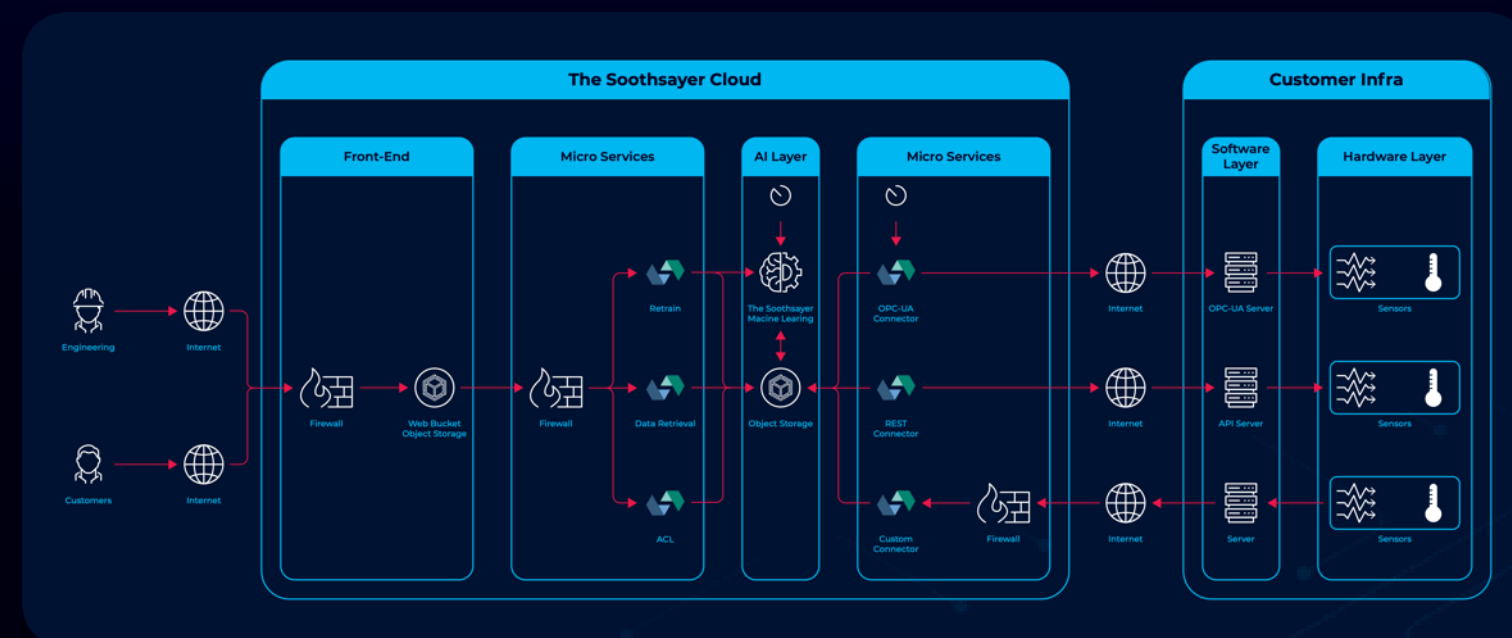
THE SOOTHSAYER

"Your Asset Reliability Partner"

All in One

TOOL

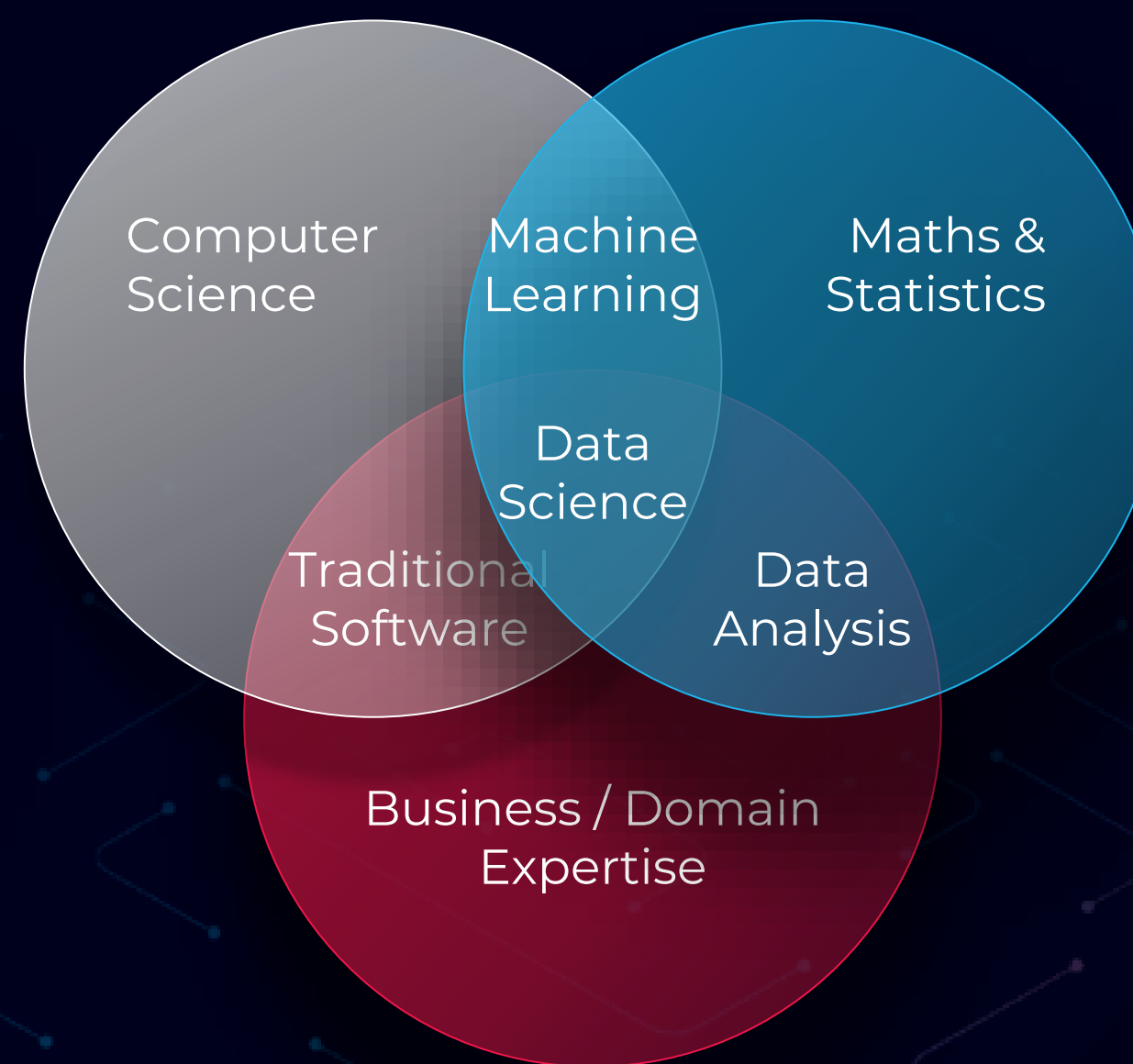
The Soothsayer Platform



TEAM



One Team



BENEFIT

Predictive Monitoring



Early Detection of failure

Alert on anomalous event

Maintenance Recommendation

Data Centralization

Feasible to tune or create new model

PREDICTIVE

Our team of engineers let the system of artificial intelligence software take control to

PREDICT

MECHANICAL FAILURES

PREVENT

UNPLANNED SHUTDOWN

SAVE

MAINTENANCE COST
PRODUCTION LOSS

THE SOOTHSAYER Dashboard

THE SOOTHSAYER

Region I Gas Pipeline Operations Division

Company Description

Dashboard

Retraining history

Report Centre

Recent View

Component 708-cx-002

Notification Center

All in one Analytic screen

Component 706-cx-001

Component 706-cx-002

Alert Box

707-cx-002 This is mockup Content, current window, and forces the browser to read the message. Do not overuse this method.

Visit Now !

Thor Odinson

Engineer

Region I Gas Pipeline Operations Division

Company Description

GP0D : Sara Buri

89.00%

+10.00%

GP0D : Kanchanaburi

30.00%

-10.00%

GP0D : Samut Prakan

61.00%

-2.00%

GP0D : Bangkok

90.00%

+5.00%

GP0D : Rayong

90.00%

+4.50%

GP0D : Songkhla

90.50%

+4.50%

Plant Location

Plant

GP0D : Songkhla

90.50%

Health Score

95%

Performance

6 Packages

47 Components

4.5% Last Day

GP0D : Samut Prakan

61.00%

Health Score

50%

Performance

6 Packages

47 Components

2.0% Last Day

GP0D : Kanchanaburi

30.00%

Health Score

30%

Performance

6 Packages

47 Components

10.0% Last Day

GP0D : Songkhla

90.50%

Health Score

95%

Performance

6 Packages

47 Components

4.5% Last Day

GP0D : Samut Prakan

61.00%

Health Score

50%

Performance

6 Packages

47 Components

2.0% Last Day

GP0D : Kanchanaburi

30.00%

Health Score

30%

Performance

6 Packages

47 Components

10.0% Last Day

Watch Out

Component

Component Name 01

708-cx-001

31.50%

35%

-4.50%

Health Score

Performance

Last Day

Machine

Machine Name 01

GSP1

Retaining

Machine

Machine Name 02

GSP2

Shutdown

Compressor

Prediction & Actual

Prediction

avg_706e26cdj1-2

Plant GSP1

Package 706-cx-001

07 Jan

100.00%

92.50%

Deviation

01 Jan

02 Jan

03 Jan

04 Jan

05 Jan

06 Jan

07 Jan

08 Jan

09 Jan

10 Jan

11 Jan

12 Jan

thesoothsayer © 2020 - 2021

Executive Summary Report

3

Summary Report

May 2021

THE SOOTHSAYER
"Your Asset Reliability Partner"
Alpha Com Company Limited

Address: 555/1 Energy complex building A, Floor 10th floor,
Vibhavadi-Rangsit Rd., Chanukah, Bangkok 10900 Thailand

No new case issue for May 2021

Follow up issue from April

Severity 1 Major issue (Trending to be Real alarm or machine problem) as Apr-2021

Total 4 issue

Severity	Plant	Machine name	Machine tag	System1 Status	Soothsayer Status	Problem issue	Recommendation action
1	GSP5	RFC GSP5	3507CO1B	OK	Lube oil	1. Finding L/O filter diff pressure Step up after and continue trending up	<ul style="list-style-type: none">Monitor and trendingSwitching filter for monitor L/O filter dPWaiting for oil lab result (JAN2021)When stopped unit should be check filter by sightseeing particle
1	ESP	SGC ESP	3206C001	HW Alarm	Motor	1.Motor DE & NDE vibration alarm & Seal slight rubbing rubbing(moton effect)	<ul style="list-style-type: none">Monitor and trending
1	GSP6	RFC GSP6	3607C001	OK	Motor	1. Motor DE & NDE Vibrationtrending up	<ul style="list-style-type: none">Monitor and trendingRecheck lube oil cooling water system
1	GSP2	RFC GSP2	788C01R	SW alarm	Power turbine	1. Power turbine bearing #5 vibration was step up significantly	<ul style="list-style-type: none">Keep monitor and trendingNotify to machine OEM for confirm machine condition

Severity 2 Minor issue (Other Change of machine behavior not heading to shutdown) as Apr-2021

Total 6 issue on this month

Severity	Plant	Machine Name	Machine tag	System1 Status	Soothsayer Status	Problem issue	Recommendation action
2	GSP2	SGC GSP2	786CX02R	OK	Gas turbine	1. Gas turbine axial vibration was increased 2. Bearing #1 vibration amplitude decreased	<ul style="list-style-type: none">Keep monitor and trendingNotify to machine OEM for confirm machine condition
2	ESP	GTG6	3225PG01A	OK	Power turbine	1. Power turbine disc end (Y) gap voltage changed significantly	<ul style="list-style-type: none">When unit stop for maintenance of power turbine, probe vibration condition and mounted installation should be checked.Keep monitor and trending vibrationNotify to instrument division to recheck probe installation
2	GSP6	RFC GSP6	3607-C-001	OK	OK	1. Compressor bearing temperature NDE side changed significantly	<ul style="list-style-type: none">Over all condition considered machine running in normal condition,Keep monitor and trendingIf unit stop for maintenance compressor bearing should be inspected
2	GSP6	RFC GSP6	3607-C-001	SW alarm	OK	1. Motor DE vibration founded spike signal	<ul style="list-style-type: none">Keep monitor and trending
2	GSP2	SGC GSP2	786-CX-02R	OK	Gas turbine	1. Gas turbine bearing #1 drain temperature increased 20 DEGC approximately	<ul style="list-style-type: none">Keep monitor and trending
2	GSP1	RFC GSP1	707-CX-01	SW alarm	OK	1. Finding Vibration spike Signal NDE steam turbine side (probe Y)	<ul style="list-style-type: none">Keep monitor and trending

11

Summary Report

May 2021

THE SOOTHSAYER
"Your Asset Reliability Partner"
Alpha Com Company Limited

Address: 555/1 Energy complex building A, Floor 10th floor,
Vibhavadi-Rangsit Rd., Chanukah, Bangkok 10900 Thailand

4. Equipment Refrigeration gas compressor Tag: 788CX-01R #GSP.2

Component: Power turbine

Severity 1

Problem issue 1. Power turbine bearing #5 vibration was step up significantly



POWER TURBINE Prediction & Actual
Plant: GSP2 Package: 788-CX-01R

Report Date: May 31, 2021
Data Date: May 31, 2021 8:00:00 AM

RPI Type: GSP2_REF100_PT_TV355XY_V5_03804

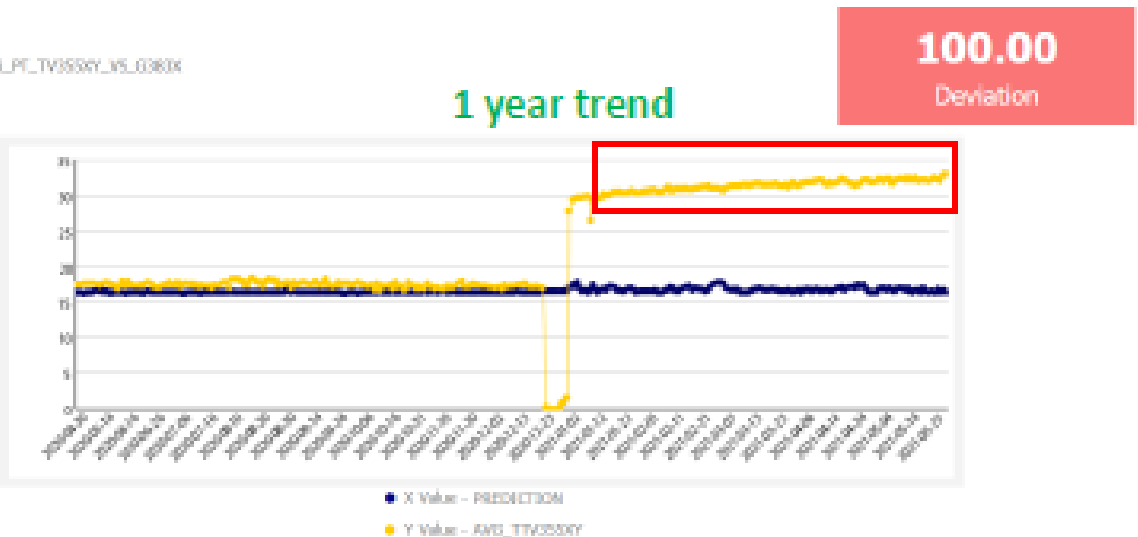
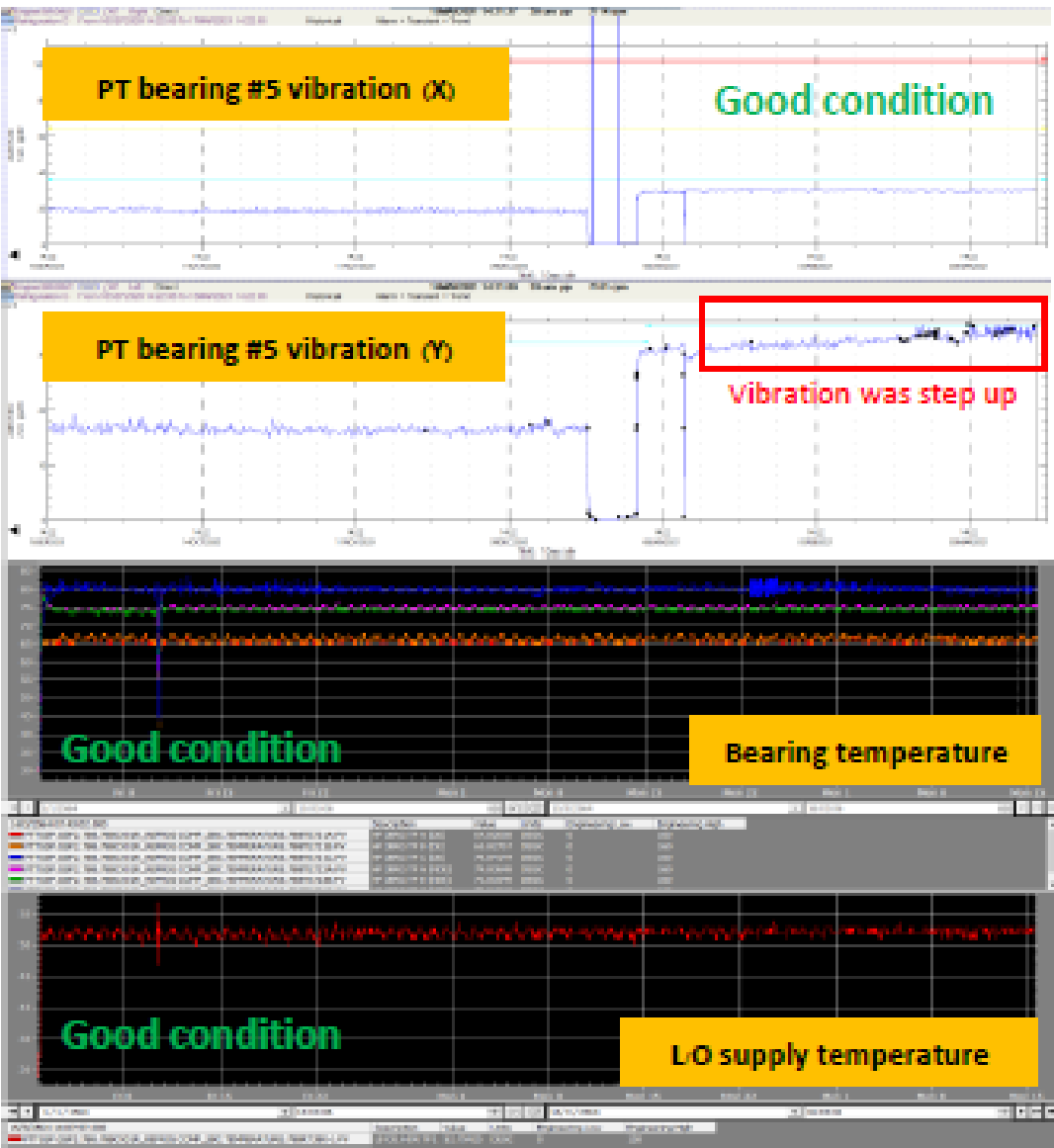


Fig. 1.1 Power turbine Bearing #5 vibration trend plot

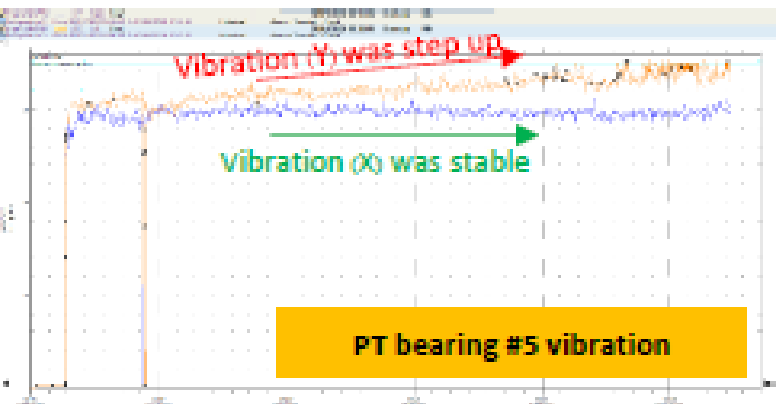


Finding cause

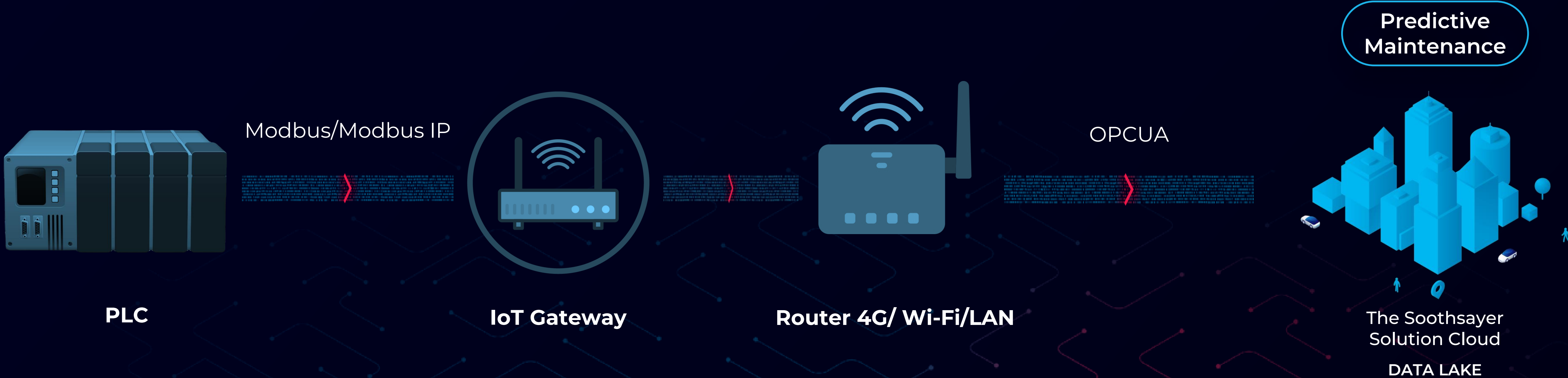
- PT bearing #5 probe Y was step up 1 um per month approximately while probe X was stable.
- Bearing temperature all position was stable.
- Lube oil supply temperature was stable.

Recommendation

- Keep monitor and trending
- Notify to machine OEM for confirm machine condition

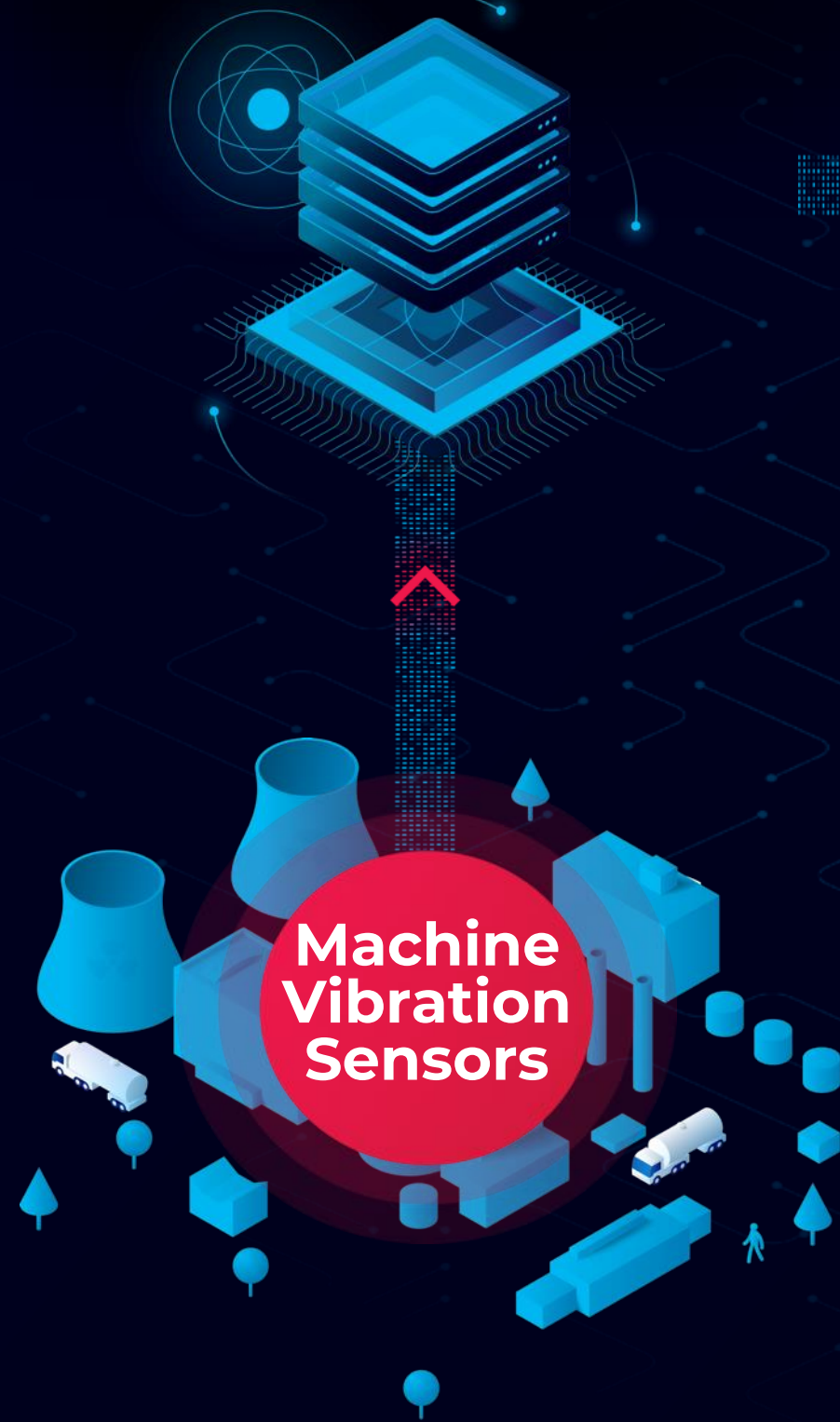


2. The Soothsayer IoT Gateway Solution



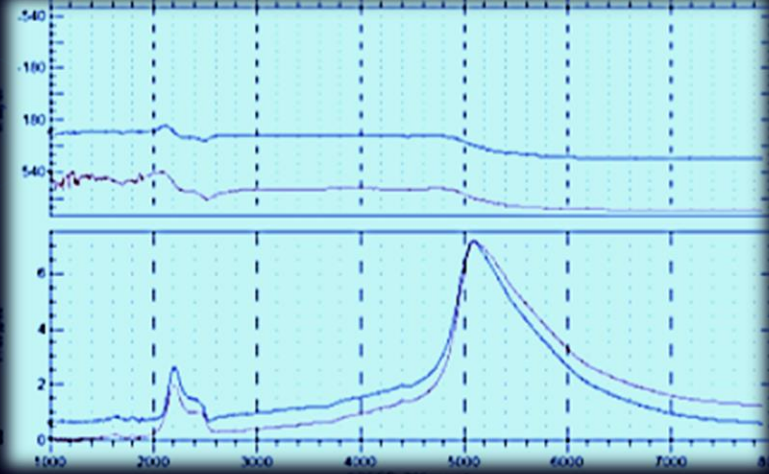
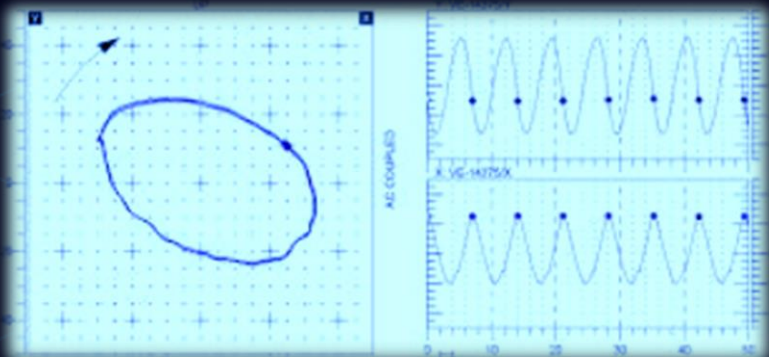
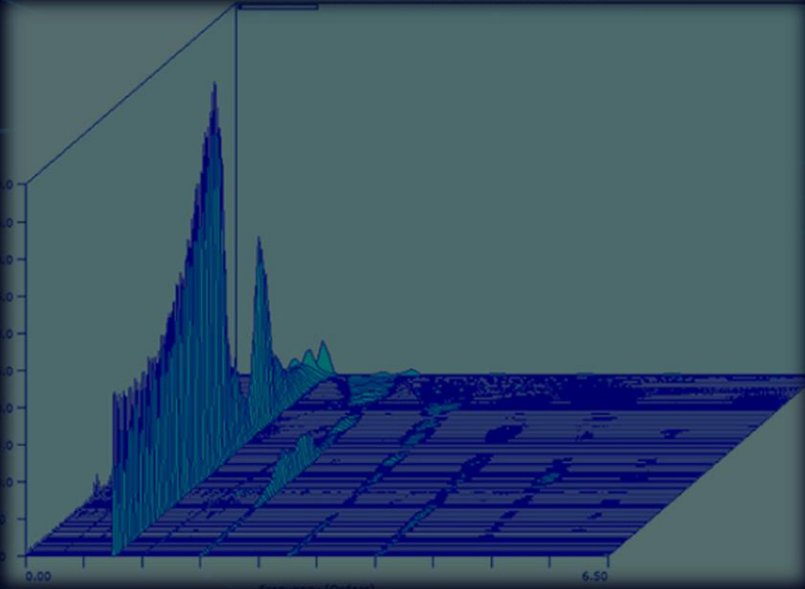
3. THE SOOTHSAYER Remote Vibration Monitoring Service

Vibration Monitoring System



Remote Access

Notification
& Recommendation



Example

Remote Vibration Monitoring Service Report

Gas turbine compressor

- GTCB

Abnormal detected



When GG rotor coasting down, **Amplitude was increased** higher than historical.

Recommendation

Lube oil parameters such as temperature, viscosity and pressure that could be affect to **damping of system** should be checked.

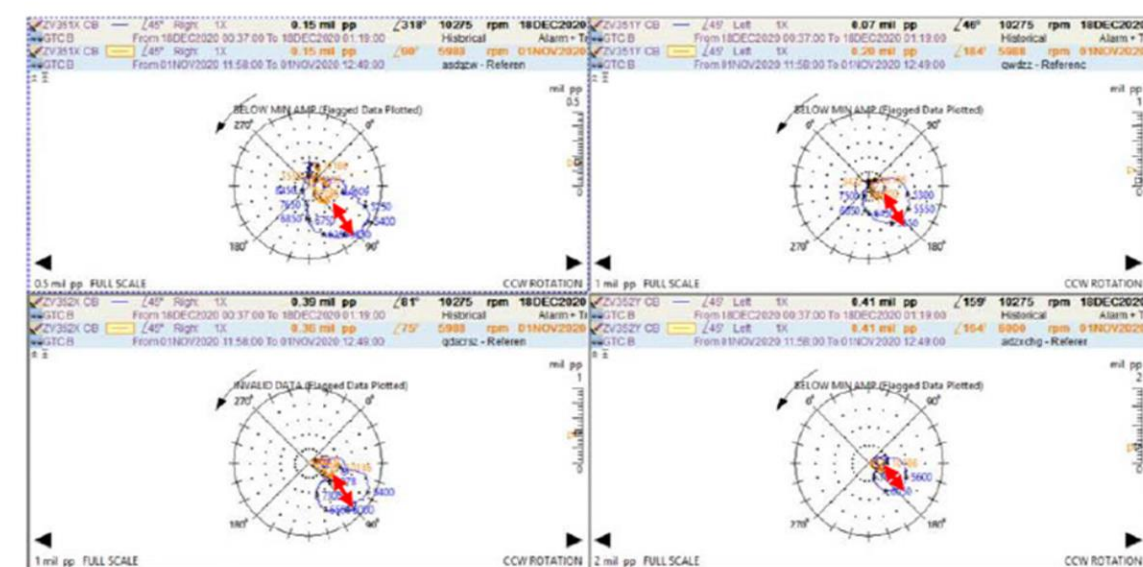


Fig. 16.12 Gas turbine vibration 1X phase and amplitude at front-center position

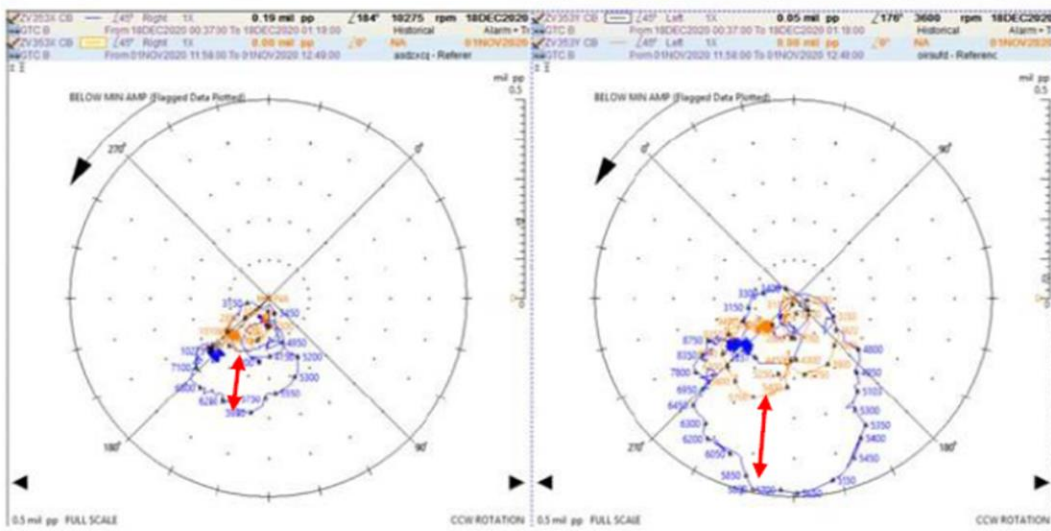


Fig. 16.13 Gas turbine vibration 1X phase and amplitude at rear position

Gas turbine generator

- GTGA

Abnormal detected



- **Phase shift** were found at **power turbine's** coupling end side. Location of unbalance mass in power turbine was possibly changed.
- When power turbine's rotor coasting down, 1X vibration phase were shifted.

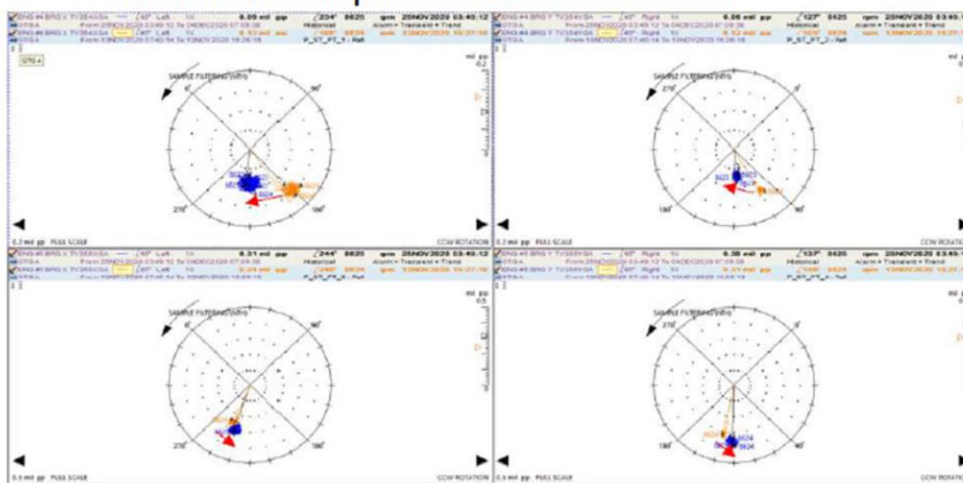


Fig. 11.119 Power turbine vibration 1X phase and amplitude at disc end and coupling end

Recommendation

- Vibration amplitude 1X and phase should be **monitored for any growth** or change in the future.
- Vibration amplitude 1X and phase should be monitored for any growth or change in the future.

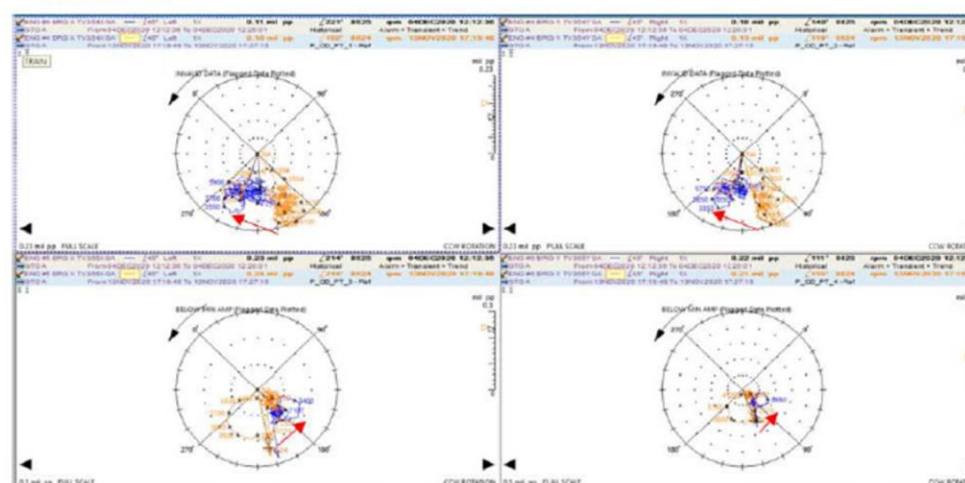
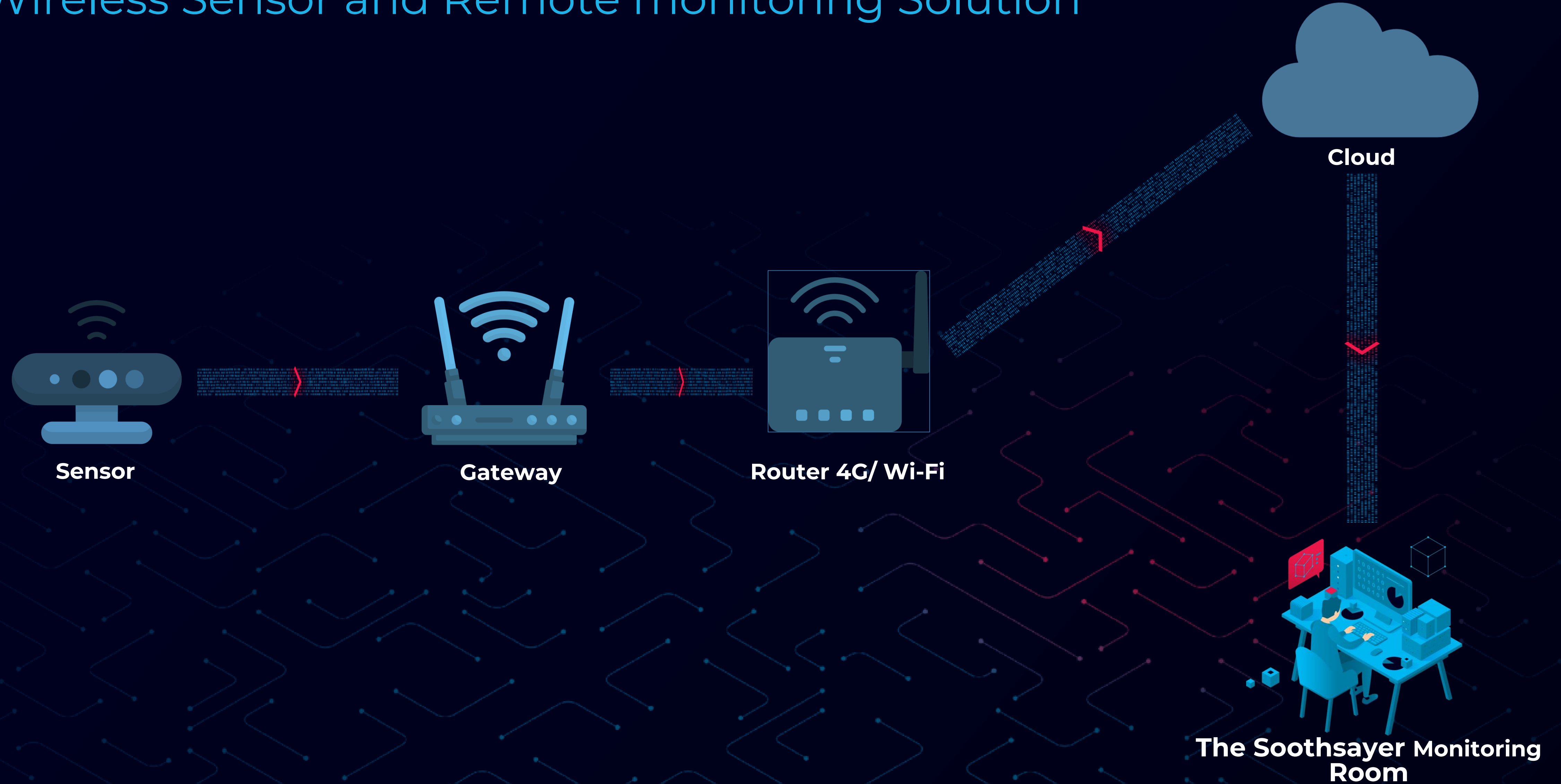


Fig. 11.123 Power turbine vibration 1X phase and amplitude at disc end and coupling end

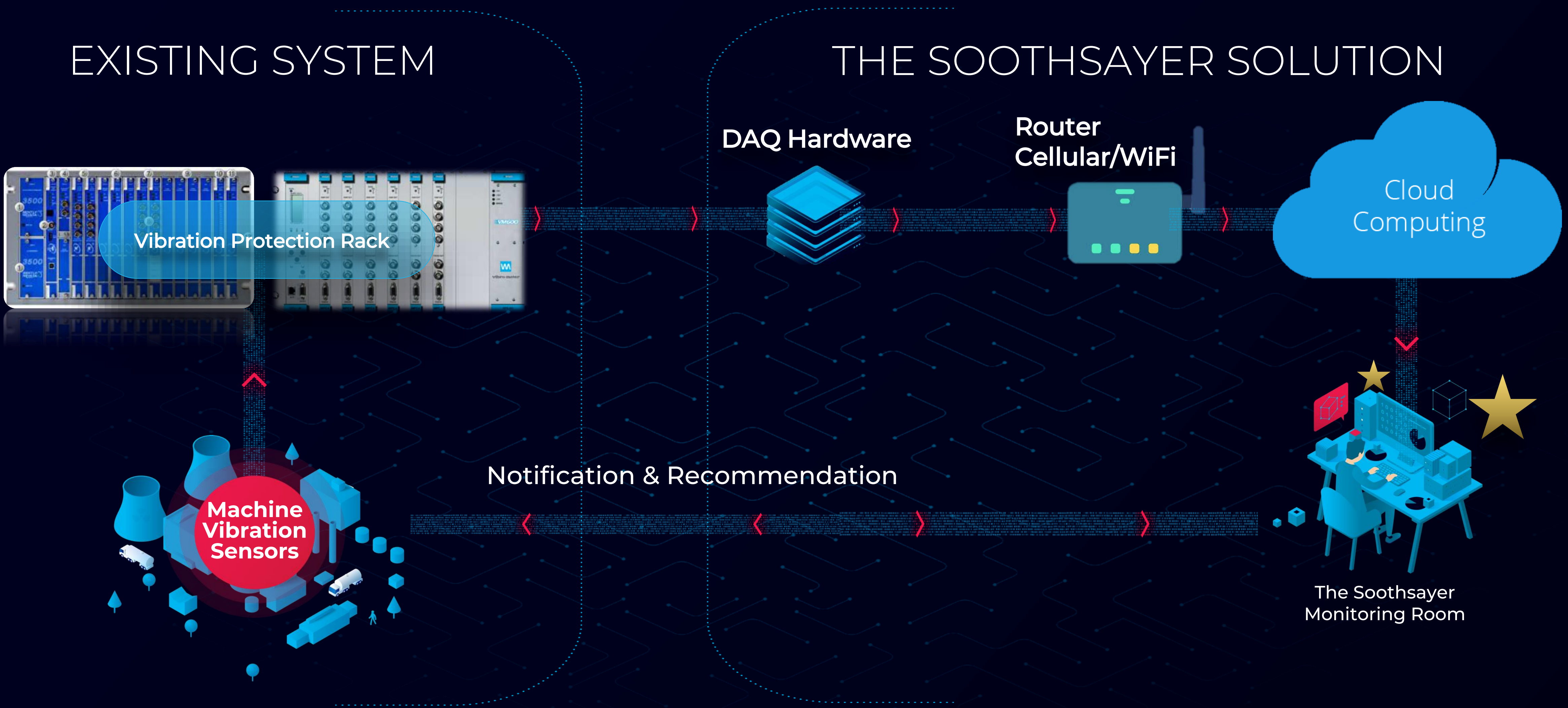
4. The Soothsayer

Wireless Sensor and Remote monitoring Solution



5. THE SOOTHSAYER

Online Vibration and Remote monitoring Solution

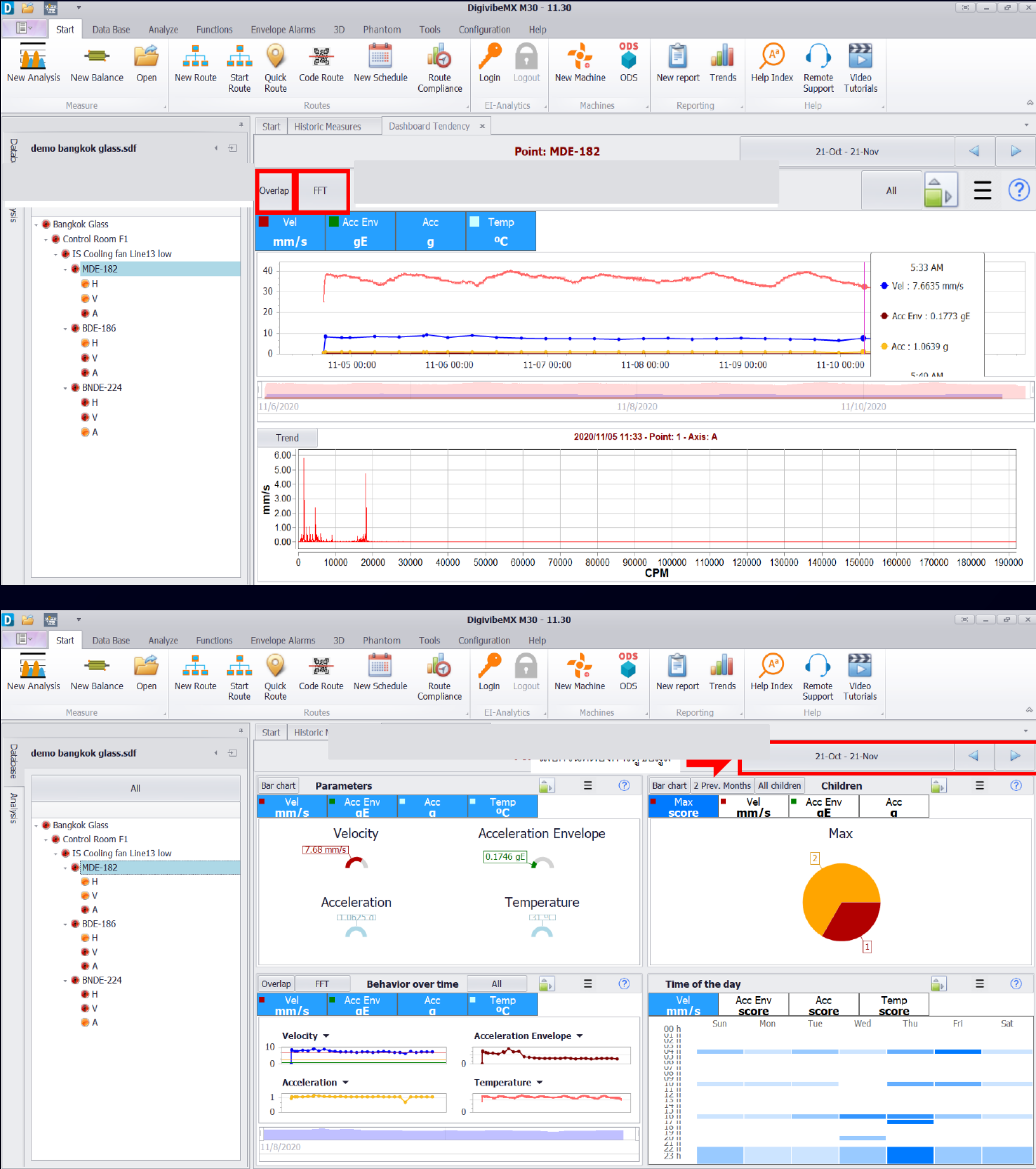


The Soothsayer Dashboard

Vibration DAQ



Wireless vibration sensor

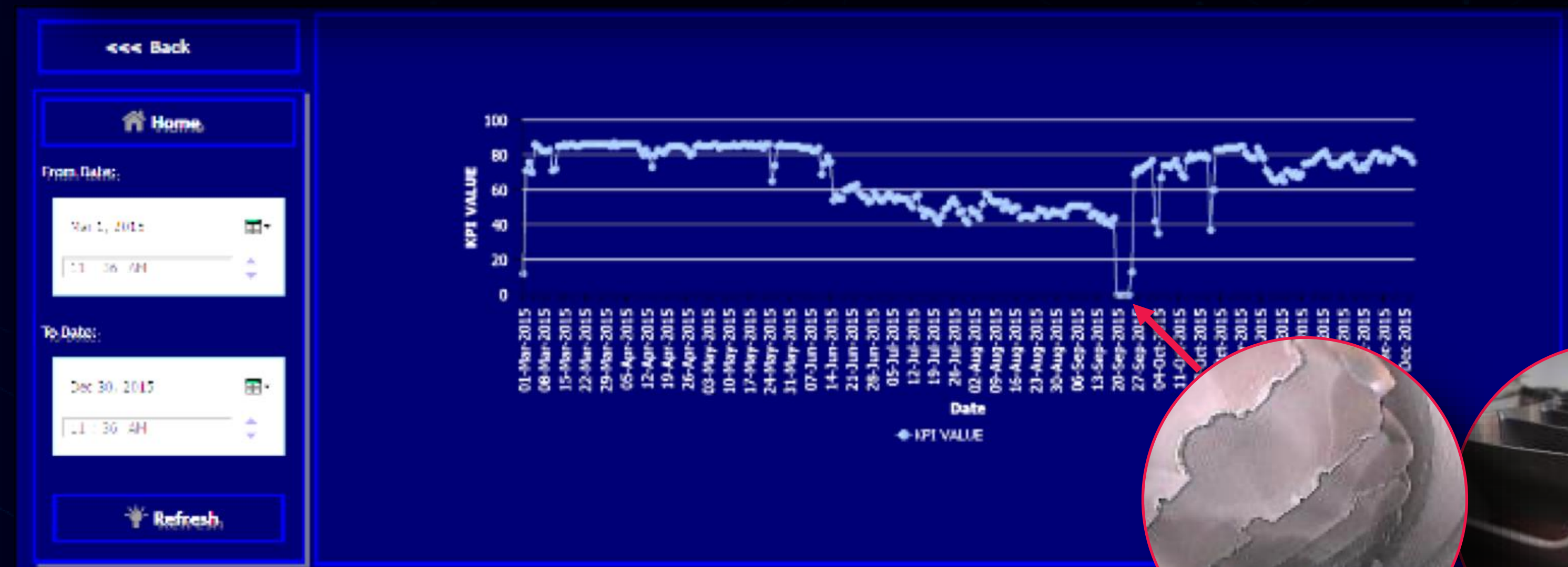
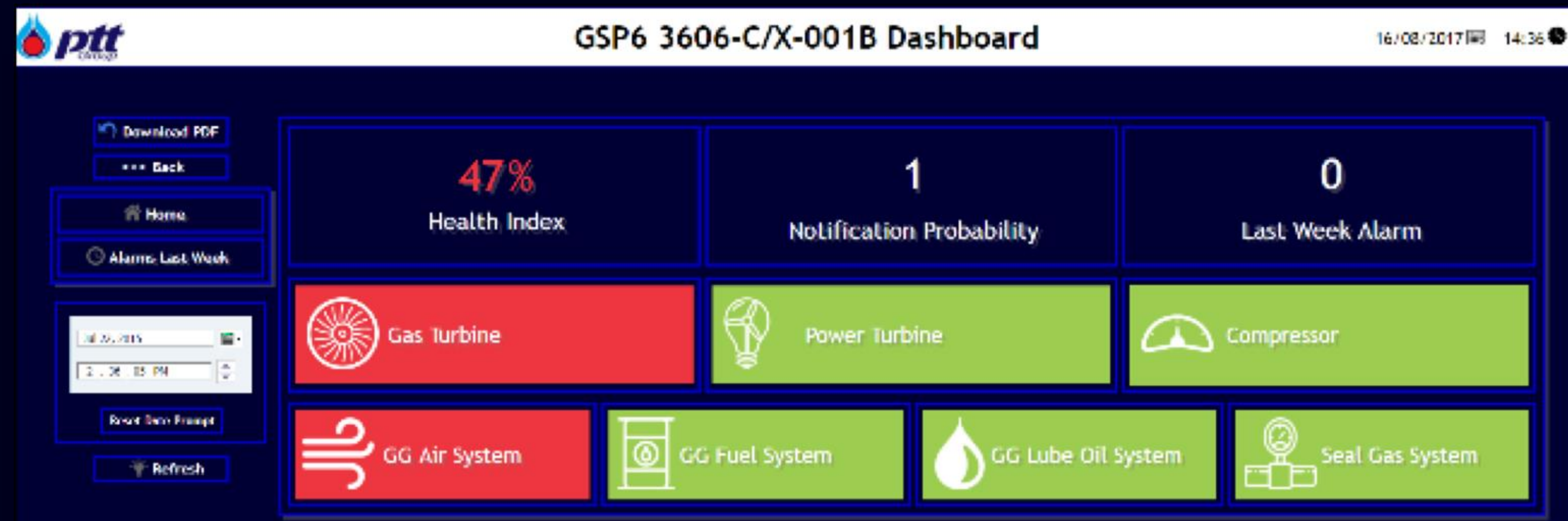


The background of the slide is a dark blue, blurred image of a stack of papers or documents. A thin, horizontal red line is positioned above the text.

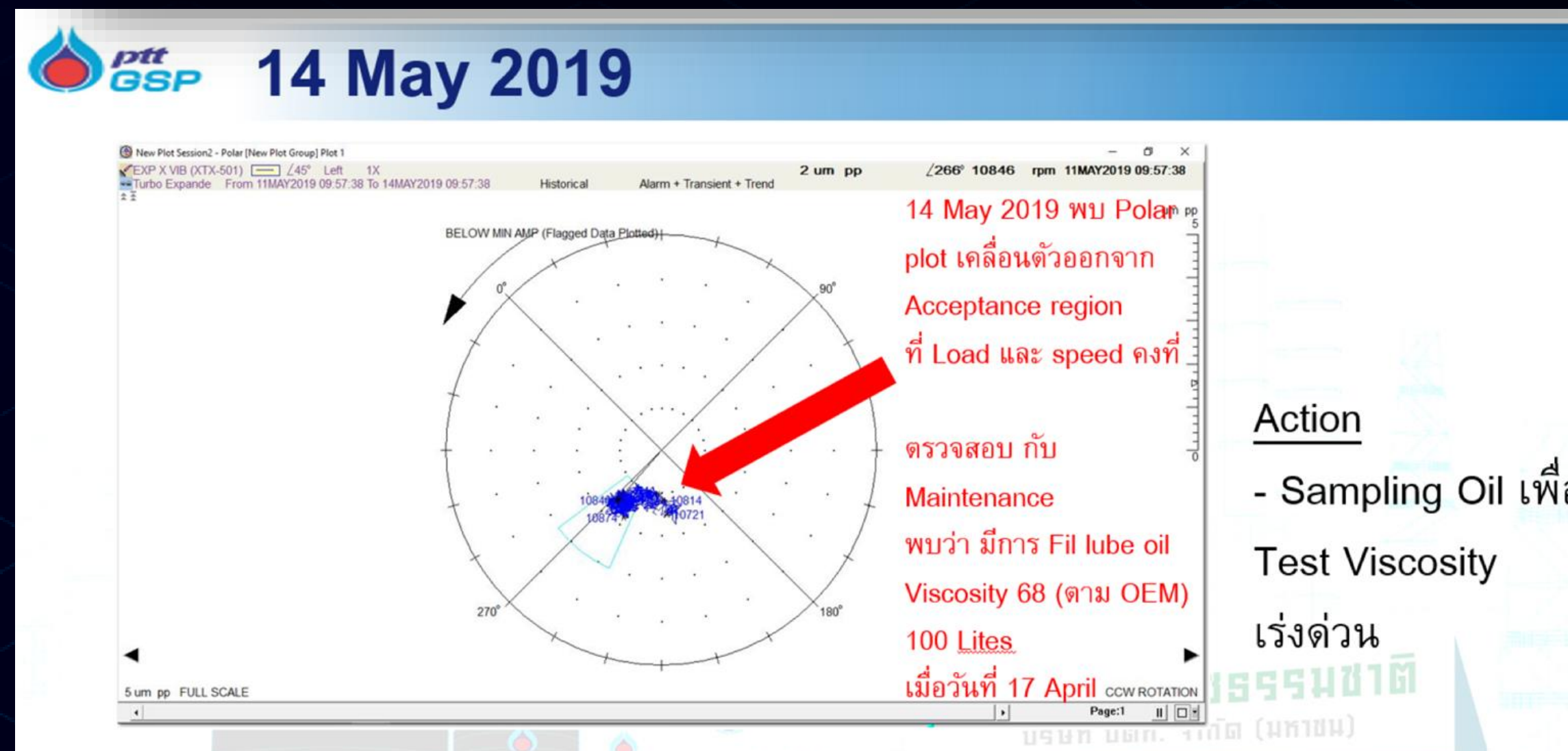
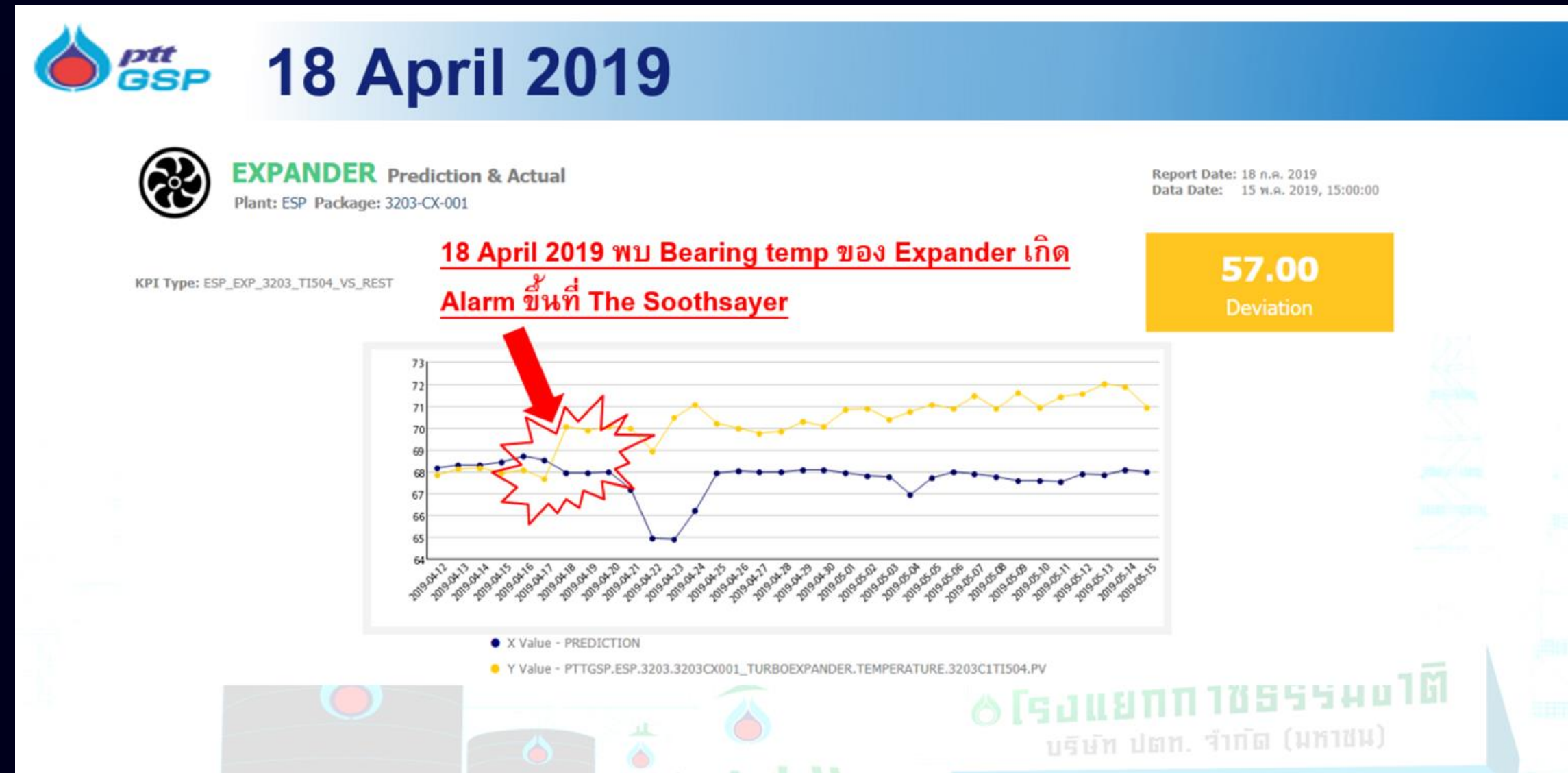
SUCCESS CASE

SUCCESS CASE

01

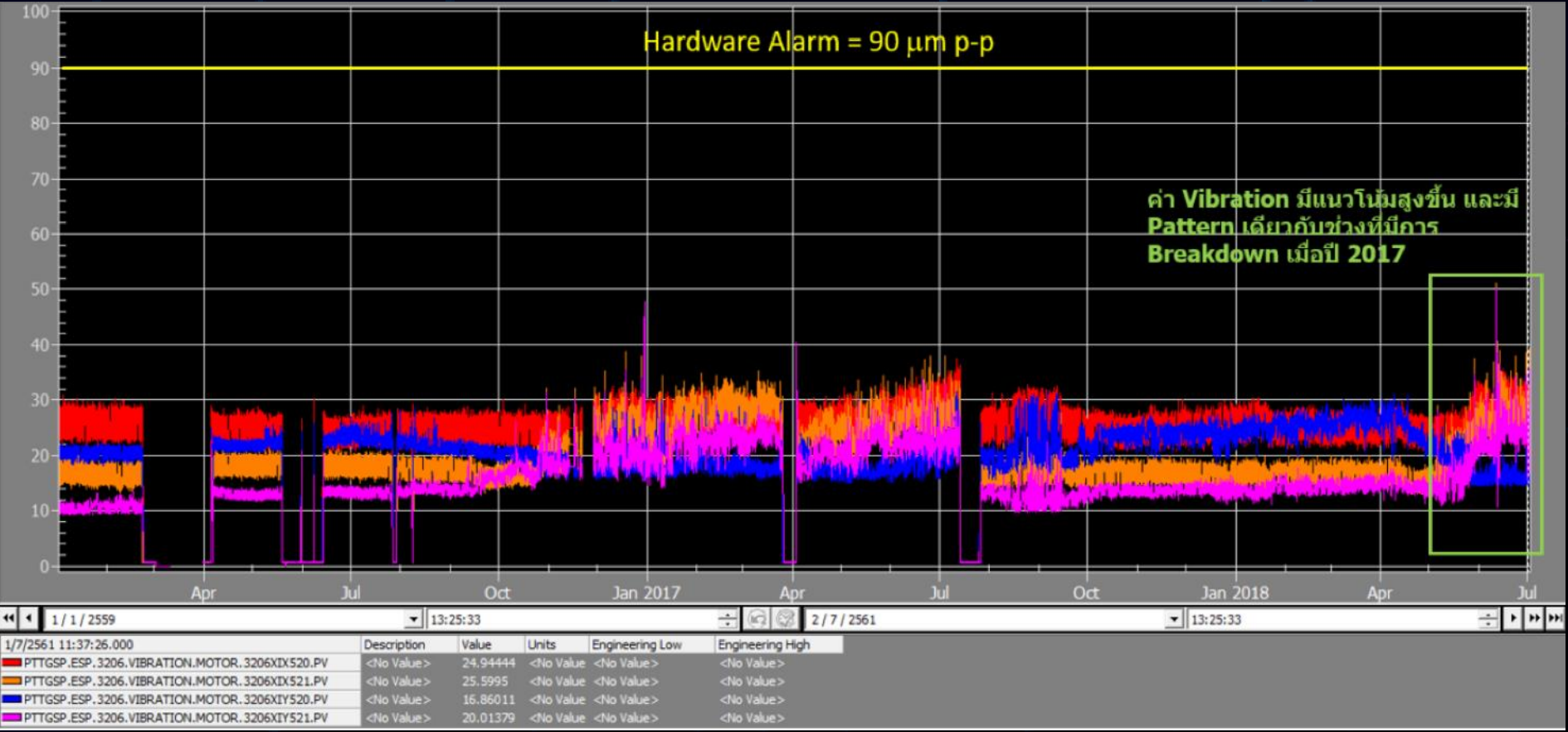
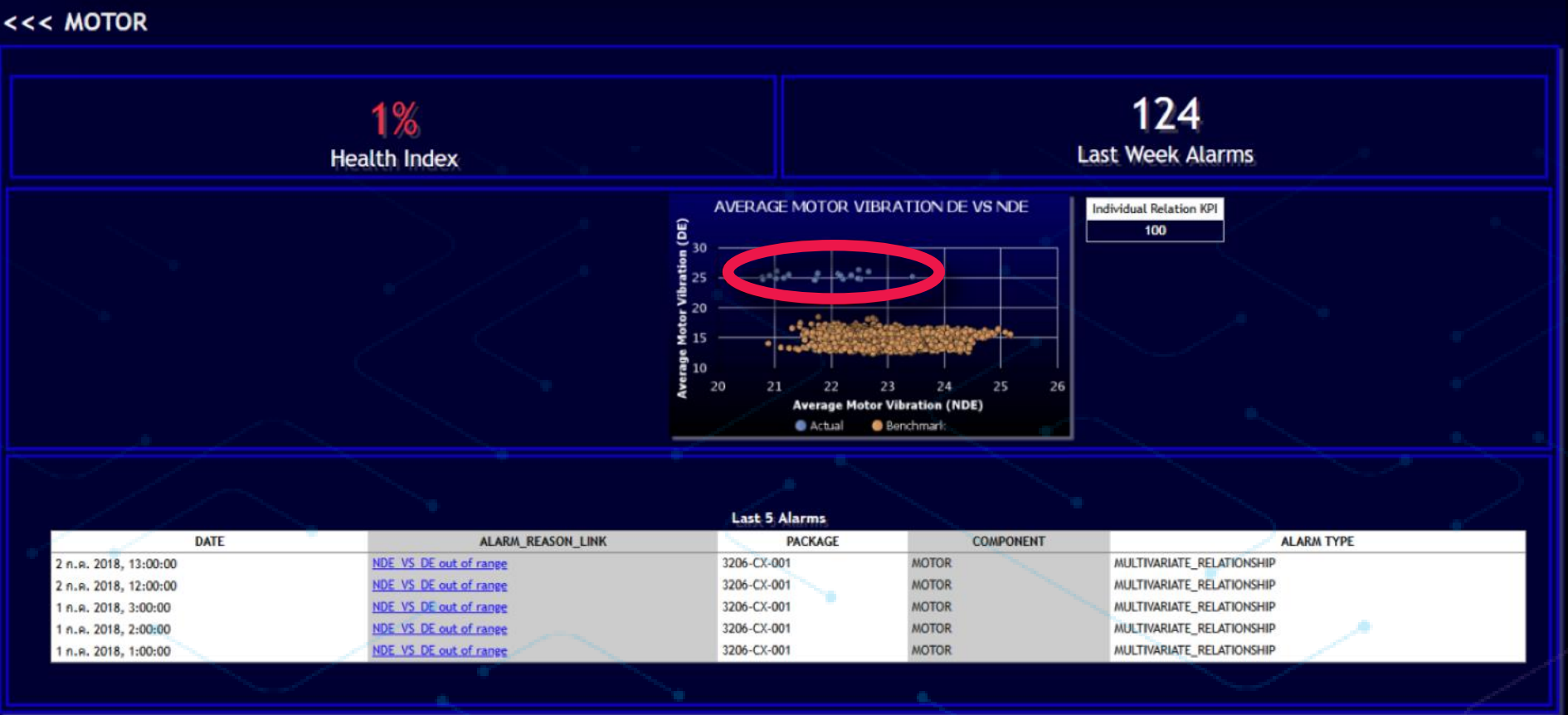
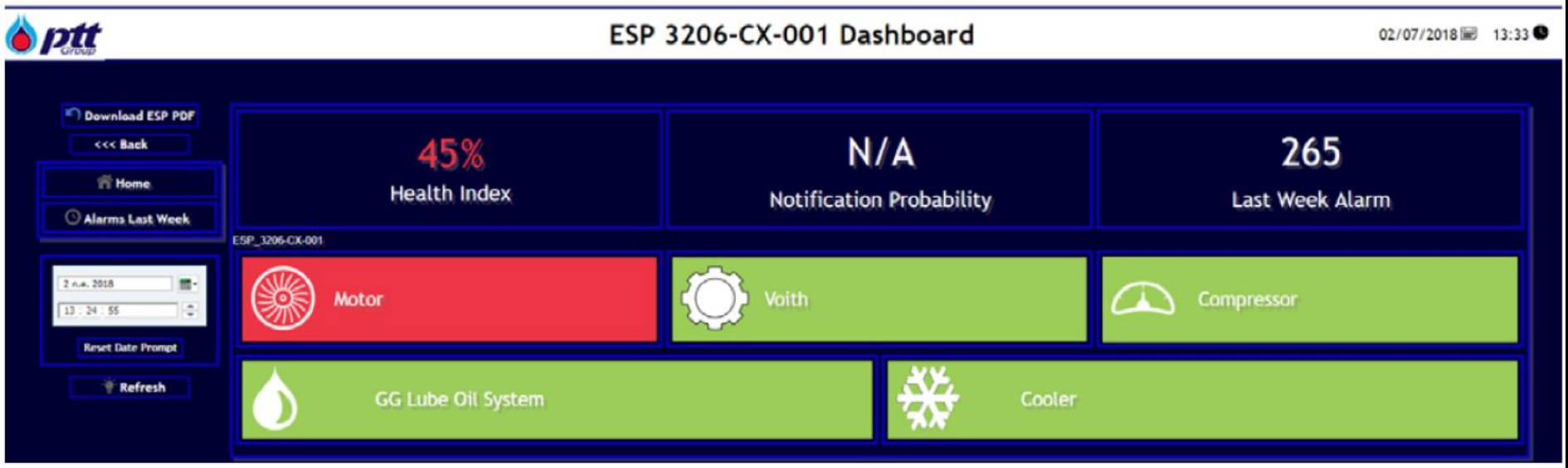


SUCCESS CASE 02



SUCCESS CASE

03



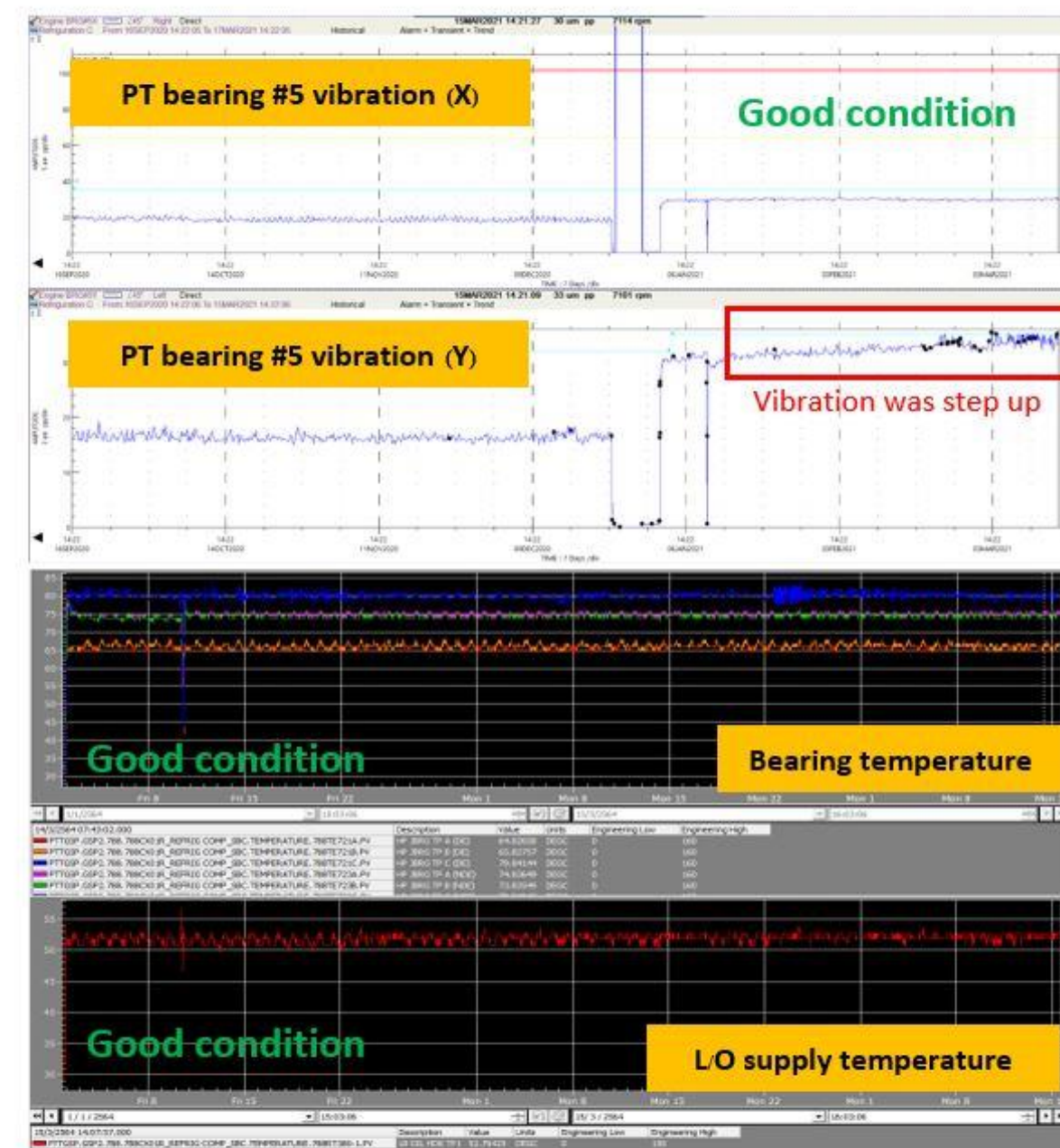
SUCCESS CASE

04

Component: Power turbine

Severity 1

Problem issue 1. Power turbine bearing #5 vibration was step up significantly



Finding cause

- PT bearing #5 probe Y was step up 1 um per month approximately while probe X was stable.
- Bearing temperature all position was stable.
- Lube oil supply temperature was stable.

Recommendation

- Keep monitor and trending
- Notify to machine OEM for confirm machine condition



Component: Gas turbine

Problem issue 1. Finding inlet & center vibration hitting alarm suddenly after start

- Severity 1

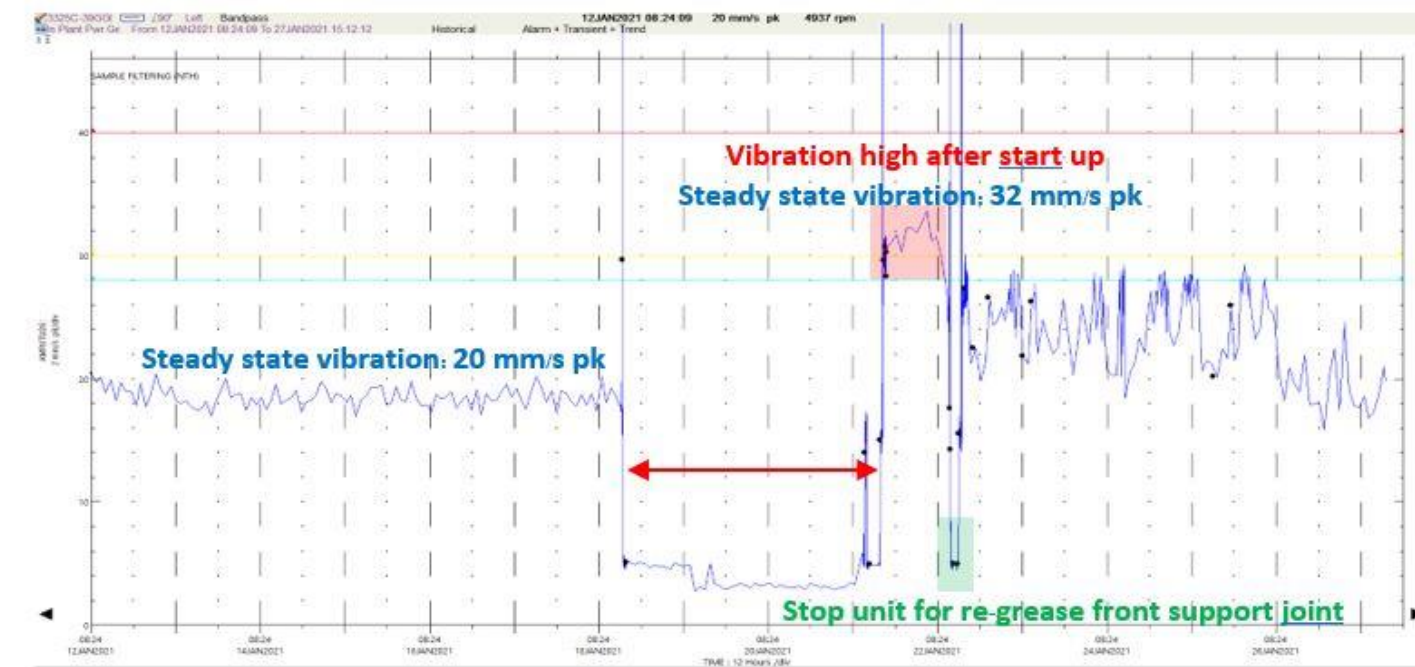


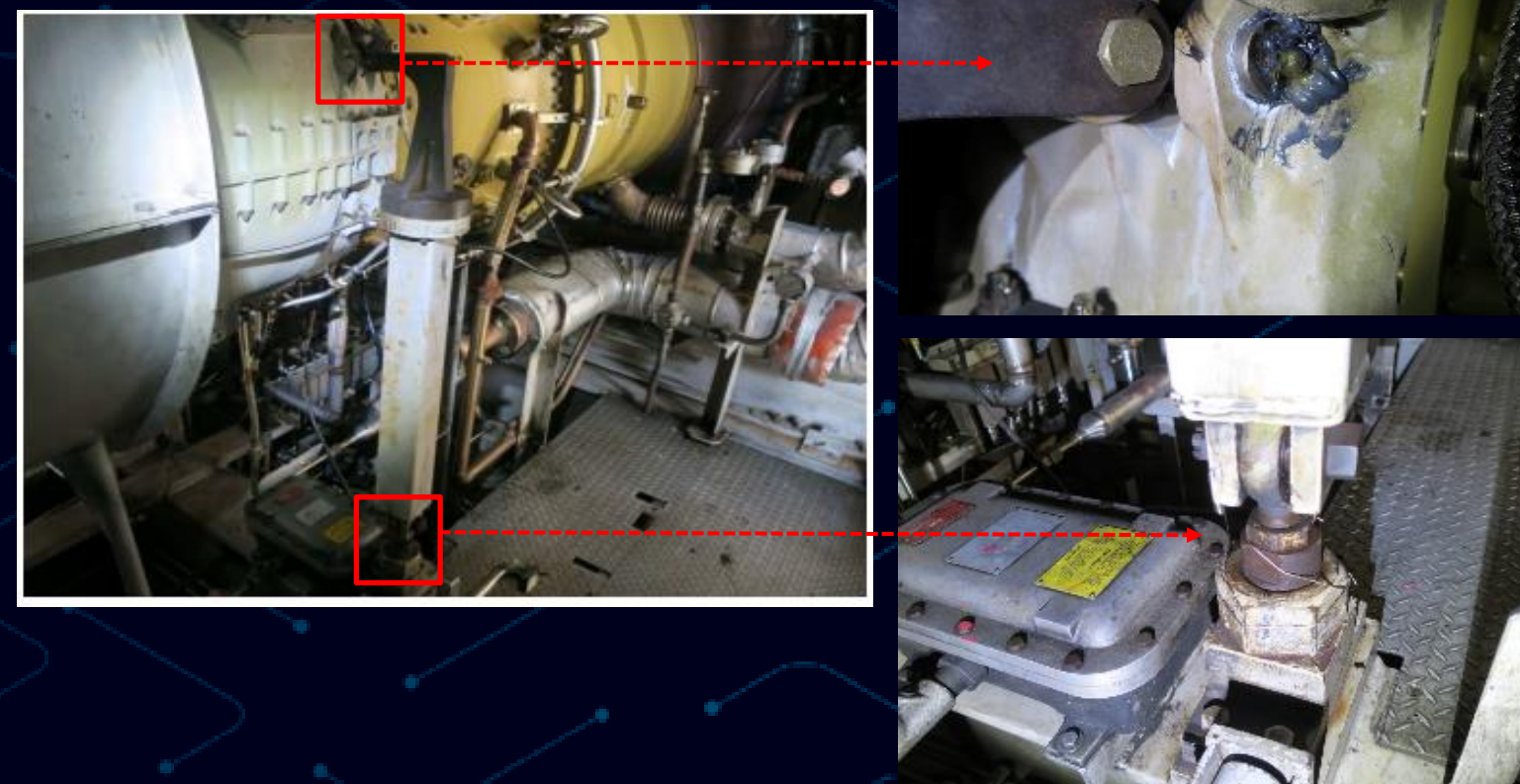
Fig. 2.1 Gas turbine inlet vibration trend plot

GTG3 was stopped due to solve oil leak problem at generator part after startup GG inlet vibration step up 12 mm/s pk at steady state.



Fig. 2.2 Gas turbine code plot (showed critical speed)

When compared latest start up code plot (21JAN2021) with previous starting up (14AUG2020), the code plot graph (Fig. 2.2) showed critical speed was shift from power turbine speed 3600 rpm to 3900 rpm due to system's stiffness was changed.



Finding cause

Front support could not move for free because old grease was decadent.

Recommendation

Clean and re-grease front support ball joint every time before start up.

AWARDS and ACHIEVEMENTS

The background features a dark blue field with a pattern of glowing blue circuit-like lines. In the center, there is a cluster of vertical, wireframe-like structures that resemble stylized columns or a digital forest. These structures are composed of many thin, overlapping lines and have a color gradient from light blue at the base to a reddish-pink at the top.

AWARDS and ACHIEVEMENTS

Countless hours from our team members and incalculable data processed by our intuitive predictive maintenance software have been driving The Soothsayer towards success and recognition so far

GROUP ACHIEVEMENTS:



PTT Group Operational
Excellence Platinum Award
(2019)



The Asset Awards
Innovation Initiative Award
(2018)



PTT Innovation Awards
(2017)

INDIVIDUAL ACHIEVEMENTS:



DataOps Methodology
(2020)



IBM Garage Methodology Explorer
(2020)



MCEMAX Predictive Motor
Analysis Data Analysis Cert
(2019)



PH125.8x: Data Science:
Machine Learning
(2019)



Mobius Institute: Vibration Analysis IV
(2018)



Certified Oil Monitoring Analyst II
(2017)

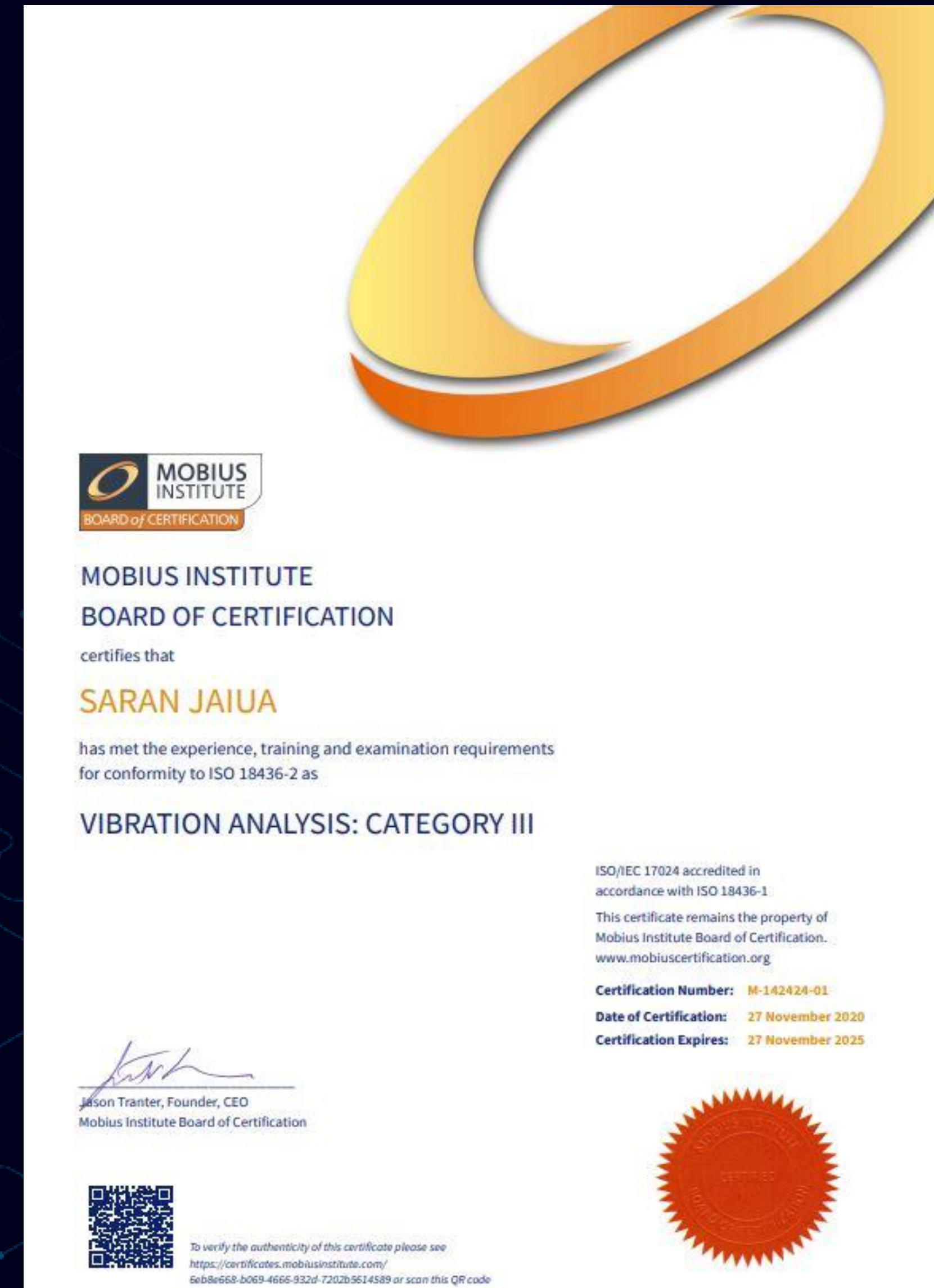
CHAIWAT CHATIYANON

Vibration Analysis Certification CAT IV



SARAN JAIUA

Vibration Analysis Certification CAT III



THE SOOTHSAYER

Achievements.



PTT Innovation Awards
(2017)



PTT Group Operational Excellence Platinum Awards
(2019)

THE SOOTHSAYER

on sharing stage.

Share knowledge to GBU
(5 SEP 2017)

GBU KM Day 2017

5th SEPTEMBER 2017

ห้องประชุมใหญ่ ชั้น 2
09.30 - 10.30
การปฏิรูปพลังงานและ
มุมมองอนาคตธุรกิจก๊าซฯ
โดย

ดร.ศุภจิต นาคกรรพ
ผู้อำนวยการด้านพลังงานของประเทศไทย
ประธานคณะกรรมการนโยบายการปฏิรูปพลังงาน
ชาติและปลัดกระทรวงพลังงาน

ห้อง SPIRIT ชั้น 13
14.00 - 15.00
Trend Watching:
Innovate @ ExpressSo
โดย ทีมงาน ExpressSo

10.45 - 11.45
**RT Success Story on
TTM Project**
โดย

คุณพอล ปินสุภา
รณก. คุณสมนึก เพ่งวาปี
พยท. คุณจรรยาฤทธิ ชาญปัญญา
อดีต CEO TTM

15.15 - 16.15
**PTT Group
"Innovation to Wealth"**
Bio SSCMB โดย RTI
The Soothsayer โดย GSP
Project New Zero โดย GTM







ลุ้นรับของรางวัลภายในงาน

สอบถามรายละเอียดเพิ่มเติมที่ คุณบดินทร์ นามะสนธิ โทร. 0 2537 1757 E-mail: bordin.t@pttplc.com

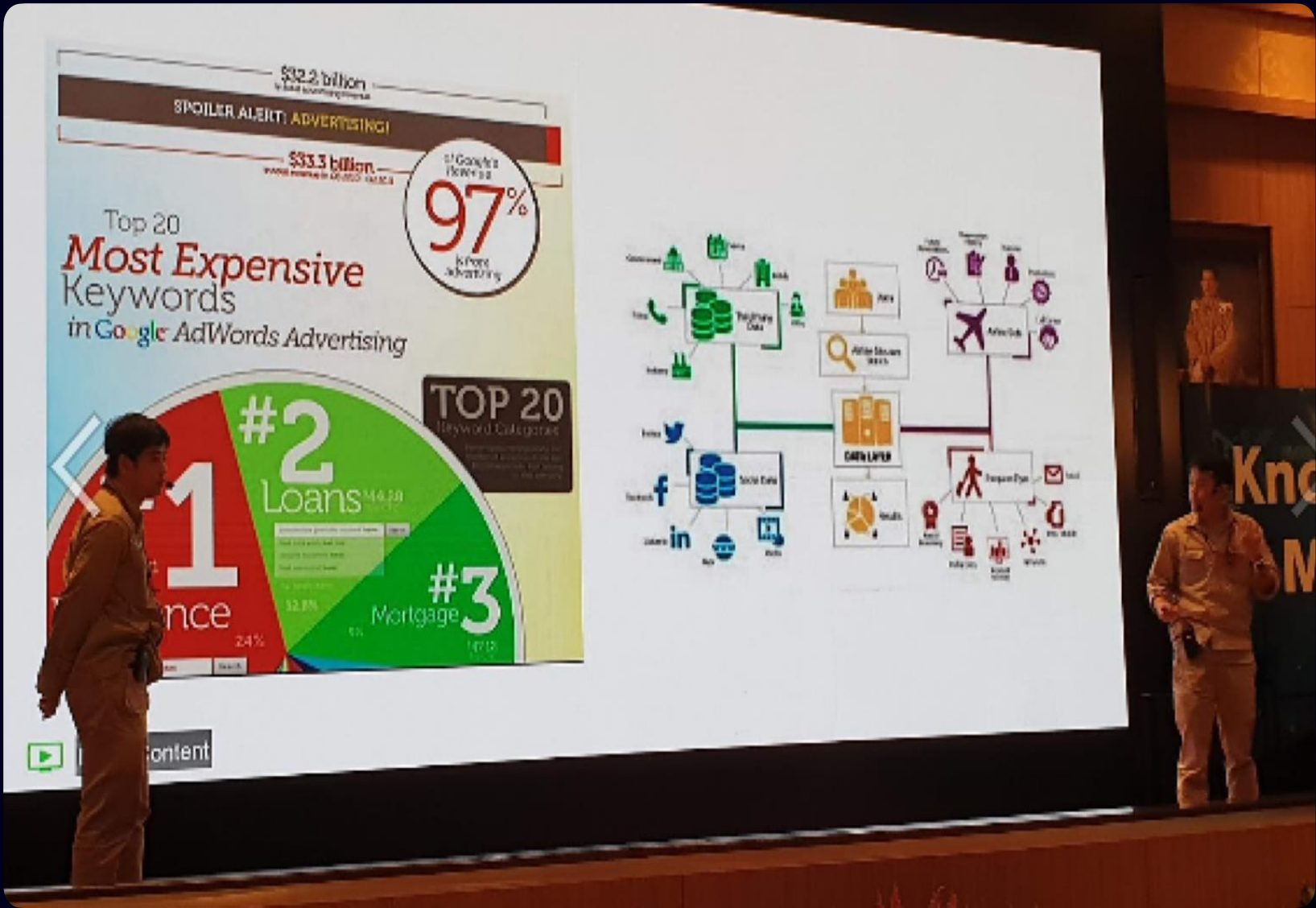


External Sharing
(17 May 2018)



THE SOOTHSAYER

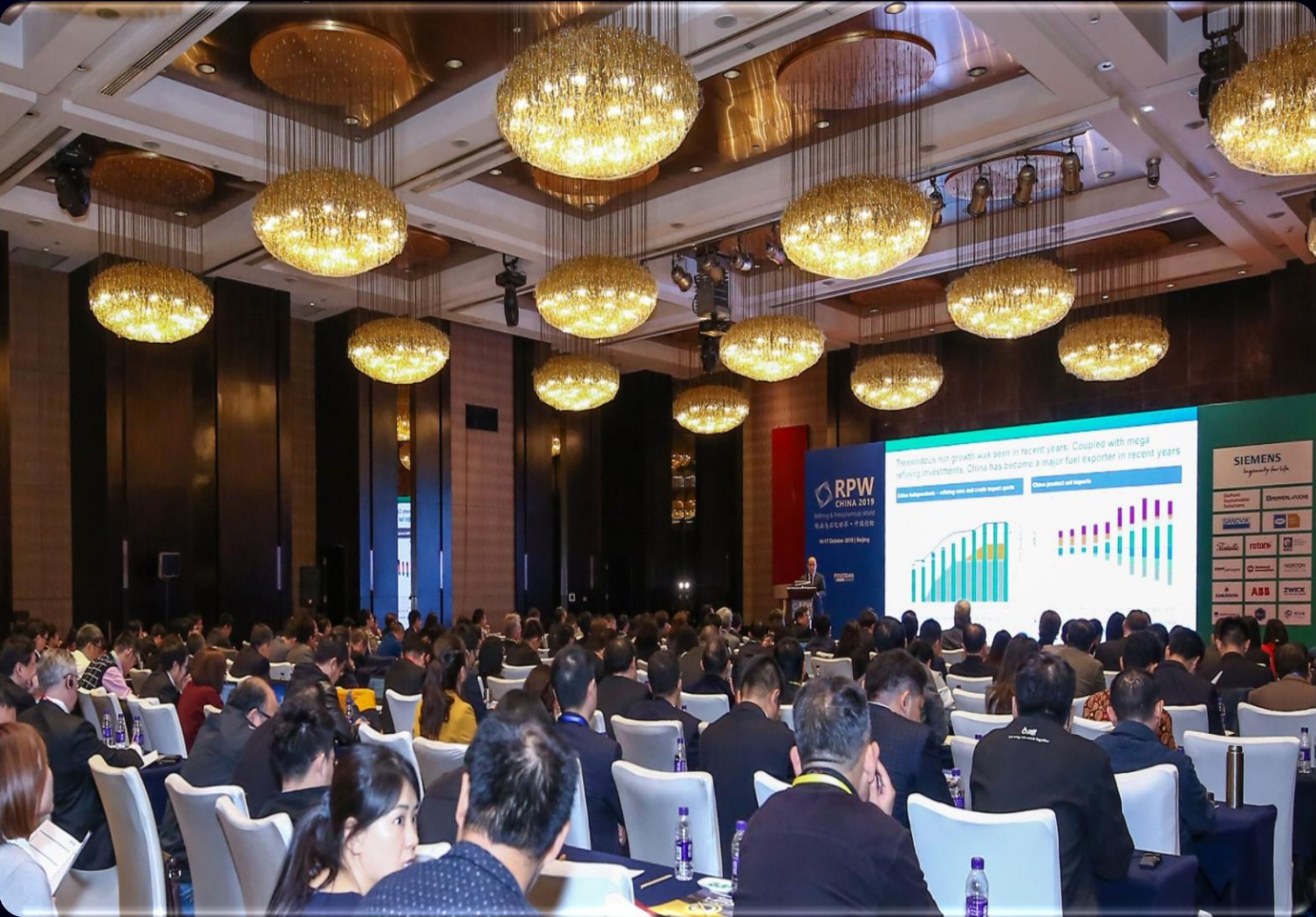
on sharing stage.



PTT GSP KM
(Aug 2018)



Thaioil Digital Day Sharing
(10 July 2018)



THE SOOTHSAYER on Public.

รางวัลนวัตกรรม มอบให้รัฐวิสาหกิจที่มีผลงานสร้างสรรค์ใหม่ๆ ที่สามารถใช้ประโยชน์ในกิจการได้จริง โดยในครั้งนี้ ปตท. ได้รับรางวัลชมเชยจากโครงการ “The Soothsayer” ซึ่งเป็นเครื่องมือนวัตกรรมที่ใช้สำหรับพยากรณ์ความเสียหายและพฤติกรรมผิดปกติที่เกิดขึ้นกับเครื่องจักร อุปกรณ์ที่ใช้ในกระบวนการผลิตของ โรงแยกก๊าซธรรมชาติระยอง



PostToday

24 Aug 2561 BE

ปตท. รับรางวัลรัฐวิสาหกิจยอดเยี่ยมต่อเนื่องเป็นปีที่ 3 จากผลการดำเนินงานอย่างมีส่วนร่วมเพื่อความยั่งยืน



POSTTODAY.COM

ปตท.คว้ารางวัลรัฐวิสาหกิจยอดเยี่ยมต่อเนื่องปีที่3



Brand Inside

21 Dec 2560 BE

"IoT เข้ามาไม่ได้ตื่นเต้นอะไรนัก" คือคำยืนยันของโรงแยกก๊าซธรรมชาติระยอง ปตท. ว่า Plant เต็มไปด้วยเซ็นเซอร์ตรวจวัดค่า ดังนั้น Digital Transformation จึงไม่ใช่ลงทุนอุปโภค... See More



BRANDINSIDE.ASIA

Digital Transformation ในฝั่งโรงแยกก๊าซธรรมชาติปตท. คือการใช้ข้อมูลให้เกิดประสิทธิภาพสูงสุด

IT Journey

THE SOOTHSAYER on Public.

ประชุมใหญ่สามัญประจำปี
ชมรมเทคโนโลยีสารสนเทศ
รัฐวิสาหกิจแห่งประเทศไทย
(ICTSEC)
(2017)



Energy
Symposium
(2018)




รางวัลความร่วมมือ
ทาง IoT กับทาง KU
(2018)



PTT Board
Conference 2018
(2018)



WHY THE SOOTHSAYER



Our resources are
based in Thailand.
Our team can
mobilize faster

Robust experience
in **oil and gas**
sectors. Our team
has the competency
to communicate
effectively

Our output delivery
seamlessly match
the data we provide

We have optimized
the formula for
the machine-learning
solution: **Predict.**
Prevent. Save.

THE SOOTHSAYER

"Your Asset Reliability Partner"

www.thesoothsayer.digital

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