Analytics and System integration for power generation industry.

Future energy projection and condition-based maintenance

Nuriban Ortega

MITSUI & CO.
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Agenda

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Presentation agenda

1

About MPA

A brief introduction about MPA and its business challenge

2

Excess Energy Forecast

How we use PI System to predict capacity, excess energy and generation costs

3

Excess Energy Improvements

How we improved our excess energy forecast through PI System

Agenda

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4

System Integration Using Viziya Workalign IIOT

MPA's Journey connecting CMMS and PI System

5

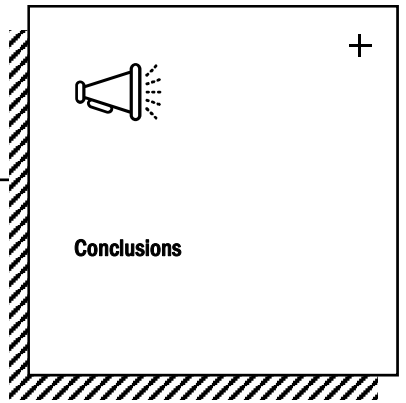
Prealarms Project

Condition monitoring as a key for continuous improvement using 6σ

6

Next Steps

See what is on MPA's roadmap



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About MPA

Mitsui & Co. Power Americas (MPA) is the second-largest private power generator in Mexico with more than 3GW of installed capacity today. MPA is a Power Generation Developer and Asset Management Company with a proven track record and knowledge of combined cycles, cogeneration, utility-scale solar and wind farms. MPA offers solutions to generators and electricity customers to improve their daily operations.

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timeline

MPA History

Our History

2006

Valladolid

530 MW

2009

Falcon

Acquisition of 5 Combined Cycle Plants

2,235 MW

2013

EDI/EDP

Joint Venture Mitsui – EDF Renewables

328 MW

2020

Calera

COD

104 MW

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Excess Energy Forecast

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Excess Energy Forecast

Capacity Prediction

MPA has developed a procedure to estimate the excess energy and generation cost for the day ahead market (combined cycle power plants).

1. Data is extracted from the previous weeks.

2. Data is filtered to base load conditions.

3. Correlations between load and ambient conditions are calculated for each turbine.

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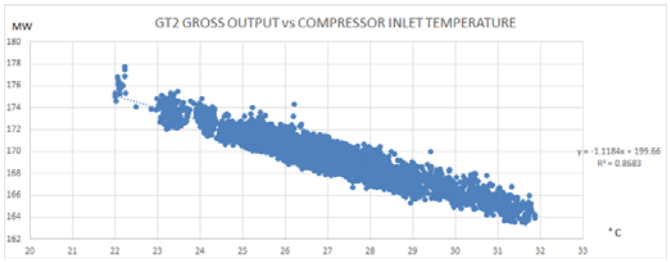
Excess Energy Forecast

Capacity Prediction

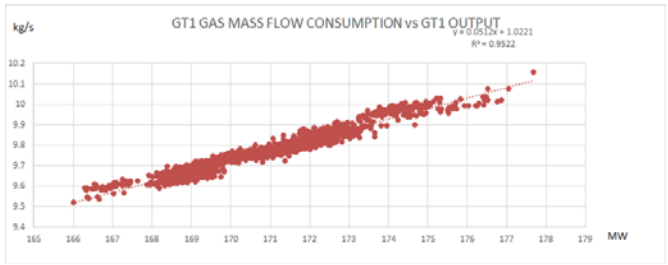


Gas Turbine 1 Correlations

Steam Turbine Correlations

Auxiliary Consumption Correlations

Gas Turbine 2 Correlations



Total Plant Power Output

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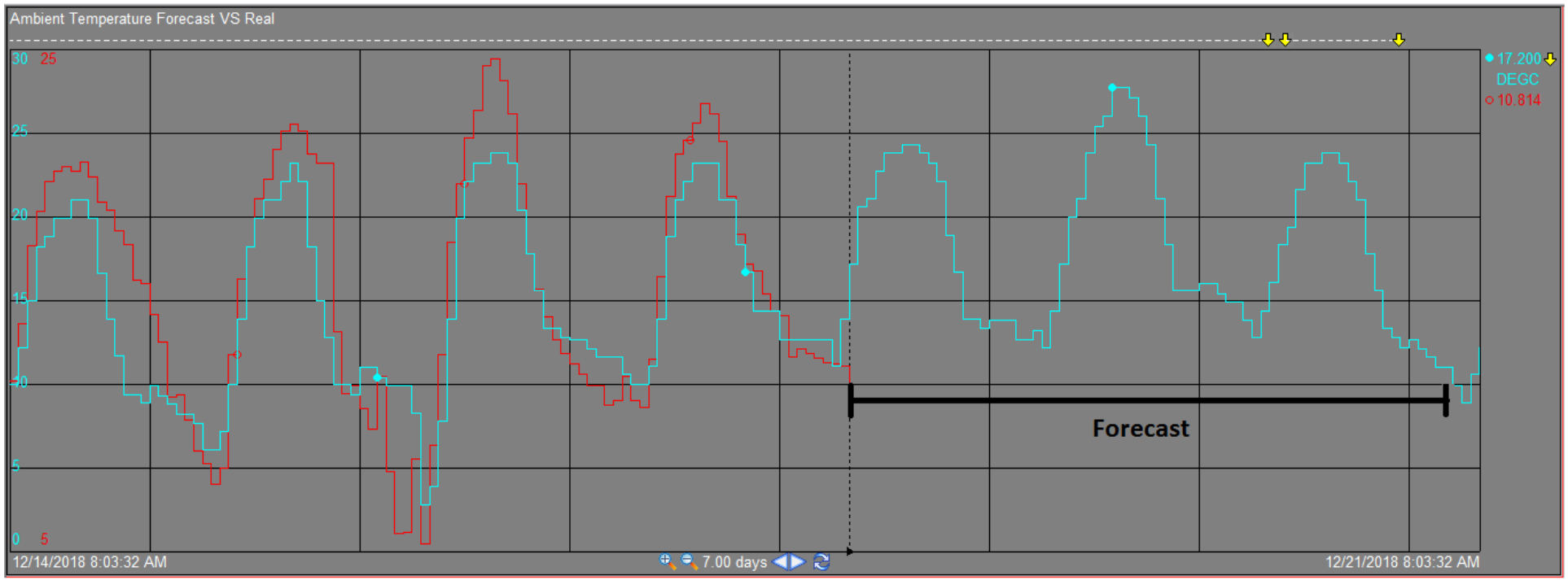
Excess Energy Forecast

Weather Forecast

Weather predictions are sent via UFL to our PI AF Server



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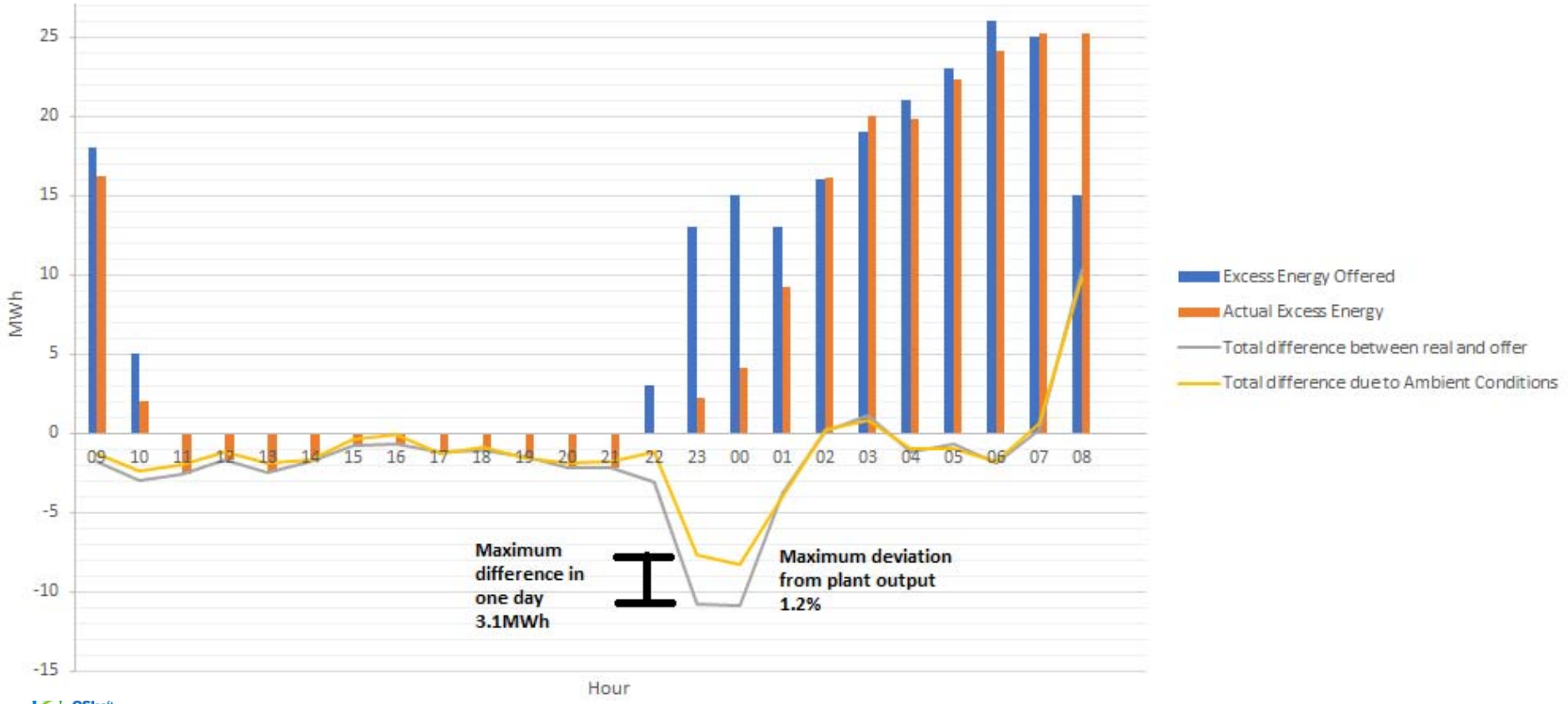
Excess Energy Improvements

Source of deviation



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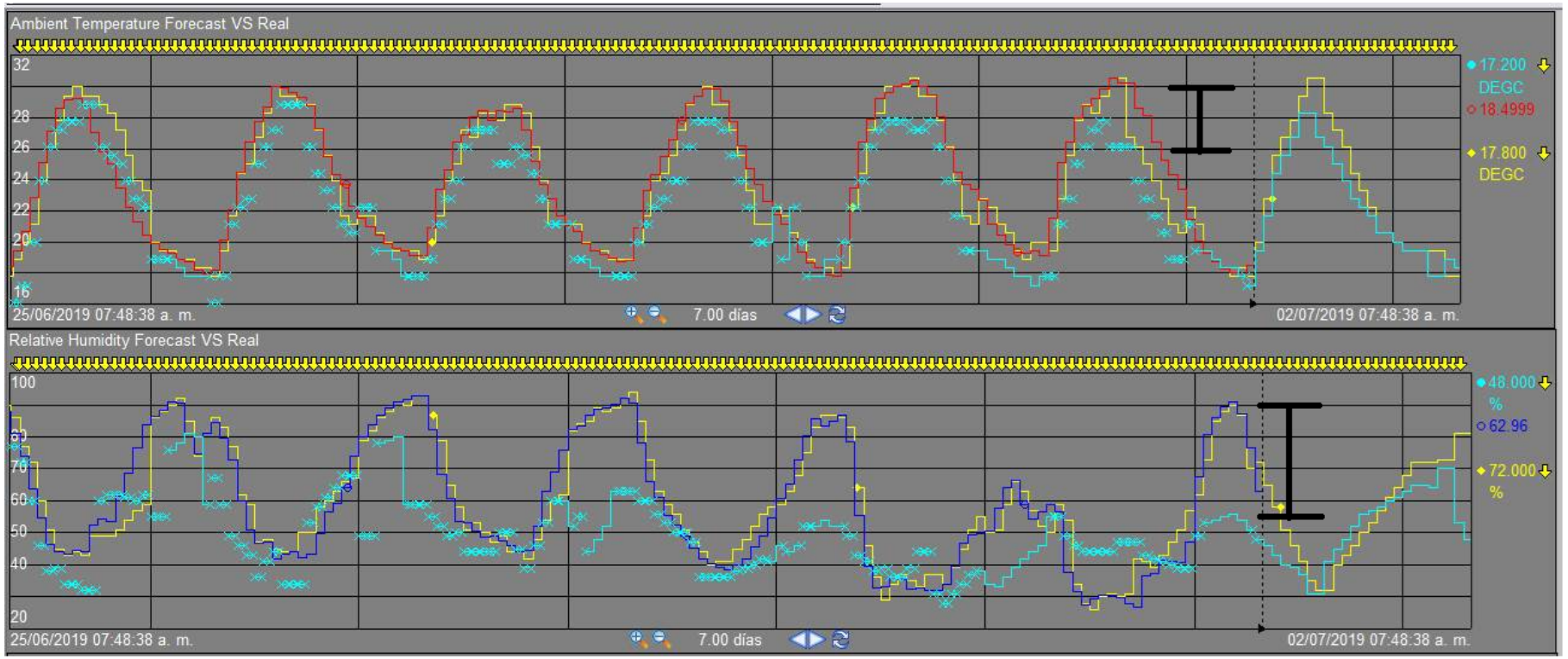
Excess Energy Improvements

Weather Forecast Accuracy

In order to increase the forecast accuracy, the data from each plant weather station is extracted from PI and sent via UFL to the weather provider.



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Excess Energy Improvements

Excess Energy Generator

The excess energy calculations have the flexibility to consider operational limitations/maneuvers

Fecha de Hoy	15-ago-19	
Fecha de la Oferta	16-ago-19	Oferta para mañana
Henry Hub (USD/MMBtu)	2.1500	Favor de verificar
Tipo de Cambio (Pesos/USD)	19.5763	
Evaporativo TG1	Disponible	
Evaporativo TG2	Disponible	
Porcentaje de Uso de Quemador de Ducto HRSG 1	100%	
Porcentaje de Uso de Quemador de Ducto HRSG 2	100%	
Ventiladores Indisponibles		

Evaporative Cooler Limitation

Duct Burner Limitation

Fans Unavailable

0
1
2
3
4
5
6

Favor de verificar
Favor de verificar

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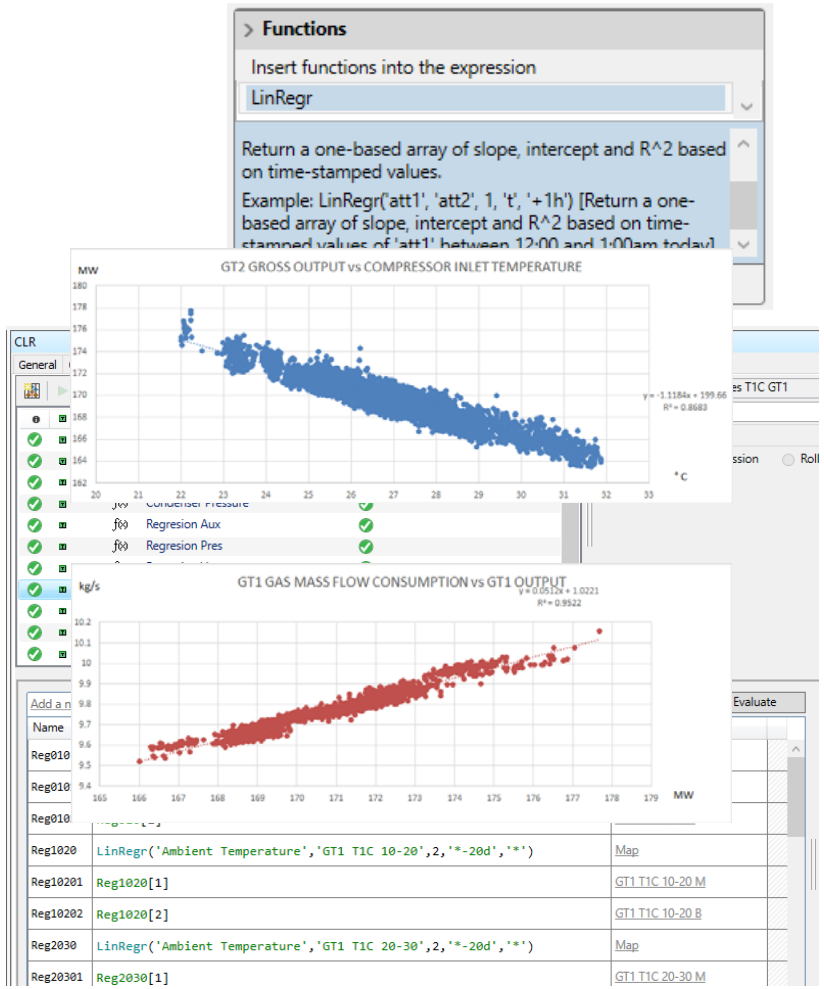
Excess Energy Improvements

Automatic Excess Energy Calculations

After PI server 2017 R2 version, linear regression function was added to PI AF library.

We are using automatic calculations for each plant since 8 months ago

- Over 100 calculated TAG's per plant.
- No need to download manually.
- No need to filter.
- No need to calculate regressions in excel.
- No need to update models.



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System Integration Using Viziya VIZIYA WorkAlign® IIoT

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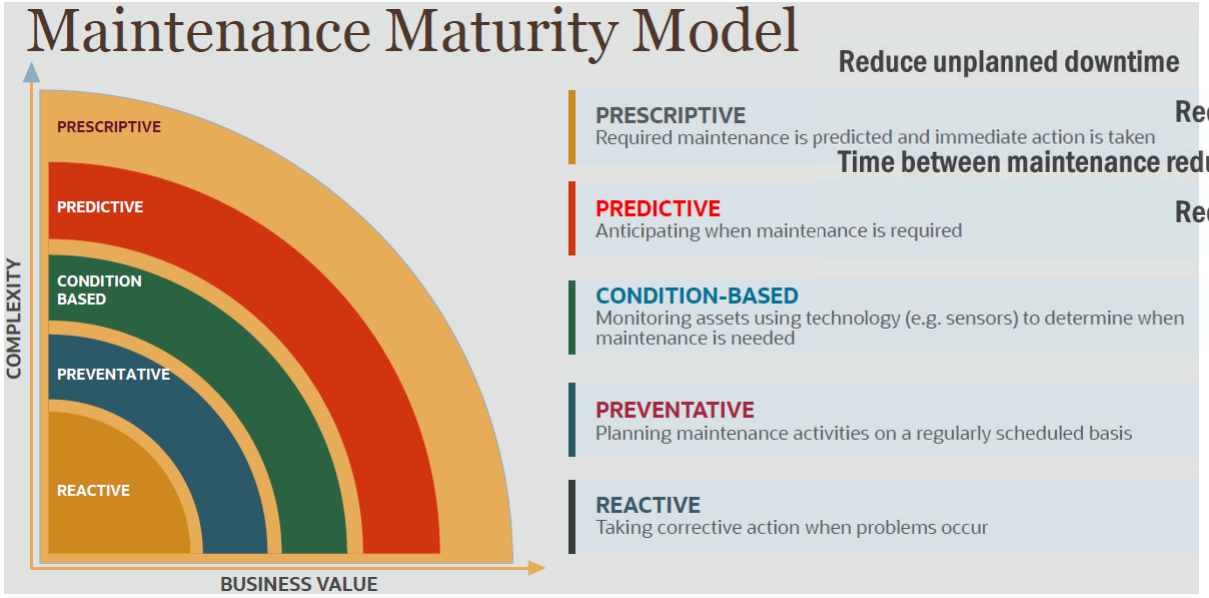
Challenge

Condition-Based Maintenance has been one of the most important challenges in the industry.



Reduce unplanned downtime

Reduce labor hours

Time between maintenance reduced

Reduce maintenance costs

Quicker diagnostic of failures

Better inventory control/less spare parts

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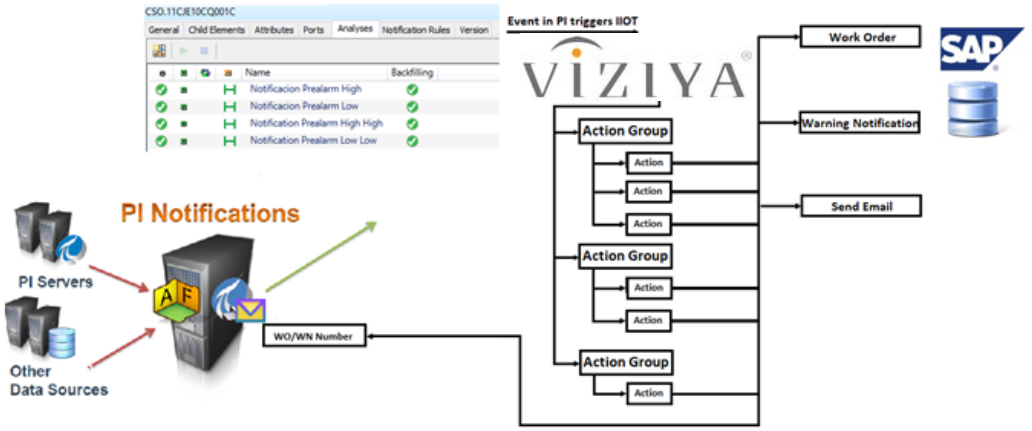
How does it work?

When an event frame is created in PI AF through a specific analytic, VIZIYA WorkAlign® IIoT server can trigger these actions:

- Create warning notification.
- Send warning notification number to PI AF attribute
- Create work order.
- Send work order number to PI AF attribute
- Send email notification.



Implementation Details

01

Implementation Time

Fastest implementation time out of 8 vendors.

02

Plug-in Plug-out

Finished product built for PI System users.

03

Additional cost

Beside the default applications, only PI Web API is required for the implementation.

04

Customizable environment

The application allows the user to configure the actions as needed.

05

SAP Partner

The system will not be affected if the SAP version is updated.

06

PI AF

All the analytics are built by the customer in PI AF. The user has the control and can modify, improve or add new analytics at any time.

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Prealarms Project

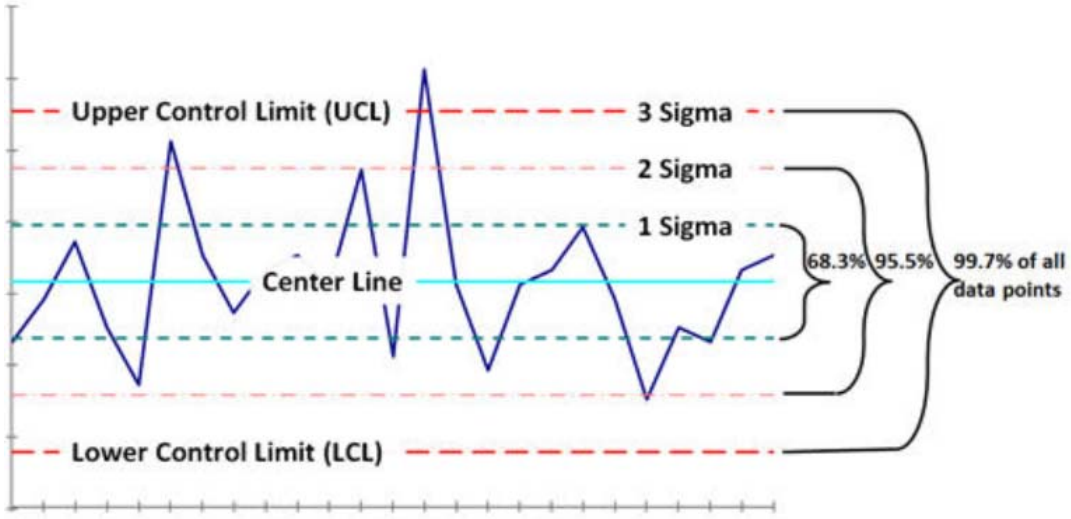
Six sigma

Definition

A data-driven method for achieving near perfect quality. Six Sigma analysis can focus on any element of production or service, and has a strong emphasis on statistical analysis in design, manufacturing and **customer-oriented activities**

Insight

We understand the fact that numbers can represent features and characteristics of a process. We believe that a deeper understanding of data and data analysis can be used to produce improvements and different perspectives of the process.



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Prealarms Project

Saltillo Project

Selection

268 variables were selected from Saltillo power plant that are critical to maintain availability and performance in the plant.

Calculation

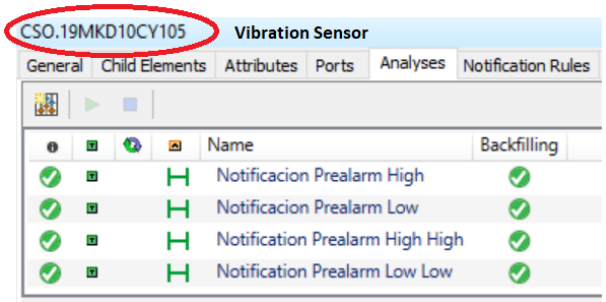
@Base load, standard deviation and average values were calculated for each of the selected variables for the past 15 days. Then upper and lower limit was set for all the variables.

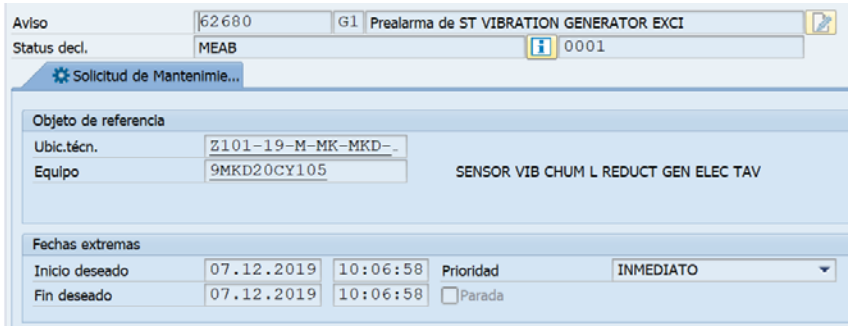
System integration

PI AF system and SAP PM were connected using Viziya's Workalign IIOT software.

Monitoring

Allowing MPA to send automatic warning notifications/work orders to SAP PM when any of the critical variables reach the upper or lower limit.





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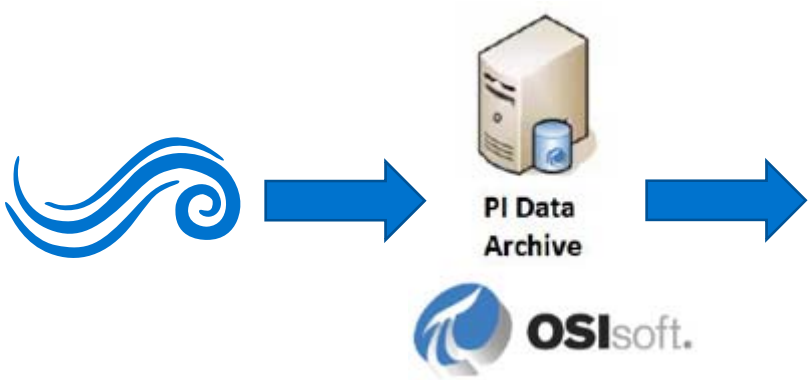
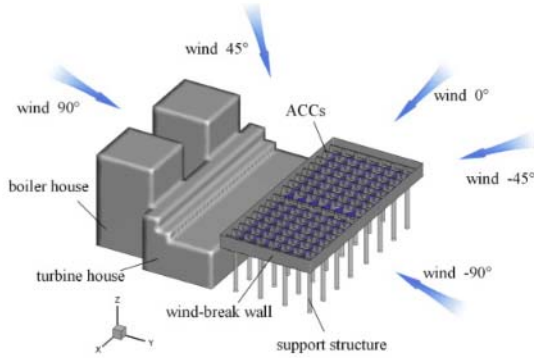
Next Steps

Continuous improvement of capacity prediction

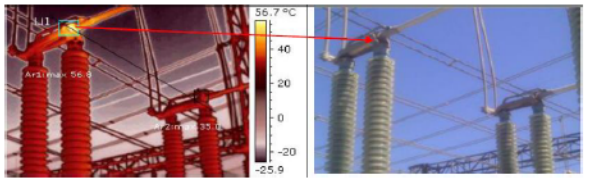
Send plant wind speed and direction to weather provider to improve the accuracy of the forecast



Add wind speed to capacity prediction models (air cooler condenser is heavily affected by wind speed and direction)



Plant Information from other sources



PI Manual Logger

Transformer DGA

PI Data Archive

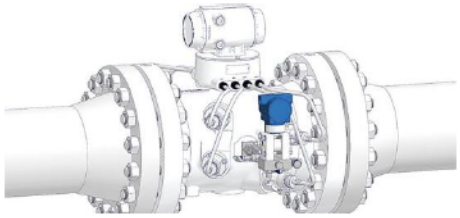
OSIsoft.

AF

Thermography

Oil Analysis

Ultrasound detection



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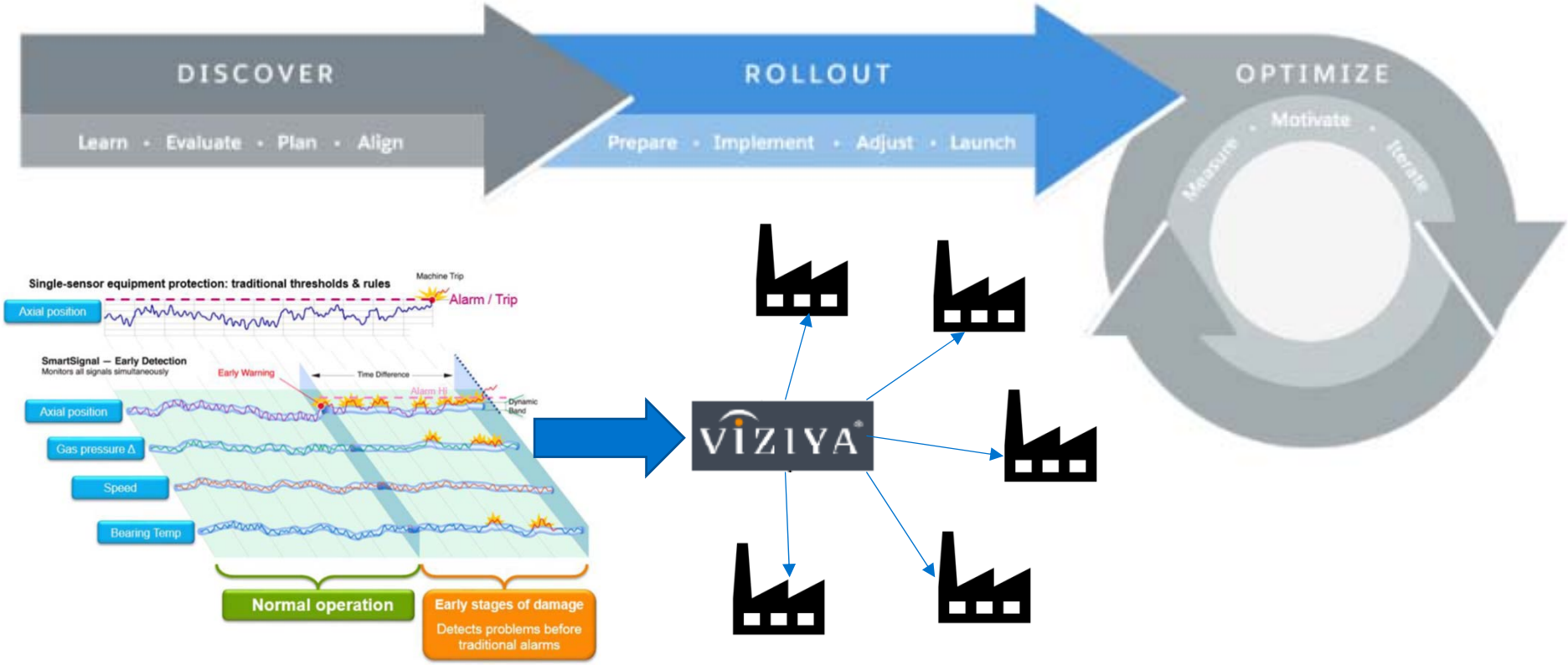
Best Practices/Next Steps

APR Implementation and Rollout



MPA MONITORING AREA AS A CENTER OF EXCELLENCE

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CHALLENGES

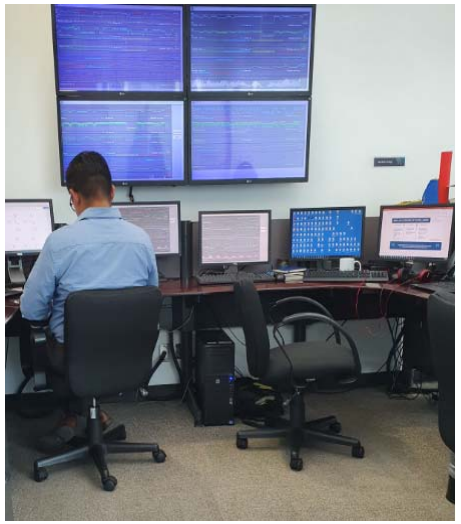
- High-accuracy excess energy prediction in a competitive deregulated Electric Market
- Develop digital strategies to increase reliability in MPA assets.
- Provide similar asset management services to third parties.

SOLUTION

- Develop analytics in PI AF using weather forecast.
- Come up with analytics and integrate with CMMS.
- Automation of processes.

BENEFITS

- 80% reduction of time consumed in Condition Monitoring
- Events are captured 20% earlier than before
- Increase of profit due to excess energy sales.



"MPA provides O&M services in an increasingly competitive Mexican Electric Market. In addition, there is a need to increase the reliability of all its assets through digitalization switching from reactive/preventive-based maintenance to condition-based maintenance."

Contact Information

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Questions?

Please wait for
the **microphone**

State your
name & company

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