

# Operational Windows Strategy at PEMEX

### Improving Operational Safety & Reliability

Presented by Mr. Carlos Alberto Guevara Díez



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# Agenda



- Pemex at a Glance
- The Journey to Operational Windows (OW)
- PEMEX's Operational Window Portal
- Examples & Video
- Results
- Next Steps
- Conclusion



# **About PEMEX**



#### 

	Exploration and Production				
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- Crude oil production: 2,513
   Mbd<sup>1</sup>
- Natural gas production: 6,406 MMcfd<sup>1</sup>
- 7<sup>th</sup> oil producer worldwide<sup>2</sup>
- 76% of crude oil output is produced offshore
- 1P reserves-life<sup>3</sup>: 10.2 years

#### Downstream

- Refining capacity: 1,690 Mbd<sup>1</sup>
- Strategically positioned infrastructure
- JVs and associations with key operators in the Mexican petrochemical and natural gas transportation industry

#### A Snapshot

#### International

- Crude oil exports: 1,187 Mbd<sup>1</sup>
- 3<sup>rd</sup> largest oil exporter to the USA
- Long-term relationship with USGC refiners
- JV with Shell in Deer Park
- 10% stake in Repsol

PEP Pozos en Explotación: 7,382 Plataformas Marinas: 233

#### PGPB Complejos Procesadores de Gas: 10 Ductos: 12.768 km.

Ductos: 12,768 km. Terminales de Distribución: 30

#### PREF Refinerias: 6 Terminales de Almacenamiento y Reparto: 77, Terminales Maritimas: 15 Autotanques: 1,360 Oleoductos: 4,647 km. Poliductos: 9,115 km.

PPQ Plantas: 38 Complejos: 5 Ductos: 1 071 km Zona Productora
 Refineria
 Complejo Petroquimico
 Complejo Procesador de Gas
 Centro de Venta
 Ducto
 Ruta Marifima





#### Proved Reserves 13.9 MMMboe

Proved Reserves



www.pemex.com

(3) At current production levels of approximately 2.5 MMbd.

2013 PIW Ranking.

(4) As of Sentember 30, 2013.

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# Implementing a Standardized Operational Window (OW) at PEMEX Refining

"We have implemented a proof of concept for a web based Operational Window (OW) that provides system wide KPIs and operational windows for critical assets and refineries. The initial results have been indicate "game changing" potential for improving asset reliability, safety, and performance with positive impact of yield and production. The use of PI Asset Framework (PI AF) and PI WebParts was foundational".

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#### **Business Case**

- Low performance in refinery utilization, reliability, and yield
- Inability to share best practices across refining division
- Inability to view entire PEMEX refining value chain in real-time



#### Solution

- Expanded current PI System to provide integration & applications infrastructure elements
- Used PI AF and PI WebParts as foundational components
- Developed web based Operational Window (OW) that for PEMEX access



#### **Results and Benefits**

- Single Operational Window (OW) for all PEMEX refining
- Web- based, simple, prioritized information presented in context
- Consistent KPIs to support continuous improvement of efforts
- Improved yields, production, reliability, and safety of refineries

# The Road to Improving Operational Safety & Reliability

 Issues with Rising Maintenance and Safety costs – 30% Avoidable Errors



- December 2012 Launch of the Operational Windows (OWs):
  - Establish the proper operation of the main equipment
  - Improve operational reliability.
- Issue of the **PEMEX Reliability Manual** 
  - Best Practices to prevent & eliminate defects through proper use of the OWs

# An Operational Window – What is it?



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### **Process for a Successful OWs Implementation**

Critical Equipment Selection	Operational Variables to be monitored			
		Definition of the OW limits		
			Management and improvement process	

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### Challenges to implement a OWs strategy

#### The strategy of OWs should have a tool that allows proper monitoring by:

- Allowing Accountability of the operational staff in each sector and as a result allows the execution of preventive and corrective actions.
- Monitoring in an standardized manner at all refineries so all displays of the status of critical OWs for all different levels of equipment are the same.
- Conduct analysis showing the percentage of time that critical equipment is inside and outside safe ranges to help prioritize the require corrective action.
- Visibility. Show critical equipment which are constantly operating out of safe range and record why corrective actions have not been made to them or means to determine the cause of deviations.
- To have an approved platform, that is **simple** to operate, which contains **uniform rules** across the organization to determine the progress in the implementation and improvement of the OWs system.



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# **Operational Window Solution**

The "Approved Display Platform for Operational Windows at Pemex" was created which was designed using the following products:

- PI Server
- PI Asset Framework (PI AF)
- Microsoft Visual Studio 2005 (To Implement Rollups)
- PI WebParts
- Microsoft SharePoint

Let's take a look of the application....

### **Standardized Real Time Portal at PEMEX**

All 4 PEMEX Companies' Metrics are in a single Portal

PEMEX

DCTIPN



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### Simple solution to standardize all KPI

Process Variables and all KPI are presented & calculated in a standard way using PI AF

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### Use of Rollups for standard KPI aggregation

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# "One ring portal to have them all..."



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### A single detailed view for all equipment



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### **The Heart -- the OW Calculation**



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### **360 solution – mobile included!!**

Site	KPI Rollup						
All Sites							
Sistema Nacional de Refinerías							
	Low Low 317 12%				I		
	Low 101 4%						
	Good 813 31%						
	High 141 5%						
	High High 303 11%						
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### Demo video here.....

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### Results



This project has allowed us to explore new solutions, ways to attack a properties holistic way, looking at all the possible angles that make life easier for operations personnel and has resulted in:

- Doubling the percentage of process variables "green" in less than 3 weeks of operation
- Building a system to **monitor** process conditions of over **2,600 variables**
- A solution capable of monitoring process variables from operations, quality, power generation and any other areas to come in the future
- A certified, simple, easy ability to transport and adapt to other production processes

## Next Steps.....



While we have achieved significant benefits we still have goals to achieve:

- Strengthen the use of the solution through internal marketing, video conferences and constantly monitor the operating windows on field in conjunction with the business area.
- Improve the quality of information contained in the model (operating limits, setpoints, text descriptions).
- Quantify the benefits obtained through the strategy OWs.
- Increase the functionality of the solution integrating some additional graphics detail pages, setting response times and some other improvements to the navigation between the different pages.
- **Replicate this solution** to all petrochemical complexes, gas processing complexes, pumping stations, storage and distribution stations and generally to all centers where there Pemex processes require monitoring and control.

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