Digital Monitoring & Control System for offshore platforms with Foundation Fieldbus

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Abstract

• Advantages of implementation of PlantPAx system with Foundation Fieldbus technology in a low consumption system for offshore platform Sinan-A & Sinan-B to get operational efficiency
Who is AMC?

A Rockwell Automation System Integrator

http://amc-tec.net
Who is AMC?

• AMC has 25 years of experience implementing projects and offering maintenance / calibration to field instruments.

• Installation of field instruments in 7 offshore platforms in compression modules.

• Experience on construction of 27 different plants (instrumentation phase) on Pemex & private industry.

• Design & construction of test equipment for well cementation

• Automation services focused on control systems & field instruments

• Ignition systems for burners
Who is AMC?

Alternative Power Generation:

Micro – Generators
Based on magnetic coupling technology

Pioneers on power generation using oil-well gas...........with no consumption!!
2. Background
Project:

Engineering, Construction, installation & start up of a power generation system (1500W) for automation systems in offshore platforms Sinan-A / Sinan-B for Litoral Tabasco Oil Field.
User's previous experience

Offshore Platform May-A
Offshore Production Requirements

- Safety & Reliability
- Severe operation conditions
- Limited space
- Uninhabited facilities trends
- State of the art equipment

RA offers value-added solutions for offshore applications:
- Integrated Control systems
- MCC
- Safety & critical control
- Commissioning time reduction
- Lower capex
- Lower Total Cost of Ownership
- Better control and communication
General Background

Existing Basic Process Control & Emergency Shutdown Systems on each offshore platform (Pemex)
General Background

Typical solution for power generation
Solar generation systems proposal
General Background

Photovoltaic cells installation proposal
General Background

Example of Photovoltaic cells installation

Batteries typical arrangement
General Background

Real Case, Yaxche-B offshore
SINAN-A & B background

- Started up: July & March 2006.

- Designed to operate with photovoltaic systems & air generators, gas turbine or fuel cells once production started.

- Due to power required, the use of photovoltaic cells was not an option.

- Pemex had to request an alternative generation system because the automation systems installed, which are responsible for monitoring the operation conditions of wells, remote shutdown of wells, emergency shutdown & surveillance system (CCTV), were out of operations due to lack of electrical energy.
Scope of supply

- Basic & detailed engineering for construction, installation & startup of a 1500 W, power generation system, 500 W of back up & 72 hours of autonomy based on maintenance free batteries for each platform Sinan- A & Sinan-B.
- Development of basic and detailed engineering for the supply, construction, installation and commissioning of the following low power consumption systems:
  - Digital monitoring & Control System.
  - Emergency Shutdown System.
  - Rehabilitation of Interface pannel
  - Surveillance system (CCTV).
- All systems replace existing equipment in offshore facilities.
Well operative conditions

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3. Challenges
Challenges

• Basic & detailed engineering for construction, installation & startup of a 1500 W, power generation system, in a limited space offshore facility.
• Power supply back up required large space to be installed.
• Existing systems required big amount of electrical power, so they had to be replaced.
• New systems had to be installed in the same space as the installed base, or be smaller
• What about the cloudy days?
4. Solution
Alternative energy generation system:

Micro – Generators Based on magnetic coupling technology

The Micro Power Generator with magnetic coupling is developed as an alternative energy source renewable or green energy, which can meet the current energy sources, produces no environmental impact, does not pollute, and does not use substances that could damage the environment. MG-500, is an energy innovation that uses sustainable energy. It uses the pressure of a fluid to generate electricity, returning it to its original process, minimizing environmental impact.
Principle of operation of Micro Generator
As the blades and the inner shaft are in a hermetically sealed chamber or enclosure and transmission of movement to the arrow is performed by external magnets, there is no possibility of gas leaks and we have the ability to handle high pressures in the feeder gas line safely.
Sistemas Integrados de Información

Control de Compresores y Turbomaquinaria

Sistemas Integrados de Información

Control Avanzado de Procesos

Control Inteligente de Motores

Seguridad y Control Crítico

Administración del desempeño de activos

Monitoreo de Vibración
Control & Safety system in same platform
Device Integration Options

Device Integration Strategy

- Leverage EtherNet/IP
- Provide options for process device connectivity
- Deliver best-in-class integration for power and motor control devices

From the supervisory layer (Engineering, Operations, Asset Management)...

Seamlessly through the controls layer...

... To multiple options at the device layer

Preferred integration with process instruments

Intelligent Devices

Drives and MCCs

Instrumentation

Compact, Flex, and 1756 HART
CN2PA Linking Device
FFLD Linking Device
FFLD-C Linking Device

Instrumentation

ControlNet
EtherNet/IP
WirelessHART
HART Communication Foundation
ProfiBus
Fieldbus Foundation H1 technology selected

- Support of Fieldbus Foundation instrumentation via linking device
  - EtherNet/IP and ControlNet high-speed communication backbone
  - Low consumption system by design

- ONE architecture, ONE set of equipment and ONE set of hardware for control and asset management
- Multiple devices in same segment help reduce control hardware (I/O)
- Low consumption field devices (E+H)
- The Linking Device (LD) brings data from 4 H1 fieldbus networks directly onto the E/IP backbone

PlantPAx includes Fieldbus Foundation H1 connectivity
Power Generation System
Power Generator

Power generation System Sinan A y B.
INGENIERÍA, CONSTRUCCIÓN, INSTALACIÓN Y PUESTA EN OPERACIÓN DEL SISTEMA DE GENERACIÓN ELÉCTRICA DE 1500 WATTS PARA LA PUESTA EN OPERACIÓN DE LOS SISTEMAS DE AUTOMATIZACIÓN DE LA PLATAFORMA SINAN-A INTEGRAL LITORAL DE TABASCO

ARQUITECTURA DEL SISTEMA
PLATAFORMA SINAN-A

MARZO 2011
Previous system vs New PlantPAx System

Smaller space required
Integration

Foundation Fieldbus technology led to seamless integration
Factory Acceptance Test.

Easy Integration – Easy commissioning
XT technology selected

- ControlLogix XT hardware
- Extended temp. -20...70 °C (-4...158 °F).
- TÜV certificated equipment
- Multiple digital bus integration capabilities
- Conformal coating
- Capable to operate in extreme conditions
Foundation FieldBus Integration

1757-FFLD modules provide an easy and secure link between Foundation Fieldbus High Speed Ethernet and H1 segments in the PlantPAx system.

FFLD allow communication to 4 FF H1 segments

Allows multiple field devices (E+H selected) to be connected to the same pair of wires.

System prepared for asset management capabilities

Remote configuration.
4. Lessons learned
Lessons learned

• MG500 is a great option for green energy in oil wells

• Power generation systems avoid the use of valuable space in offshore platforms.

• RA’s collaboration for the design of low consumption systems helped to implement a highly efficient system.

• Process Control System & ESD in same control platform allows for seamless integration & a reduction in commissioning time

• Using same configuration & visualization tools allows for a more efficient system.

• RA's PlantPAx allows the flexibility to use different bus technologies, allowing users to define the best solution for every application.
PLANT-WIDE OPTIMIZATION

QUESTIONS

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