



Global Remote Monitoring System for Ansaldo Energia Generation Fleet

- Integrated Plant Support (IPS) and PI System -

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Agenda

- Company Presentation
- Integrated Plant Support (IPS) overview
- Back to the past - Berlin 2016, First step to IPS platform
- IPS & PI *Vision “for the future”*
- Results
- Conclusion

Company Presentation

Ansaldo Energia – Company Overview

Engineering Procurement
Construction
Gas Turbine Power Plants



Power Equipment

Gas & Steam Turbines and Generators



Power Equipment Services

Original Service Provider
with One-stop shop solution



Nuclear

Plants & Decommissioning



Power Generation

Our Mission
Achieve a sustainable growth by providing a **Flexible** and innovative portfolio of **Solutions** to match global energy demand



Ansaldo Energia Facilities



Ansaldo Thomassen Gulf
Abu Dhabi (UAE)

Full capabilities for hot gas path parts repairs of gas turbines

Operational space:
3,200 sqm



Ansaldo Nuclear
Wolverhaption (UK)

Manufacturing, assembly and test of electromechanical equipment for nuclear industry

Operational space:
- Wolverhampton: 8,200 sqm
- Beckermert: 1,320 sqm



Ansaldo Thomassen
Rheden (Netherlands)

Repair shop on heavy duty gas turbine based on GE technology.

Operational space:
5,200 sqm



Ansaldo Energia Switzerland
Birr (Switzerland)

Testing area for new gas turbine and components

Operational space:
30,000 sqm



PSM
Jupiter (Florida, USA)

Full service provider to gas turbine equipped power plants

Operational space:
10,000 sqm



Ansaldo Gas Turbine Technology
Shanghai (China)

Manufacturing of hot gas path parts and repairing

Operational space:
9,200 sqm

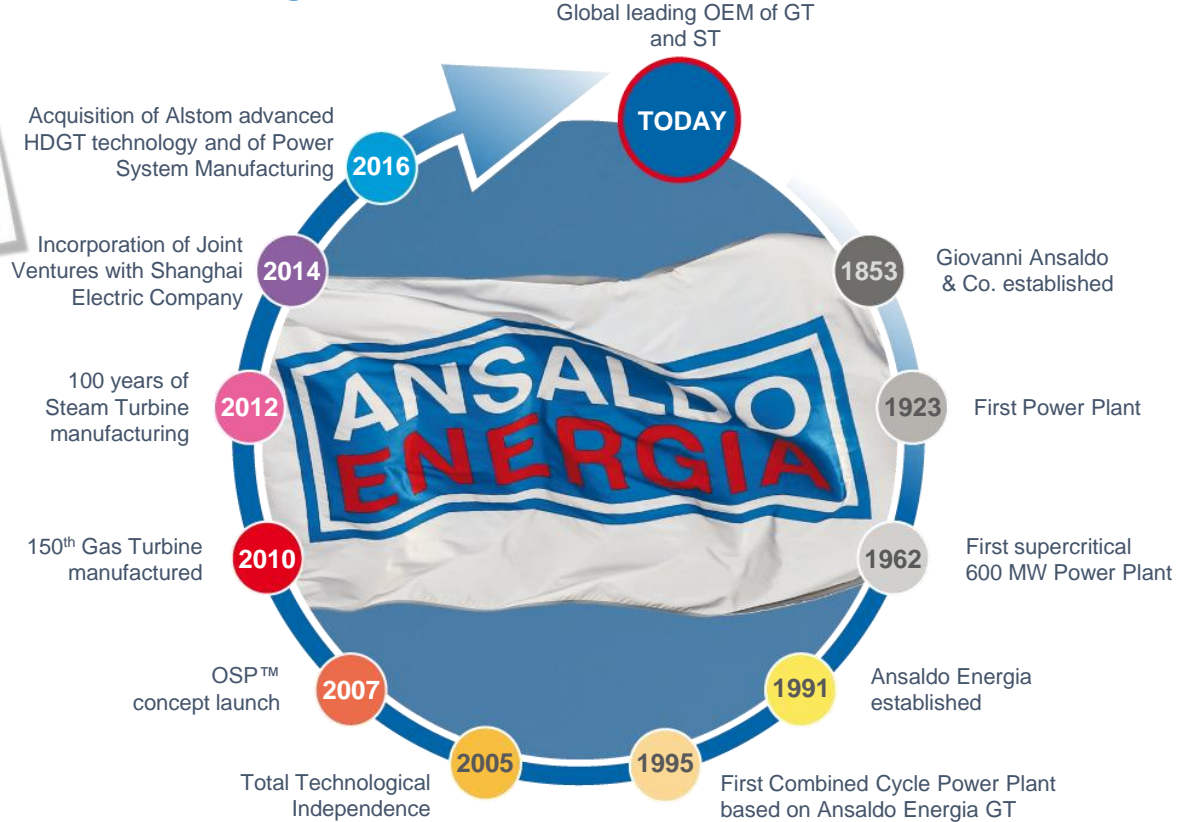


Ansaldo Energia Genova

Ansaldo Energia
Complete manufacturing and service capabilities of gas turbines, steam turbines and generators.
Operational space: 219,000 sqm

More than 160 Years Background

- **165 Years of History**
- **165 Years of Know How**
- More than **12** Years of **PI Data**

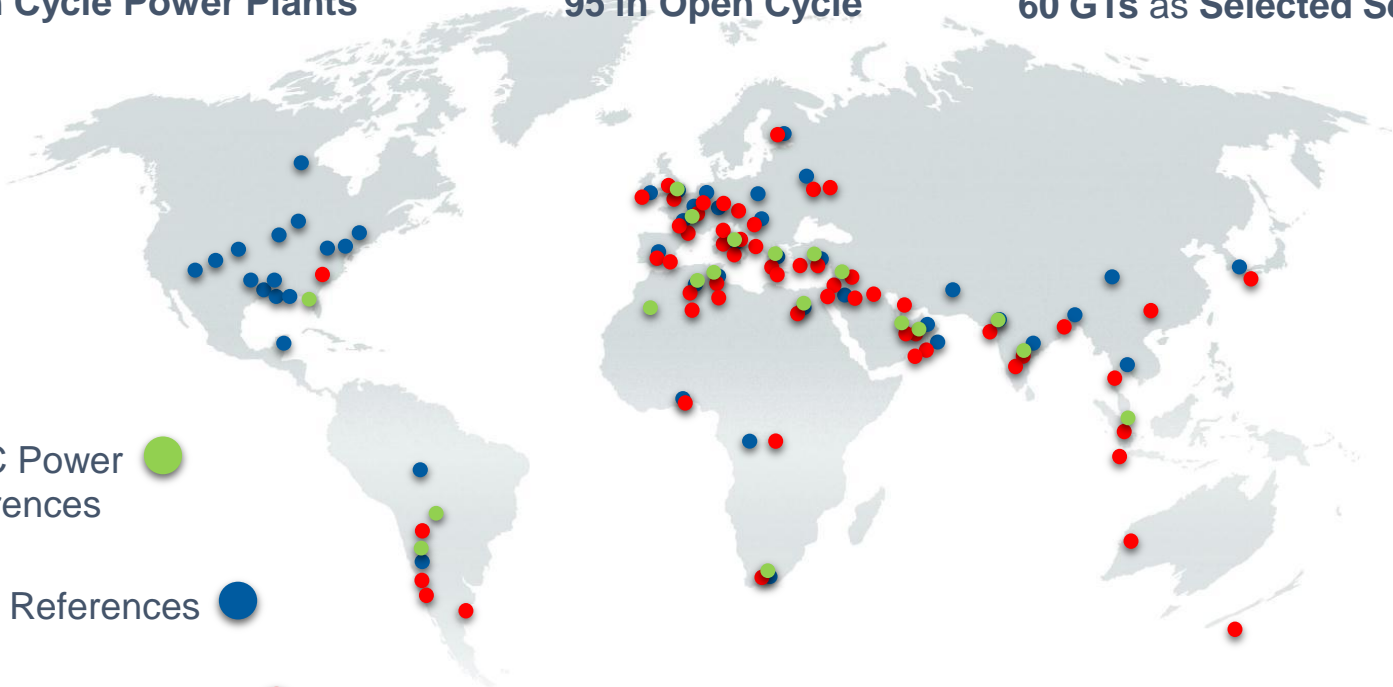


AEN Group References

48 Combined Cycle Power Plants
16 Open Cycle Power Plants

250 in Combined Cycle
95 in Open Cycle

223 GTs under LTA
60 GTs as Selected Service Provider



CC and OC Power Plant References 

GT Service References 

Gas Turbines References 

More than a Traditional Service Provider

Flexible Service Contracts



GT & Shaftline Service Capabilities



All OEM Technologies



Full Service Portfolio



ALL-ROUND CUSTOMER VALUE

Integrated Plant Support (IPS)

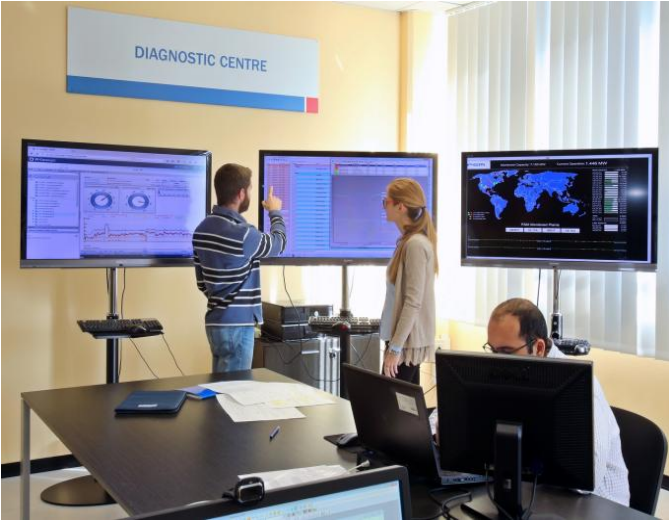
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Overview

How Global Monitoring System evolves in IPS

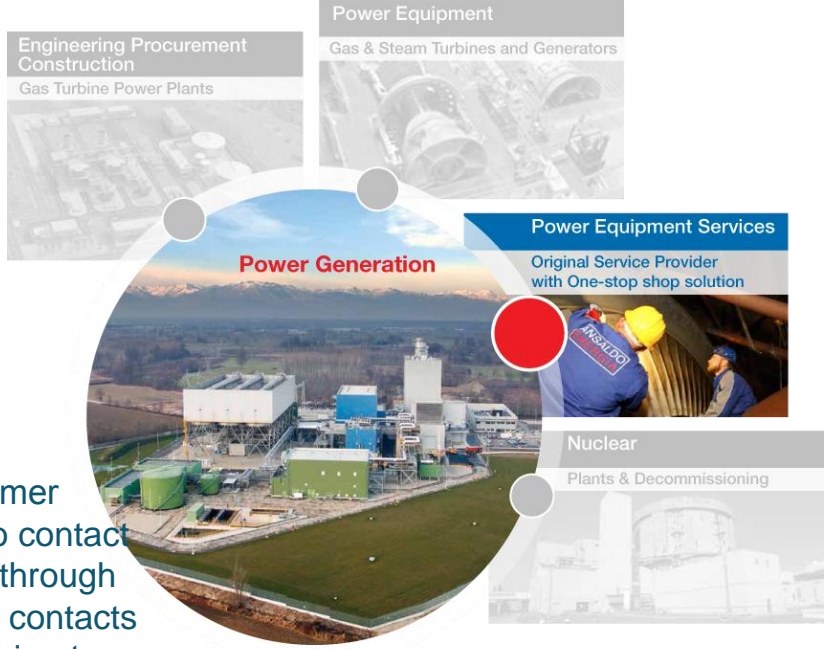
Mission is to support **Customer Strategy** by providing a service able to **achieve highest reliability** and **highest availability** at **optimum performance**

Integrated Plant Support



The IPS offers:

- 24/7 Front End Customer Support allowing you to contact the Center at any time through direct phone and email contacts
- An Extended Engineering team that works to give you the full support of our discipline experts community.



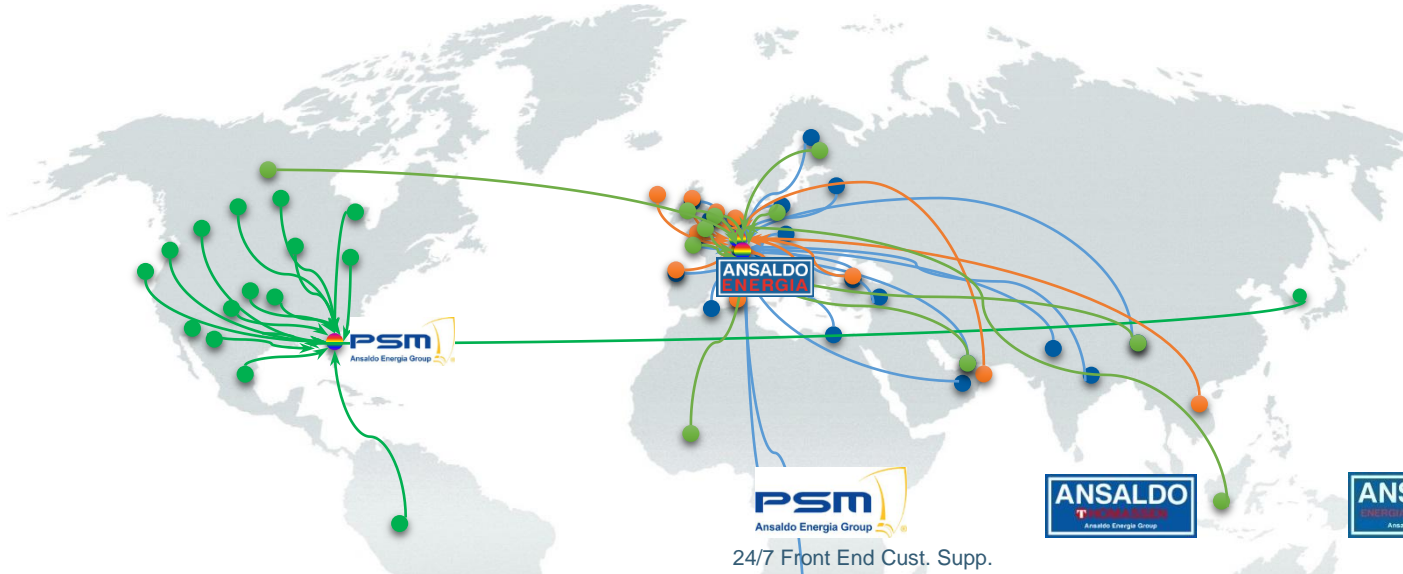
IPS Center



IPS Center

Ansaldo Energia monitored fleet – Range of services

- Ansaldo Energia Genoa
- Ansaldo Energia Switzerland
- PSM
- Ansaldo Thomassen



RM&D network 24/7 Front End Customer Supporting over 130 GTs / 42 STs / 116 GENs

PSM
Ansaldo Energia Group

24/7 Front End Cust. Supp.
Extended Engineering
GT 7 FA
GT M 501
6150 MW
16 Customers
4 Countries

ANSALDO ENERGIA
Ansaldo Energia Group

Extended Engineering
GT Frame 6B
GT Frame 9E
750 MW
4 Customers
4 Countries

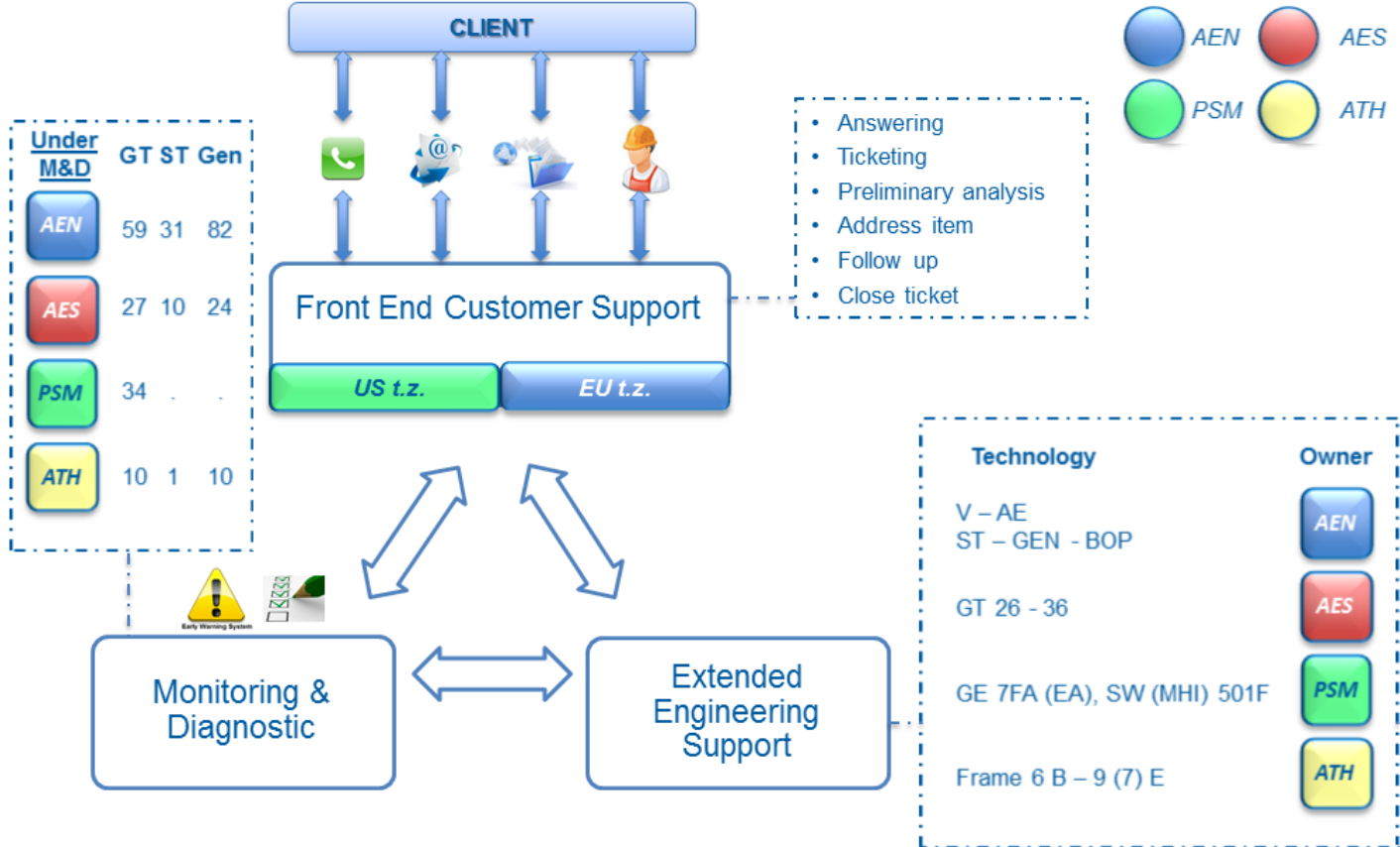
ANSALDO ENERGIA
Ansaldo Energia Group

Extended Engineering
GT 26
GT 36
9000 MW
11 Customers
9 Countries

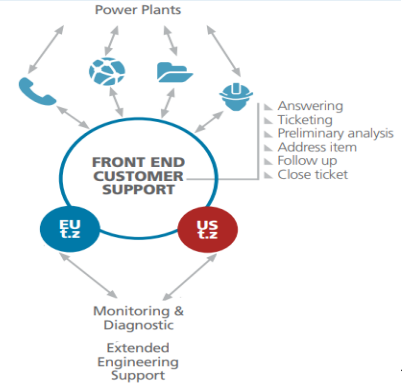
ANSALDO ENERGIA
Ansaldo Energia Group

24/7 Front End Cust. Supp.
Extended Engineering
GT V/AE
ST-GEN-BOP
21800 MW
20 Customer
12 Countries

IPS Center - Workflow



Back to the past - Berlin 2016, First step to IPS platform



Quick review of Targets & Results 2016

COMPANY and GOAL

Ansaldo Energia, leader in Engineering Procurement Construction, Power Equipment and Services, Nuclear Plant with 160 Years of experience and know how.

The growing of Ansaldo Energia required to integrate different PI System infrastructures, teams and knowledge as well.



CHALLENGE

To get a common diagnostic monitoring center (IPS) operating 24/7

- Genoa and Jupiter diagnostic centers
- Two different teams
- Availability and reliability of the infrastructure

SOLUTION

Move PI System infrastructure in the Ansaldo Energia cloud

- PI System installation on cloud
- Training of the teams (Italy / US)
- Normalize the OSI architecture
- Share knowledge

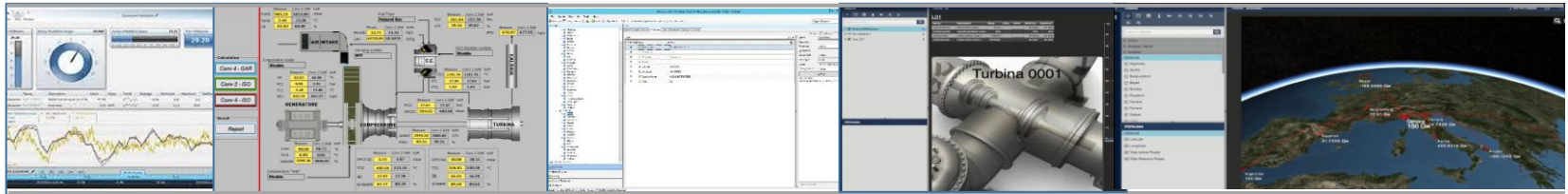
RESULTS

Consolidated infrastructure to provide 24/7 integrated support service

- High scalability and flexibility
- High availability and reliability
- Facilitated know-how sharing

October 2016 → Next steps along the way of the IPS Portal

- Complete the integration between Italy and US team
- Complete the standardization and normalization of tools and procedures
- Review AF modeling asset to integrate new sites
- Implement new AF Analysis and PI Notification alerts
- Implement new PI Vision pages
- Migrate PI ProcessBook display to PI Vision
- Implement KPI to measure level of service and ROI
- Scouting phase for 3D asset modeling in PI Vision



IPS & PI *Vision “for the future”*

OSIsoft Infrastructure

AF Asset Modeling

This screenshot displays the 'AF Asset Modeling' interface. It features a hierarchical tree on the left showing the project structure under 'AnsaldoCompany'. The main area shows a table of asset attributes for 'GT_AE943A', including categories like 'Anagrafica', 'Asset', 'CE Air Temperature', and 'Display'. A search bar at the top allows filtering elements by name or value.

Event Frames e Asset Analytics

This screenshot shows the 'Event Frames e Asset Analytics' interface. It displays a table of event frame templates, such as 'D3000 TG Comb Alarm Acceleration Analysis'. Below the table, there is a configuration area for 'Event Frame Template: APEX TG Humming', including a table for 'Start triggers' and a 'Functions' section for defining logic expressions.

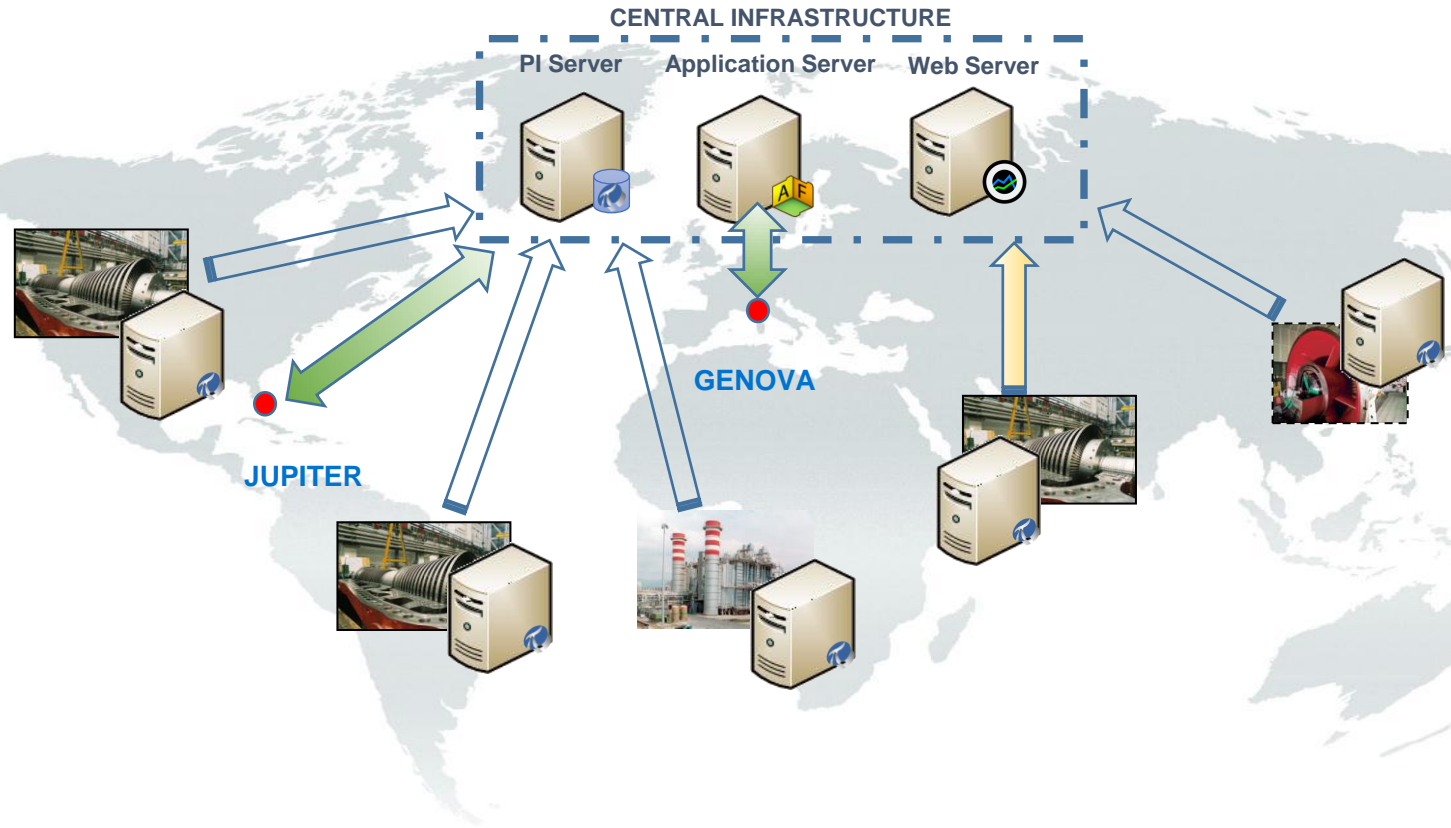
AF Alert e Notifications

This screenshot illustrates the 'AF Alert e Notifications' configuration screen. It shows a message configuration for 'D3000 TG Comb Alarm: CO Notification Email'. The 'Trigger Input' section is configured with 'Event Frame:Start Time' and specific paths. The 'Constant Value' is set to 'Predictive system -> Alarm for deviation on combustion parameters -> CO Emission'. A 'Division Link' is also defined for 'PI Vision LinkURL'.

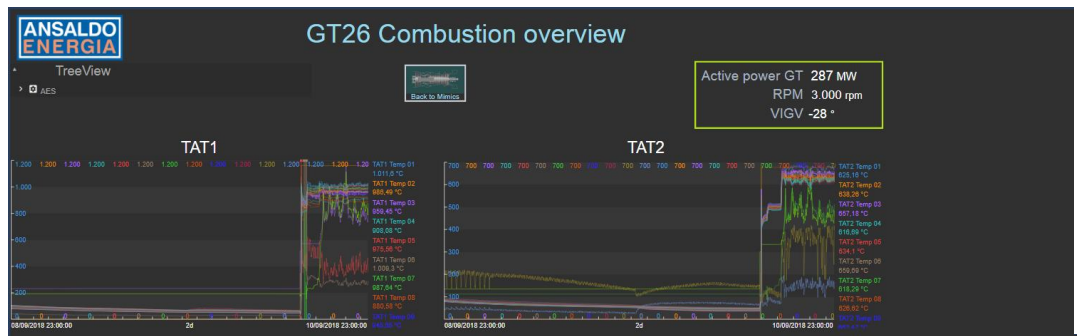
PI Vision + «Extensibility»

This screenshot shows a PI Vision dashboard for a power plant. It features a world map with highlighted locations: 'ROMA 2920 MW' and 'GENOVA 9314 MW'. A data table on the right lists various power generation units and their outputs, such as 'Ap1: 0 MW' and 'GT1: 0 MW'. The Ansaldo Energia logo is visible in the top left corner.

OSIsoft Architecture



PI Vision Portal for IPS – Gas Turbine Production Monitoring



TimeSlider: 08/09/18 23:00:00 to 10/09/18 23:00:00

Lotus Notes Table

Category	No.	Title	Item Link	Warning Link	Item Status	Notification Name	Comment Subject (Item)	Comment
	PG-2016-1013	GT start fault - no flame	Link		Monitoring			
EW			Warning Link		D3000 TO COMB ALARM ACCELERATION ANALYSIS	Diagnostic system	D.4.11. Apex m...	

GT26 Combustion overview

Active power GT 0 MW
RPM 233 rpm
VIGV -65 °

TAT1 TAT2

EV SEV

TimeSlider: 10/09/18 09:50:35 to 12/09/18 09:50:35

Lotus Notes Table

Category	No.	Title	Item Link	Warning Link	Item Status	Notification Name	Comment Subject (Item)	Comment	Free Comment	Notification Flag	Notification Feedback	Trigger Time
	PG-2016-1013	GT start fault - no flame	Link		Monitoring							
EW			Warning Link		D3000 TO COMB ALARM ACCELERATION ANALYSIS	Diagnostic system	D.4.11. Apex model	model spike	Solved			08/09/2018 07:26:47

PI Vision Portal for IPS – Generator Production Monitoring

OSIsoft
PI Vision

GT_Generator_mimic * Asset: GT_Generator overview+

+ New Display | AEN90001379 | ?

Ad Hoc Display

GT Generator overview

TreeView

- AEN
 - Cold Air/Gas I2 38 °C
 - Cold Air/Gas I4 33 °C
 - Calculated Rotor Temp. 59 °C
 - Hot Air/Gas I1 33 °C
 - Hot Air/Gas I2 76 °C
 - Hot Air/Gas I4 60 °C

Active power (average) GT **248 MW**

RPM **2.999 rpm**

Reactive power GT **9 MVAR**

Excitation Current **1.114,5 A**

Excitation Voltage **263,01 v**

Slip ring Temperature **48 °C**

TimeSlider

12/09/18 15:13:09 19/09/18 15:13:10

Lotus Notes Table

Category	No.	TiE	Item Link	Warning Link	Item Status	Notification Name	Comment Subject (Item)	Comment	Free Comment	Notification Flag	Notification Feedback	Trigger Time
-	PG-2018-1058	Acceleration - 2 Max5 and 1 Max2	Link	-	Rejected	-	-	-	-	-	-	-
EW	-	-	-	Warning Link	-	MAX ACCEPTABLE LIMIT C.C. ACCELERATIONS 1/2/3 ANALYSIS	A1	D.4.1. Humming increasing during power download	Acceleration increase around 60% IGV and at high load.	Monitoring	-	11/09/2018 06:00:29
EW	-	-	-	Warning Link	-	MAX ACCEPTABLE LIMIT HUMMING 1/2 ANALYSIS	H2	D.4.2. Humming increasing during power upload	No issue: slit from 30 to 40	Solved	-	17/09/2018 16:14:37
EW	-	-	-	Warning Link	-	MAX ACCEPTABLE LIMIT HUMMING 1/2 ANALYSIS	H1	D.4.5. C.C. Acceleration (<8g)	Three reduction - two Max5 - one max2	Active	-	12/09/2018 16:08:19
-	-	-	-	-	-	MAX ACCEPTABLE	-	-	-	-	-	-

12/09/2018 15:41:50

◀ **7d** ▶

Now
19/09/2018 15:41:51

Valore C

Valore N

Valore C

Valore N

Valore C

Valore N

Valore C

Valore N

Valore C

Valore N

Date/Tim

PI Vision Portal for IPS – Gas Turbine Production Monitoring



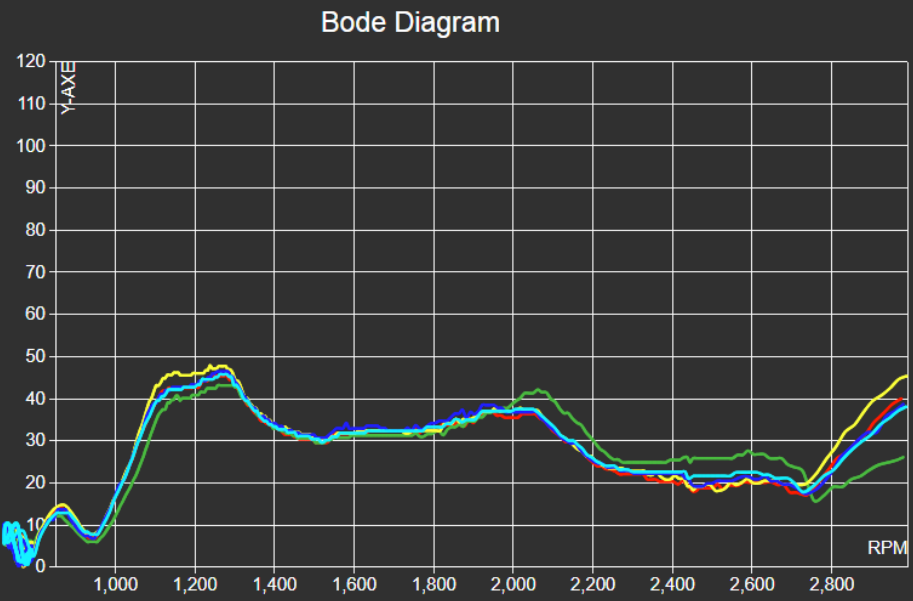
Compressor Bearing: Bode Diagram

TreeView

- ▼ AEN
 - > Customer1
 - > Customer2
 - > Customer3
 - ▼ Customer4
 - > Site1
 - ▼ Site2
 - ▼ Group1
 - ▼ GT_AE943A
 - GT_Combustion overview
 - GT_Generator overview
 - GT_GTPA-APEX
 - GT_Vibration overview
 - ▼ ST_AEN
 - ST_Expansion - Steam Temperatures and Pressures
 - ST_Generator overview
 - ST_Vibration overview
 - > Group2

Items

14/06/18 06:15:10	[Icon]
15/06/18 06:20:12	[Icon]
19/06/18 04:52:57	[Icon]
20/06/18 05:18:24	[Icon]
22/06/18 05:05:00	[Icon]
26/06/18 19:13:40	[Icon]
27/06/18 06:21:37	[Icon]
03/07/18 05:32:56	[Icon]
11/07/18 04:57:36	[Icon]
12/07/18 05:56:26	[Icon]
13/07/18 06:21:31	[Icon]
18/07/18 07:35:42	[Icon]
20/07/18 02:07:18	[Icon]

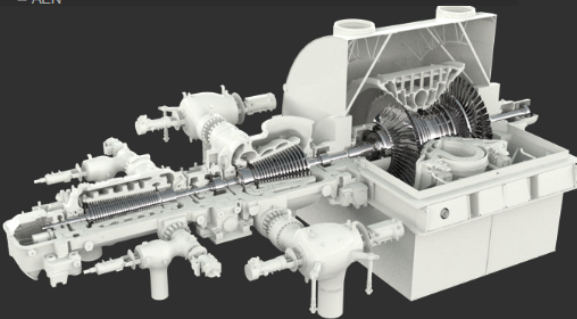


PI Vision Portal for IPS – Steam Turbine Production Monitoring

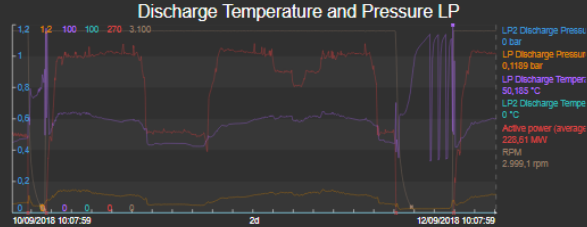
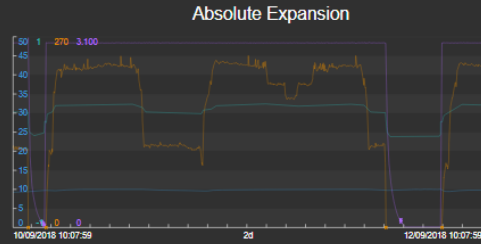
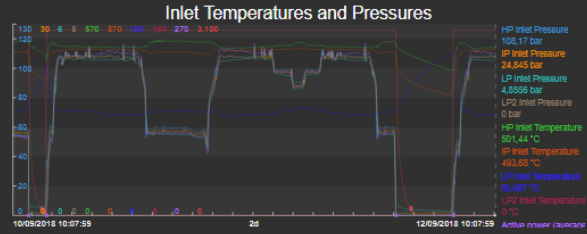


ST Overview: Expansion - Steam Temperatures and Pressures

TreeView
 ▶ AEN



Active power (average) ST 229 MW
 RPM 3000 rpm
 Reactive power ST 13 MVAR



Lotus Notes Table

Category	No.	Title	Item Link	Warning Link	Item Status	Notification Name	Comment Subject (Item)	Comment	Free Comment	Notification Flag	Notification Feedback	Trigger Time
-	PG-2018-0628	fault VM500 card	Link	-	Monitoring							
-	PG-2018-1008	GT START FAULT - NO FLAME	Link	-	Monitoring							
-	PG-2018-1038	Humming increase	Link	-	Monitoring							
EW	-	-	Warning Link	-	-	D3000 TG VIBR ALARM DISARMONICA ANALYSIS	Diagnostic system	D.3.7. Anomaly	VM500 acquisition card fault. Speed signal no correct. Scheduled the card replacement	Solved		08/08/2018 15:38:52
EW	-	-	Warning Link	-	-	D3000 TG VIBR ALARM SBIANCAMENTO O AMP ANALYSIS	Apex model	D.3.7. Anomaly	Mistake on expected value calculation probably for speed signal anomaly	Solved		03/09/2018 03:45:02
EW	-	-	Warning Link	-	-	D3000 TG VIBR ALARM DISARMONICA ANALYSIS	C4A	D.3.2. Step change (Permanent)	After last startup, turbine vibrations are increased	Monitoring		05/09/2018 05:45:42



PI Vision Portal for IPS – Integration with CRM Ticketing Platform (L. Notes)

Lotus Notes Table											
Category	No.	Title	Item Link	Warning Link	Item Status	Comment Subject (Item)	Comment	Free Comment	Notification Flag	Notification Feedback	Trigger Time
-	TS-2018-0004	TEST	Link	-	Active	-	-	-	-	-	-
EW	-	-	-	Warning Link	-	missing keyword for EWGT EXHAUST TEMP	missing keyword for EWGT EXHAUST TEMP	-	Active	Threshold modified	15/03/2018 22:01:01
EW	PG-2016-0195	TASCI -11-2016-0019 ST Trip while o/o Power oil pumps from 2 -> 1.	Link	Warning Link	Active	PGT - Decrease	D.1.3. Fogging Active	Ciao	Active	Suspended	15/03/2018 22:13:22
SMF	-	-	-	Warning Link	-	GTPA Stuck	S.1.1.	-	Solved	Threshold modified	15/03/2018 22:00:22

- Lotus Note integration in PI Vision pages
- List of open tickets related to the specific product
- Immediate correlation between tickets and PI Vision Trend/Mimics



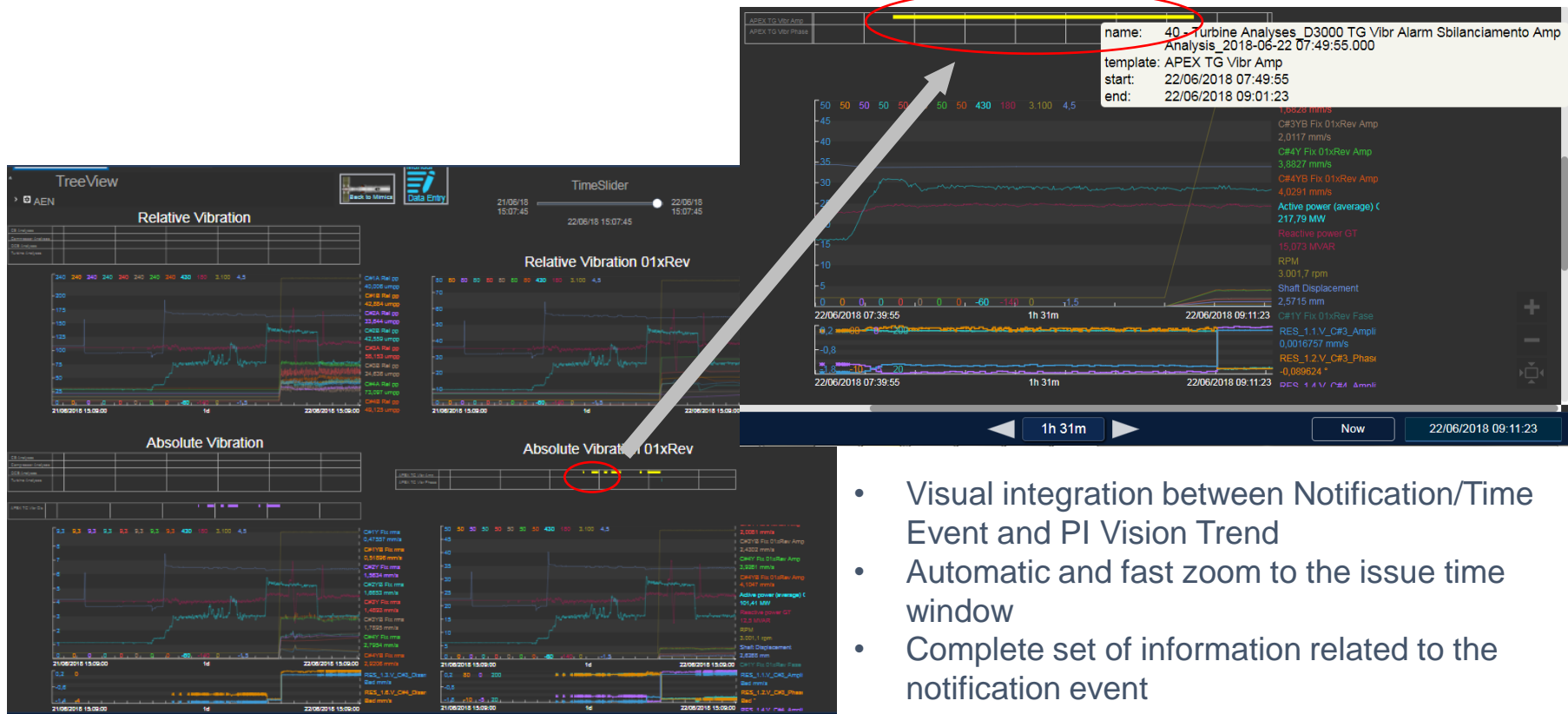
Start Time: 01/03/2018 10:22:29

End Time: 30/05/2018 10:22:29

Filter: <NONE>

- <NONE>
- GTPA Stuck
- PGT - Decrease
- missing keyword for EWGT EXHAUST TEMP

PI Vision Porta for IPS – Early Warning Alarm



- Visual integration between Notification/Time Event and PI Vision Trend
- Automatic and fast zoom to the issue time window
- Complete set of information related to the notification event

Results

ANSALDO ENERGIA

IPS – Diagnostic Common Platform



CHALLENGE

Implementation of a single platform (PI System) for all the assets, with the same user's experience.

Different data sources, different legacy systems, different visualization platforms.

Complex data sharing and accessibility.

Facilitate data analyses with dedicated tools not available on PI Vision nowadays off-the-shelf.

Different approach of Cyber security.

SOLUTION

Internal brainstorm with IPS team for finalizing requirements and needs

New approach using AF templates to standardize data organization and visualizations.

New custom widgets for improving visualization and analysis capabilities (PI Vision Extensibility)

Review of architecture for reinforcing security, using a common and accurate PI profiling.

RESULTS

1 unique platform for several different technologies, 300 machines under monitoring 18 different asset models for an easy and quick maintenance and development).

- Centralization approach for a strong global team working
- Possibility to manage all diagnostic and tickets using a single platform.
- Easy platform to maintain

Special Thanks!

We would like to stress and express our gratitude to all people who took part in this project.

The IPS Team:

Biondo M., Bittarello R., Pelosi M., Sacco F., Milingi O., Verardo C., Panciera F., Francia L., Carpano A., Bevilacqua M.

The responsible for developments and upgrades:

Stanchi P.

The entire AEN IT Department

e-matica Team: *Ottonelli G., di Bartolo G., Interlenghi F., Cilione P.*

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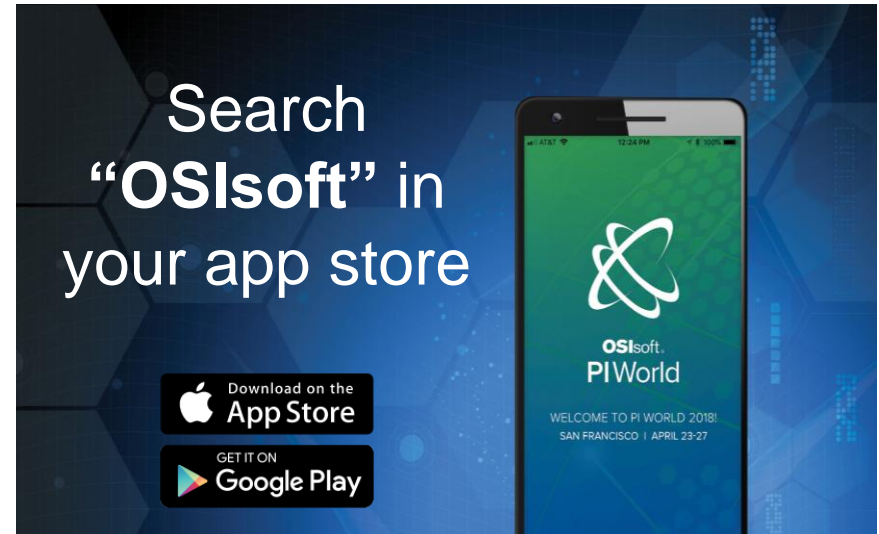
Questions?

Please wait for
the **microphone**



State your
name & company

Please rate this session in the mobile app!



謝謝 KEA LEBOHA
 TAPADH LEIBH 고맙습니다
 БАЯРЛАЛАА MISAOTRA ANAO
 DZIĘKUJĘ CI NGIYABONGA TEŞEKKÜR EDERIM GRACIES OBRIGADO شكرا SALAMAT
 DANKON TANK TAPADH LEAT
 KÖSZÖNÖM DANKIE TERIMA KASIH GRACIES
 СПАСИБО
 ПАКМЕТ СІЗГЕ
 GO RAIBH MAITH AGAT
 БЛАГОДАРЯ GRACIAS MAHADSANID
 ТИ БЛАГОДАРАМ
 TAK DANKE MAHADSANID
 RAHMAT MERCI
 HATUR NUHUN
 GRAZZI ПАККА ПЕР
 PAXMAT САГА
 CẢM ƠN BẠN
 WAZVIITA
 FALEMINDERIT
 TI БЛАГОДАРАМ
 СИПОС
 OSi soft.
PI World
THANK YOU
 MULȚUMESC
 HVALA FAAFETAI
 ESKERRIK ASKO
 HVALA ХВАЛА ВАМ
 TEŞEKKÜR EDERIM
 DANK JE ΕΥΧΑΡΙΣΤΩ GRATIAS TIBI
 AČIŪ SALAMAT MAHALO IĀ 'ŌE TAKK SKALDU HA
 ДЗЯКУЙ GRAZIE
 DI OU MÈSI
 ĎAKUJEM
 MATUR NUWUN
 SIPAS JI WERE TERIMA KASIH
 UA TSAUG RAU KOJ
 TI БЛАГОДАРАМ
 СИПОС