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Power System Analysis, Evaluation and Implementation of ETAP PMS

Company: Oman India Fertilizer Company (OMIFCO)

Location: Industrial Area, Sur, Oman

About OMIFCO: OMIFCO was established as the result an initiative between Governments of Oman and India in order to construct, own and operate a modern world scale petrochemical facility with two-train ammonia-urea fertilizer manufacturing plant at the Sur Industrial Estate in the Sultanate of Oman.

Challenge: Unplanned system outages due to disturbances in the supplying utility

Solution: ETAP Real-Time™ Power Management System and Intelligent Load Shedding System

Benefit: Reduced process downtime and increased the operations efficiency

Background

Before the implementation of this project, OMIFCO experienced several unplanned outages due to disturbances in the supplying utility. The facility's power management control system had deteriorated and did not provide adequate visualization and controls of the interconnection tie to the Grid.

ETAP was contracted to perform power system studies to investigate unplanned outages, operational issues, and provide recommendations to improve system performance. In addition, the scope included the replacement of Bay Control Units (BCU) and Human–Machine Interface (HMI) / Supervisory Control & Data Acquisition (SCADA) systems.

ETAP helped OMIFCO to resolve their frequent breakdown of previously installed EMS/SCADA, automate their processes and reduce load shedding by implementing ETAP Real-Time.

Site Details

Load Characteristics

• Total No. of Substations = 8

• 11 kV Switchgear = 3

• 6.6 kV Switchgear = 18

• 0.48 kV Switchgear = 20

Power Generation

• GT – 1 & 2 (2 X 40.72 MW)

• OETC Grid – 30 MW Import, 6 MW Export

Equipment Details

ETAP Hardware system is composed of:

• Redundant PMS and Stand-Alone Historian Server

• Engineering and Operator Workstation

• BCU & RTU

Protocols supported: DNP3.0, OPC, IEC 61850, I/O Tags - 10,000

Challenges

• Missing Electrical Data and Power System Model

• Lack of proper electrical data and system model

• Lack of system historical events

• Missing electrical data in Distributed Control System (DCS)

• Limited system knowledge by the operator

• Unplanned Outages and Process Interruptions

• Frequent unplanned outages due to improper protective device setting

• Nuisance load shedding triggers caused by power grid frequency fluctuations

• Inadequate frequency relay setting and operation

• Excessive process shutdown during load shedding events

• Improper generator operating mode

• Excessive voltage drop due to un-sequenced motor starting

• Outdated and Faulty SCADA system

• Substation control and HMI failures

• Unable to effectively monitor energy usage

• Manual grid synchronization with GTGs

• No infrastructure for root cause analysis

Solution

The co-engineering effort between ETAP and OMIFCO provided the plant with an integrated power management solution with a unique model-based approach:

- Creating and validating entire plant's electrical model
- Performing exhaustive power system analysis
- Finding out shortfalls of entire operations
- Replacing existing BCU's with latest ones
- Segregating and interfacing all electrical data to ETAP
- Tuning and implementing same model for PMS
- Configuring a user-friendly HMI for easy electrical system operation

- Installation of various interlocks preventing operational and human errors
- Optimizing grid synchronization to prevent unnecessary system shutdowns

Implemented ETAP Real-Time™ applications:

- Advanced monitoring
- Predictive simulation and what-if analysis
- State and load estimation
- Event playback and root cause analysis
- Intelligent load shedding and validation
- Grid synchronization
- Tabular events and alarm management
- Web-based HMI dashboards
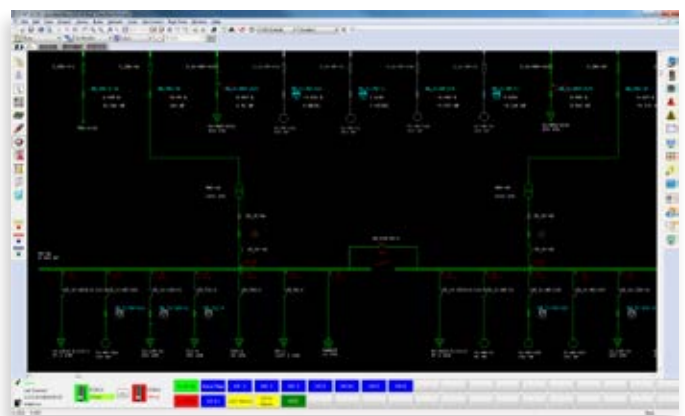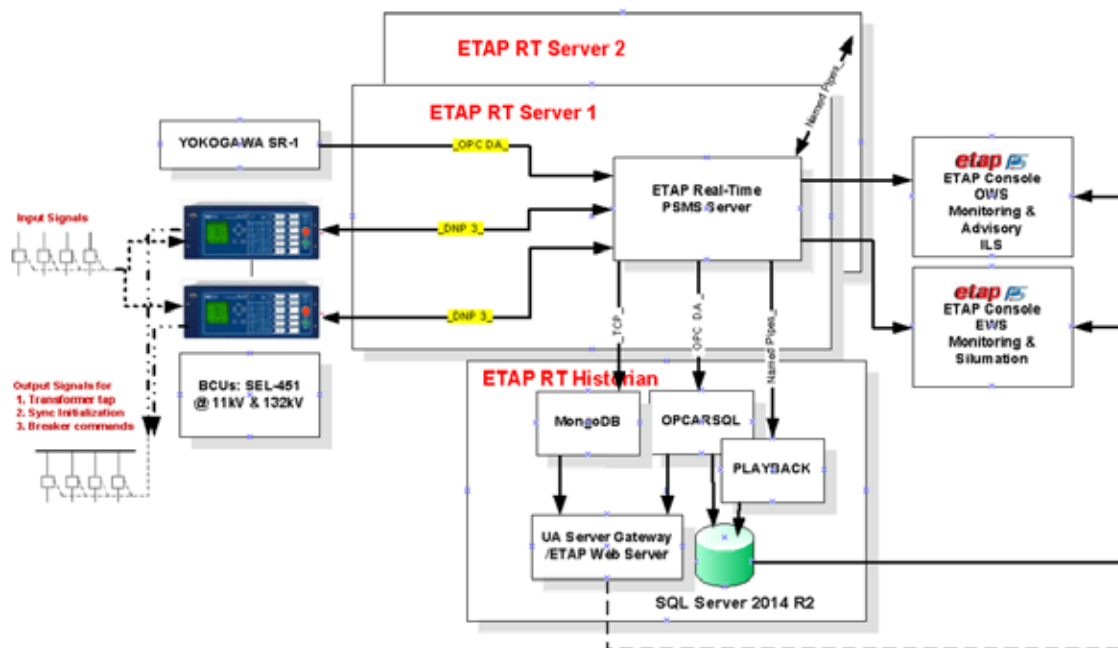
Benefits

The installation and application of ETAP software has proven to be a great benefit to OMIFCO for operations and validation of their plant's power system. The overall production increase by preventing unnecessary system shutdowns with predictive analysis.

- Reduced process downtime from one hour to 15 minutes
- Increased the operations efficiency by 75%
- Over $41,000 savings per month on synchronization procedures
- ROI after second year of 105.6%

About Us

ETAP is the global market and technology leader in modeling, design, analysis, optimization, monitoring, control, and automation software for electrical power systems. The company has been powering success for over 30 years by providing the most comprehensive and widely-used enterprise solution for generation, transmission, distribution, industrial, transportation, and low-voltage power systems. Founded in 1986, ETAP is headquartered in Irvine, California, USA, with offices around the world. Our mission is to provide state-of-the-art products and superior engineering services by combining advanced technologies with the highest standard in quality to achieve overall customer satisfaction.

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