COMPANY DATA

Company Name: PT. SCADA PRIMA CIPTA
Address of Head Office: Jl. Kembar 1 No. 12, Bandung 40253 West Java, Indonesia
Phone: +62 22 522 3648
Faksimili: +62 22 520 6258
E-mail: support@scada.co.id
Company Website: www.scada.co.id

RESELLER & PARTNERS

Ignition

Kepware

Invensys

Wonderware

SES
PT. SCADA PRIMA CIPTA (SPC) is an engineering service, consulting and system integrator company that provides engineering and services to the energy, petrochemical and manufacturing markets. SPC serves a broad range of clients in government and industry that providing engineering design, maintenance services, project management consultant, system development and integration among various SCADA System, Custom Solution and Application Development to meet user’s requirements.

We have proven products and software for oil & gas, petrochemical and manufacturing ranging from SCADA System solution, Production Data Management / Hydrocarbon Accounting and also Asset and Risk Management System which will improve productivity, quality and safety with cost effective solution.

We also have technical professionals and experienced support personnel dedicated to specific assignments with fully responsibility to execute the work to satisfy the client’s requirements in terms of performance, quality, schedule and safety concern. We are always committed to deliver high quality and prominent services to our customers.

VISION

To become an engineering and system solution provider that is the world's best in the area and to become a valuable asset of Indonesia

MISSION

- Developing knowledge, skills and market network, while intensively perform continuous improvement to its quality of services
- Being disciplined and consistent to carry out all necessary tasks in order to be a great and the world's best company

VALUE

- Idealism
- Trust
- Teamwork
- Togetherness
- Respect
OUR SERVICE

Automation & Scada System & Industry 4.0
- Engineering Design
- Scada System Implementation
  - RTU/PLC/DCS
  - RT/Historian DB/OSI PI/INSQL
  - OPC and Data Integration
- Automation & Scada System O&M Services
- MES / OEE Manufacturing
- Machine Learning for Industrial Application
  - Predictive Maintenance & Condition Monitoring
  - Plant Optimization

Information Communication & Technology
- Big Data Analytic Industrial Application
- Production Data Management System
- Realtime & Historical Industrial DB System
- Asset Management System
- Alarm Management System
- Realtime Data Analytic and Anomaly Detection for Predictive Maintenance
- Realtime Flow Assurance & Pipeline Management System

Maintenance & Reliability
- Asset Register
- Equipment Criticality Assessment
- Maintenance Management System Development
- Risk Based Inspection (RBI)
- Reliability Centered Maintenance (RCM) Study & Implementation
- Reliability, Availability and maintainability (RAM ) Study ( Realiasoft-BlockSim, DNV Maros, Isograph )
- Reliability Engineering Modeling
- Reliability Improvement Program Asset Management System Based-On ISO 55000 series

Training & Distribution
- Scada System Training
- Automation Training
- OSI PI Training
- OPC Training
- RBI / RCM / RAM Training
- Cyber Security for Scada System
Our Services:

- Design & Detailed Engineering
  - Automation & SCADA System
  - PLC/RTU (AB, ABB, Siemens, Schneider, DCS, Etc Third Party Devices)
  - Metering System
  - F&G System
  - OPC Data Integration to Third Party
  - Human Machine Interface HMI / MMI
  - Realtime & Historical Database System
  - Reporting System
  - Alarm Management System
  - Automatic Failure & Reporting System
  - Energy Monitoring System

- FAT, Installation, Commissioning, O&M
- Training Automation PLC/RTU, SCADA & OPC, Scada Cybersecurity
OUR SERVICE

Automation & Scada System for Industrial Manufacturers & Petrochemicals (2002 - Now)

Our Services:

- Design & Detailed Engineering
  - Automation & SCADA System
  - PLC/RTU (AB, ABB, Siemens, Schneider, DCS, Etc Third Party Devices)
  - Metering System
  - F&G System
  - OPC Data Integration to Third Party
  - Human Machine Interface HMI / MMI
  - Realtime & Historical Database System
  - Reporting System
  - Alarm Management System
  - Automatic Failure & Reporting System
  - Energy Monitoring System
- FAT, Installation, Commissioning, O&M
- Training Automation PLC/RTU, SCADA & OPC, Scada Cybersecurity
Automation & Scada System for Indonesian Government
Implementasi dan Pemeliharaan Sistem Monitoring Volume Minyak dan Gas Bumi Tahun Anggaran 2007

**Scada & Automation Services:**
- Data Collection Metering System
- OPC Data Integration to FlowCom
- Data Communication VSAT
- HMI Metering System
- Reporting
- Sistem Monitoring Volume Minyak & Gas Bumi

**KKKS Location:**
- Conoco Phillips
- Energy Equity Sengkang
- FSO Madura Jaya
- HESS – PLTUG Gresik
- Kalila - Korinci Baru
- Kodeco - Gresik
- Lapindo Brantas - Sidoarjo
- Santos - Maleo
- Pertamina – Pagar Dewa
- Semco - Tanjung Batu
- BP Indonesia - Pupuk Kujang
Automation & Scada System for Power Plant (PLTMH)

**SILAU**
9 MW, Silau River
Buntu, Erunran Village, Hatontuhan Subdistrict, Sinulangun Regency, North Sumatra Province

**MANIPI**
10 MW, Tangkas River
Tariku Village, Sinja Subdistrict, South Sumatra Province

**KRUENG ISEP**
20 MW, Krueng Isop River
Muniasih Parwo Aria Village, Khacang Subdistrict, Nagari Paya Regency, Aceh Province

**SEGARA**
7 MW, Segara River
Bentuk Village, Ganggung Subdistrict, North Lombok Regency, Nusa Tenggara Barat Province
Commission Date: March 2014

**TANJUNG TIRTA**
8 MW, Pekakayan River
Tanjung Tirta Village, Punggolan Subdistrict, Karang Anyar District, Central Java Province
Production Data Management System:

- Data collection
- Data Interface: Wonderware InSQL, OSI PI, Honeywell PHD, Yokogawa Exaquantum, OPC
- Data Entry Modules: Operations, Productions, Wells, Well Test, HSE, Personnel, Chemical, Process, Transportation, etc.
- Reports: Daily, Weekly, Monthly, SKKMigas'
- Oil/Gas Allocation
- Gas Virtual Metering
- Data Integration: SAP, Oil Field Manager, Avocet, SOT Production, etc.
- Custom Application Development

![Map of Indonesia with project locations]
Design & Implementation Online Flow Assurance System

- WNTS Linepack Modeling & Calculation - COPI
- WNTS Data Reconciliation - COPI
- Uncertainty Analysis For Gas Distribution System – PGN
- Flow Assurance : Sand Deposition Study & Prevention – Star Energy
- Online GHV Gas Quality Tracking System - PGN
- Online Pipeline Capacity Analysis System - PGN
- Online Gas Prediction & Forecasting Analysis - PGN
- WNTS Online Gas Management System – MEDCO EP
- Anomaly Detection & Prediction Maintenance for Gas Metering System - PGN
Maintenance & Reliability Services:

- Asset Register
- Equipment Criticality Assessment
- Maintenance Management System Development
- Reliability Centered Maintenance (RCM) Study & Implementation
- Reliability, Availability and maintainability (RAM) Study (Realiasoft-BlockSim, DNV Maros, Isograph)
- Reliability Engineering Modeling
- Reliability Improvement Program Asset Management System Based-On ISO 55000 series
- Training

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Block B West Natuna
ConocoPhillips

Chevron Pacific Indonesia
Petrochina
PHE Jambi Merang
ConocoPhillips
CNOOC
PT PGN

Badak NGL
ENI
JOB Tomori

ConocoPhillips

MEDCOENERGI
Oil & Gas

PERTAMINA
PHE JAMBI MERANG
RISK BASED INSPECTION (RBI) SERVICES
(2005 – Now)

Risk Based Inspection (RBI) Services:
- Data collection/Data simulation
- Risk Assessment
- Risk Register
- Corrosion Mapping
- Probability of Failure calculation
- Consequence of Failure calculation
- Remaining useful life
- Inspection Planning
- RBI Reports
- Data Integration RBI Application to SAP PM / Oracle EAM
- Training RBI
Training Services:

- Automation & SCADA System
- OPC Data Integration
- RBI Training
- RCM Training
- Cybersecurity & Scada Training
- SIL Training
- Flow Assurance Training
OUR SERVICE

SPC Partners

-logos of various technology companies and platforms-

Microsoft, SQL Server, ORACLE, MySQL, .NET Framework, HTML, Java, Python, SQLite, Android, Honeywell, Siemens, ABB, Rockwell Automation, Schneider Electric, GE, Fanuc, Yokogawa, Advantech, Phoenix Contact, BECKHOFF, kepware.
PROJECT EXPERIENCE
# A. AUTOMATION AND SCADA SYSTEM

<table>
<thead>
<tr>
<th>Year</th>
<th>Project Name</th>
<th>User</th>
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<tbody>
<tr>
<td>2020</td>
<td>Engineering Services Alarm Rationalization on DCS Dayung</td>
<td>Conocophillips Indonesia Inc Ltd</td>
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<td>Engineering Services Hang Tuah DMZ (Demilitarized Zone)</td>
<td>Medco E&amp;P Indonesia</td>
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<td>Call Out Maintenance: OsiSoft PI StarEnergy (Salak &amp; Darajat)</td>
<td>Pusindo/ Star Energy</td>
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<td>IMPLEMENTATION OF SIMBIOSYS PILOT PROJECT - THINGWORX</td>
<td>Berau Coal</td>
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<td>Engineering Services for North Belut GTC Roll Royce</td>
<td>Medco E&amp;P Indonesia</td>
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<td>DEVELOPMENT OF SUBAN PIMS</td>
<td>Conocophillips Indonesia Inc Ltd</td>
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<td>INSTALL, OPC SERVER, CONNECT TO DCS</td>
<td>PT Indah Kiat /Sinarmas</td>
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<td>2020</td>
<td>Upgrade HMI Server Gelam</td>
<td>Conocophillips Indonesia Inc Ltd</td>
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<td>SUBAN FT HISTORIAN</td>
<td>Conocophillips Indonesia Inc Ltd</td>
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<td>Maintenance Sistem Taksasi &amp; Gas Quality Tracking</td>
<td>PT. Perusahaan Gas Negara (PGN)</td>
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<td>Implementation Of HMI Report Modificataion (Husky - CNOOC Madura Limited)</td>
<td>HCML</td>
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<td>Pemeliharaan Aplikasi Network Intelligence For Market Optimization (NIMO)</td>
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<td>Online Training – OSI PI System</td>
<td>Conocophillips Indonesia Inc. Ltd</td>
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<td>Pengadaan Sistem Supervisory Control and Data Acquisition (SCADA) Mirroring</td>
<td>PT.MTIGA Power Management</td>
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<td>2019</td>
<td>Training OPC</td>
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<td>Provision of Alarm Management System</td>
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<td>Engineering Services HDPE</td>
<td>CAP (PT Chandra Asri Petro)</td>
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<td>Material and Installation for SILO PLC Modification</td>
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<td>Purchase License Upgrade in Touch Runtime 60K</td>
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<td>Instalasi PowerMeter</td>
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<td>Purchase Redundancy Flow Comp for GMS</td>
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<td>Automation Modifikasi PLC Big Bag Packing</td>
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<td>Pengadaan Sistem Supervisory Control and Data Acquisition (SCADA) untuk PLTM</td>
<td>PT.MTIGA Power Management</td>
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<td>2019</td>
<td>Purchase Flowboss S600 Report Editor (SCRIPT) Software</td>
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<td>2019</td>
<td>Installation of Emonitor</td>
<td>Medco E&amp;P Indonesia</td>
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<td>2019</td>
<td>Engineering Services (HT EDG Upgrade)</td>
<td>Medco E&amp;P Indonesia</td>
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<tr>
<td>Year</td>
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<td>Pembaharuan (Upgrade) Sistem Pemantauan dan Pengendalian Terpusat untuk PLTM Cikaso</td>
<td>PT.MTIGA Power Management</td>
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<td>Pembaharuan (Upgrade) Sistem Pemantauan dan Pengendalian Terpusat untuk PLTM Segara, PLTM Silau 2, PLTM Lebak Barang dan PLTM Lebak Tundun</td>
<td>PT.MTIGA Power Management</td>
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<td>Sistem Pemantauan dan Pengendalian Terpusat untuk PLTA Tangka</td>
<td>PT.MTIGA Power Management</td>
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<td>Sistem Supervisory Control and Data Acquisition (SCADA) Mirroring for PLTA Tanjung Tirta</td>
<td>PT.MTIGA Power Management</td>
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<td>Flowboss S600 Report Editor (SCRIPT) Software</td>
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<td>Engineering &amp; Maintenance Services For Instrumentation and Automation System</td>
<td>Medco E&amp;P Natuna Ltd</td>
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<td>Pembaharuan (Upgrade) Sistem Pemantauan dan Pengendalian Terpusat Untuk PLTM Cikaso</td>
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<td>Additional Engineering Service for WHCP Belanak Installation</td>
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<td>Program Pelatihan Risk Based Inspection (RBI) for Refinery</td>
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<td>2017</td>
<td>Software, License, HoneyWell Inc, MTKOPCAMR001, Matrikon OPC Server, For SCADA Omni Flow</td>
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<td>2017</td>
<td>Upgrade Scada System</td>
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<td>2016</td>
<td>Engineering Service for Experion HMI Modification of F&amp;G of GEC</td>
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<td>2016</td>
<td>HT Deploy WNTS Export Calculator</td>
<td>Conocophillips Indonesia Inc. Ltd</td>
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<td>2016</td>
<td>Installation and Configuration Wonderware in Touch on Spare Computer</td>
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<td>2016</td>
<td>Re-Engineering HMI and Flow compn OMNI 6000</td>
<td>PT Media Karya Sentosa</td>
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<td>PCC Automation System Maint and Support</td>
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<td>Engineering Service for Belanak Turbomachinery PLC upgrade</td>
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<td>Engineering Service for SAAB Troubleshooting at FPSO Belanak</td>
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<td>2016</td>
<td>Engineering Service for Onshore Software Modification</td>
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<td>Engineering Service for Onshore Historian Tag Upgrading</td>
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<td>Engineering service for Hangtuah DMZ Maintenance</td>
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<td>Engineering Service for Belanak Emergency Generator Upgrade</td>
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<td>Engineering Service for Hangtuah Turbine Upgrade</td>
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<td>Engineering Service for Belida TGA &amp; TGB Hmi Upgrade</td>
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<td>Engineering Service for Programming, Configuration and FAT</td>
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<td>2016</td>
<td>Wonderware, Upg, InTouch 2014R2 Runtime 60K Tag with I/O</td>
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<td>Assessment Scada PGN RT</td>
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<td>Order Pekerjaan Pengadaan Simulator KIT dan Training Siemens PLC S7</td>
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<td>PHE WMO-SCADA Upgrade dan Modification Study</td>
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<td>Belida TM Revamping</td>
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<td>PG&amp;T Scada Master Maintenance and Enhancement</td>
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<td>Retrofit Yokogawa Centum ICS to WW In Touch</td>
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<td>Wonderware PCN Compliance</td>
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<td>Rebuild and Upgrade Metering Supervisory Computer</td>
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<td>OPC System and Dewpoint Upgrade – Natuna Sea Block A</td>
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<td>Migration ICS 02.53 at Cooling Water Train G-H Control Room Utility II</td>
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## PROJECT EXPERIENCE

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<tr>
<td>2010</td>
<td>Additional Update for Wonderware Integration for Gas Engine</td>
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<td>2009</td>
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<td>Gases Gas Engine HMI Development and Modification</td>
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<td>2009 – 2010</td>
<td>Control Real Time System Blanket Services</td>
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<td>Jasa Pembuatan Plant Fuel Cell Instrumentation and Automation System</td>
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<td>SCADA Risk Assessment</td>
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<td>Intan Metering System Assessment</td>
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<td>Online Realtime Monitoring of Oil and Gas Volume Lifting</td>
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<td>Interfacing PLC to Vibration Monitoring System</td>
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<td>MPCIS Extend (Quality System Integration)</td>
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<td>2004</td>
<td>Upgrading of Computer Control Unit for Pilot Plants Catalyst</td>
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<td>Telemetry System</td>
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<td>HangTuah PCS Enhancement</td>
<td>ConocoPhillips Indonesia</td>
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<td>2004</td>
<td>Design &amp; Development Color Analyzer for Phonska</td>
<td>PT. Petrokimia Gresik</td>
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<td>2003</td>
<td>PCS System Modification Block-B Subsea Development</td>
<td>ConocoPhillips Indonesia</td>
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<td>2003</td>
<td>Interfacing Preparedness for MSI V O-VMS at Belida and Hang Tuah</td>
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<td>2003</td>
<td>HangTuah Enhanced VO-VMS Interfacing</td>
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<td>2003</td>
<td>MCS-PCS Modbus Verify and Test</td>
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<td>Interfacing BBFE to HangTuah PCS</td>
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<td>Hang Tuah PCS/PCN Trending &amp; Fault Tolerance Project</td>
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<td>2002</td>
<td>HMI Application Conversion Modification</td>
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<td>2002</td>
<td>PCS/PCN Enhancement</td>
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## B. PRODUCTION DATA MANAGEMENT SYSTEM

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<th>Year</th>
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<tr>
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<td>Jasa Pendukung untuk Aplikasi Pterotechnical dan Manajemen Data/ Pterotechnical Application Support and Data Management Service</td>
<td>Bp Berau Ltd</td>
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<td>2017</td>
<td>Call-Out Engineer Jakarta Office</td>
<td>PEARLOIL (SEBUKU) LTD</td>
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<td>2015</td>
<td>Pengadaan Program Pembangunan dan Implementasi Sistem Operasi Terpadu (SOT) Asset Lifecycle Management Berbasis SOT Common Framework (CF)</td>
<td>SKK Migas</td>
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<td>2015</td>
<td>Pengadaan Enhancement SOT – Pembuatan Sistem Handheld SOT</td>
<td>SKK Migas</td>
</tr>
<tr>
<td>Year</td>
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<td>Sistem Operasi Terpadu–Prototyping PRODML, WITSM, dan PPDM Data Mapping 2014</td>
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<td>Sistem Operasi Terpadu–Pemetaan Data KKKS Dalam PRODML dan WITSM</td>
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<td>Field Data Capture Implementation and Maintenance</td>
<td>PT. Mubadala Petroleum Indonesia</td>
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<td>2011</td>
<td>Integrated Production Reporting System</td>
<td>Star Energy (Kakap) Ltd, PT</td>
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<td>Program Pengumpulan Data Pra Implementasi Sistem Operasi Terpadu</td>
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<td>Pemindahan dan Backup System Production Data Management</td>
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<td>FDC.NET Annual Software Maintenance</td>
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<td>Bridging PDMAR Support Services And Upgrades</td>
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<td>Report Blanket Services</td>
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<td>Production Database Management System</td>
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<td>Production and Operation Application Support Services</td>
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<td>IS Maintenance Support Services</td>
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<td>FDC Allocation Engine Modification and Well Addition Phase I</td>
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<td>2004</td>
<td>Field Data Capture (FDC) Maintenance Support &amp; Upgrade</td>
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<td>Manufacture Process Control &amp; Information System (MPCIS) GSP Software Block-A</td>
<td>PT. BAT Indonesia</td>
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<td>2004</td>
<td>Lifting and Well Monitoring (Extend License)</td>
<td>PT. Surveyor Indonesia</td>
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<td>Lifting and Well Monitoring – GSP Software</td>
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<td>FDC Modification for BBFE</td>
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<td>FDC Monitoring Equipment Running Hours</td>
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<td>Capturing Block-B Oil Downtime Metric and Gas Physical</td>
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<td>2003</td>
<td>FDC Pseudo Metering and Its Automation for Kijing/Keong/Tembang and Belida Wells</td>
<td>ConocoPhillips Indonesia</td>
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<td>2003</td>
<td>Field Data Capture (FDC) Phase I and II</td>
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<td>2003</td>
<td>Interfacing Preparedness of MSI Virtual Operator and Virtual Metering at Belida and Hang Tuah</td>
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<td>HangTuah Enhanced Vo-vms (Virtual Operator-virtual Metering System) Interfacing</td>
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<td>2002</td>
<td>Field Data Capture (FDC) Maintenance Support &amp; Upgrade Service</td>
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<td>Database Exchange</td>
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## C. ENGINEERING DESIGN AND STUDY

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<tr>
<td>2016</td>
<td>Provision of Noise Study at Gajah Baru Platform</td>
<td>PT. Premier Oil Natuna Sea/Tuna B.V.</td>
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<td>2015</td>
<td>Study pre-FEED Fasilitas Produksi Permukaan Pengembangan Lapangan Kinanti</td>
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<td>2015</td>
<td>Update P&amp;ID North Belut Facility</td>
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<td>2013-2014</td>
<td>Studi Kelayakan dan Pengembangan Security Master Plan (SMP) Serta Implementasi Perbaikan dan Peningkatan Performa Sistem SMP Tahap-1</td>
<td>Badak NGL</td>
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<td>2013</td>
<td>Sembilang Reactivation Plan Conceptual Study – Pre FEED</td>
<td>PT Mandiri Panca Usaha</td>
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<td>2012</td>
<td>Konsultasi Turn Around CO2 Removal Plant Cilamaya</td>
<td>PT. Pertamina EP Field Subang</td>
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<td>2011</td>
<td>Project Management Consultancy Implementasi Gas Management System &amp; Pipeline Management System (PMC)</td>
<td>PT. Pertamina Gas</td>
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<td>2011</td>
<td>Feasibility Study Retrofit DCS Unit 2 PLTP Gunung Salak</td>
<td>PT. Indonesia Power UBP Kamojang</td>
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<td>2011</td>
<td>Improve Gap of Procedure and People Performance</td>
<td>PT. Badak NGL</td>
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<td>2009</td>
<td>Jasa Service Design RTOC Room Layout</td>
<td>PT. Medco Energy</td>
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<td>2009</td>
<td>Jasa Service Perform Cost Benefit Analysis In Realtime Operation</td>
<td>PT. Medco Energy</td>
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<td>Jasa Service Specification of Required in Control Center Physical Availability Data</td>
<td>PT. Medco Energy</td>
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<td>Jasa Service 3D Vizualization of Required Furnitured in Operation</td>
<td>PT. Medco Energy</td>
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<td>Noise Study and Survey</td>
<td>PT. Inti Karya Persada Teknik</td>
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<td>Technical Assistant Upgrading SCADA Jawa Barat</td>
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<td>2008</td>
<td>Noise Mapping and Software</td>
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<td>2008</td>
<td>Design and Layout of Integrated Operation Room</td>
<td>PT. Medco Energy</td>
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<td>2007</td>
<td>Blanket Contract for Specialty Studies, Research and Integrity Assessment</td>
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## D. RISK MANAGEMENT, MAINTENANCE AND SAFETY

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<th>Year</th>
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<tr>
<td>2020</td>
<td>Reliability, Availability, Maintainability AND SAFETY STUDY PETROCHINA JABUNG</td>
<td>Petrochina - Jabung</td>
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<tr>
<td>2019</td>
<td>Provision of Failure Analysis Study (LAPI)</td>
<td>Eni Muara Bakau B.V</td>
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<td>2019</td>
<td>Training Weibull</td>
<td>Chevron Pasific Indonesia</td>
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<td>2019</td>
<td>Provision of MMS Maturity Study</td>
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<td>2019</td>
<td>Asses Integrity Management System (AIMS) GAP Assessment Petrochine Jabung</td>
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<td>Year</td>
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<td>2019</td>
<td>Oracle EAM Reconfiguration in Asset Management Implementation – Stage One Business Unit Infrastructure</td>
<td>PT. Perusahaan Gas Negara</td>
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<td>Conoco-Instrument Specialist for Maint Support Service</td>
<td>PT. Perusahaan Gas Negara</td>
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<td>2017</td>
<td>Asset Management Maturity Mapping</td>
<td>PT Mahadaya Pradhana Sejahtera</td>
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<td>2017</td>
<td>Program Pelatihan Risk Based Inspection (RBI) for Refinery</td>
<td>PT Pertamina (Persero)</td>
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<td>2016</td>
<td>RCM Engineering Service</td>
<td>PT. Catur Elang Perkasa</td>
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<td>2016</td>
<td>Implementasi Reliability Control Program</td>
<td>PT. Perusahaan Gas Negara (Persero) Tbk (Pgn)</td>
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<td>2015</td>
<td>RBI RCM</td>
<td>PT. Chevron Pacific Indonesia</td>
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<td>Risk Based Inspection (RBI) Development and Implementation Services</td>
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<td>2014</td>
<td>Implementation of Risk Based Inspection (RBI) Study Interfacing with Jambi Merang’s SAP – PM Module</td>
<td>JOB Pertamina – Talisman Jambi Merang</td>
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<td>2014</td>
<td>Implementation of Reliability Centered Maintenance (RCM) Study Interfacing with Jambi Merang’s SAP – PM Module</td>
<td>JOB Pertamina – Talisman Jambi Merang</td>
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<td>2012</td>
<td>Review Equipment Criticalty Rating</td>
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<td>Instruments Reliability Assessment</td>
<td>PT. Badak NGL</td>
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<td>2007</td>
<td>Risk Based Inspection and Supporting Studies</td>
<td>ConocoPhillips Indonesia</td>
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**E. MAINTENANCE SERVICE**

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<td>Support to Tiara Jaya Tunggal Mandiri for “Offshore CCTV Maintenance Service – Conoco Phillips Indonesia”</td>
<td>Tiara Jaya Tunggal Mandiri</td>
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<td>2015</td>
<td>Support to Suplintama Maju Semesta for “Sieger-Honeywell Fire &amp; Gas System Maintenance Services – Conoco Phillips Indonesia”</td>
<td>Suplintama Maju Semesta</td>
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<td>2015</td>
<td>Support to Transavia Otomasi Pratama for AllenBradley PLC Maintenance</td>
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<td>2014</td>
<td>UTI (Ullage Temperature Interface) Calibration</td>
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<td>2014</td>
<td>Maintenance service for Metering Belanak</td>
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<td>2014</td>
<td>Maintenance service for FCI Belida</td>
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**F. PIPELINE MANAGEMENT SYSTEM (PMS)**

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<td>Pemeliharaan Fungsi Gas System Simulation (NIMO dan Gas Quality Tracking)</td>
<td>PT. Perusahaan Gas Negara (Persero) Tbk</td>
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<td>Konsultasi Pengembahan Aplikasi Network Intellegence for Market Optimization (NIMO)</td>
<td>PT. PGAS Telekomunikasi Nusantara</td>
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<td>Konsultasi Pengembahan Aplikasi Network Intellegence for Market Optimization (NIMO)</td>
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<td>Pekerjaan Pengembangan Sistem Perhitungan Taksasi dengan Historical Profiling</td>
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<td>Jasa Aplikasi Network Intervention Management System (NIMS)</td>
<td>PT. Perusahaan Gas Negara (Persero) Tbk</td>
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<td>2016</td>
<td>WNTS Data Online Monitoring services for three 3 Month</td>
<td>PT Star Energy (KAKAP) LTD</td>
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<td>Pengembangan Sistem Penentuan GHV Harian Berbasis Simulasi PGN Regional Distribusi II</td>
<td>PT PGAS Telekomunikasi Indonesia</td>
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<td>Pengembangan Sistem Penentuan GHV Online</td>
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<td>Kajian Analisa Pengendalian Unaccounted Gas Allocation (UAG)</td>
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<td>KAKAP FIELD Flow Assurance Assessment</td>
<td>Star Energy (KAKAP) Ltd.</td>
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<td>West Natuna Transportation Systems Linepack Allocation Model</td>
<td>ConocoPhillips Indonesia, Ltd.</td>
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<td>Pembuatan Gas Transporter Data Analysis Reporting System (GTDARS)</td>
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G. DEVELOPMENT OF APPLICATION AND INFORMATION TECHNOLOGY

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<td>Asset Register and Risk Management</td>
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<td>Jasa Konsultasi Hydraulic Calculation for PANCA</td>
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<td>2018</td>
<td>Jasa Pembuatan dan Pemutahiran Dokumen Acuan Kerja dan Harga Satuan Center of Technical Excellence</td>
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<td>Pengembangan Sistem Elektronik Bahan Baku</td>
<td>BPOM (Badan Pengawas Obat-obatan dan Makanan)</td>
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<td>Pengadaan Sistem Antrian Elektronik Berbasis Komputer</td>
<td>BPOM (Badan Pengawas Obat-obatan dan Makanan)</td>
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<td>Peningkatan Sistem Elektronik Terintegrasi</td>
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<td>Penyempurnaan Online Sistem</td>
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<td>Audit Information Technology</td>
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**H. ENERGY MONITORING AND ASSESSMENT**

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<td>PT. Sanbe Farma</td>
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<td>PT. Lucky Abadi</td>
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**I. INTEGRATED SAFETY SYSTEM**

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<td>Implementasi SMP (Security Master Plan) Tahap 2</td>
<td>PT. Badak NGL</td>
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<td>2015</td>
<td>Automatic Identification System (AIS) Vessel Tracking Survey, Assessment and Workshop</td>
<td>ConocoPhillips Indonesia</td>
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<td>2015</td>
<td>Assessment of control system or sub system installed at Belanak's facilities for ISPS Compliances and Integrated Security</td>
<td>ConocoPhillips Indonesia</td>
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<td>Implementasi SMP (Security Master Plan) Tahap 1</td>
<td>PT. Badak NGL</td>
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<td>2014</td>
<td>CCTV Maintenance Service for Belanak Crane</td>
<td>KMG – Conoco Phillips Indonesia</td>
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<td>2013</td>
<td>Studi Kelayakan Security Master Plan</td>
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PROJECT EXPERIENCE DETAIL

Integration for Best Your Solution
Project Name: Sembilang Reactivation Plan Conceptual Study (Pre-FEED)
Client: PT Mandiri Panca Usaha
Year: 2013

Background
The Sembilang Field is a small, faulted hydrocarbon accumulation located on the western edge of the South Natuna Sea Block “B” Contract Area (“Block B”). The field has been shut-in and temporarily abandoned by previous KKKS. Of the 5 subsea wells, 3 were potentially capable of producing oil, and one was a gas well, supplying fuel for the project and gas lift.

PT Mandiri Panca Usaha plans a well reactivation program in Sembilang Field. Previous Topside Facility Design will be used with some sizing based on latest production profile.

Challenge
Reactivation program should not use rig since it is not economical based on Production Profile. It will use rigless well intervention techniques. These rigless techniques include Wireline, Coiled Tubing (CT) and Hydraulic Workover (HWO).

After analyzing the condition of each well barrier element, methodology for reactivation procedure can be constructed. Specific Well Procedure generated based on well condition.
Deliverable
Sub Surface Facility
- Review Reservoir Study
- Well Integrity
- Reactivation Plan
Under Water Facility
- Flexible Flowline Risers
- Flexible Umbilical Risers
- Subsea Tensioning Buoy
- X-Mass Trees
- Wireline Re-Entry Risers
Surface Facility
- FlowLine Simulation
- Process System
- Separation System
- Gas Lift Compressor
- Flare System

- Utility System
  - Fresh water system
  - Power generation
  - Fuel gas system
  - Heating medium system
  - Utility Air and Nitrogen system
  - Air Start Compressor systems
  - Chemical injection system
  - Closed and open drain systems
  - Sand washer unit

- Marine System
  - Storage System and Offloading
  - Slops System
  - Ballast System
  - Positioning System
  - Tank Blanketing System
  - Mooring System
  - Living Quarter
Project Name: Engineering & Maintenance Services for Instrumentation and Automation System
Client/End User: ConocoPhillips Indonesia
Year: 2014-2017

Background
As part of ConocoPhillips Indonesia’s maintenance program to ConocoPhillips Indonesia’s facilities to ensure continuous and uninterrupted supply to be committed under Sales Agreement, ConocoPhillips Indonesia intends to develop Long Terms Services Contract (LTSA) for specialized engineering services in the area of instrumentation and process automation to support its production operations located in various offshore and onshore operating blocks.

Scope of Work
ConocoPhillips Indonesia requires specialized services in instrumentation and process automation and intends to establish a blanket call-out contract that will be used to support ConocoPhillips Indonesia’s onshore and offshore based operations activities. This Work will be performed under the guidance and direction of CONOCOPHILLIPS INDONESIA’s Instrumentation and Control Systems Engineers.

The broad areas of activities shall include but not limited to the following:

a. Instrumentation and control systems maintenance, troubleshooting, and modification;

b. Automation and control system integration

c. Automation and control system maintenance, development and modification

d. Enhancement study for automation and control system

e. Systems documentation & document verification/ update;

f. Creating or updating manuals/ procedures;

g. Assessment of existing control systems and recommendations for the improvement/ enhancement;

h. Developing and conducting training programs for ConocoPhillips Indonesia’s personnel;

i. Safety Integrity Level (SIL) verification;

j. Custom interface and application software development, implementation, and maintenance;

k. Alarm management system development and maintenance;

l. Asset performance indicators definition and development;

m. Design review and verification;

n. Data analysis, data reconciliation/ validation and optimization system development;

o. Data tags tracing, mapping and documentation;
ConocoPhillips Indonesia has a large installed base of instrumentation and control systems in its offshore and onshore operations. These control components/systems range from basic pneumatic/hydraulic local controls to advanced integrated microprocessor/PLC/DCS based systems.

Contractor shall perform the work at ConocoPhillips Indonesia’s office in Jakarta. However, the work may require site visits to ConocoPhillips Indonesia offshore and onshore production facilities as mentions below or other locations:

1. Onshore areas: Grissik Central Gas Processing Plant, Suban-1 and Suban-2 Gas Processing Plant, Dayung and Sumpal Gas Gathering Stations, Gelam Gas Gathering Station, Letang/Tengah Gas Gathering Station, Supat and Rawa Oil Field, Puyuh Oil Field, Keban Oil Field, RebonJaro, Oil Barge Operation, Pipeline ROW.

2. Offshore area:
Project Name : HangTuah Process Control System Upgrade
Client : Transavia Otomasi Pratama
End User: ConocoPhillips Indonesia
Year : 2013

Background
The Hangtuah platform acts as a Metering hub which delivers gas to ORF and DRF via WNTS’ pipeline facility. Metering is an important system which provides total gas will be delivered from supplier to buyer.

Currently, the Process Control System is obsolete and it will be replaced with new system. The existing control system was using PLC ControlLogix CLX-L55 and Wonderware 7.11 as Human Machine Interface. In this project, CLX LL-55 is upgraded to CLX L-74 and all Wonderware system are upgraded to Allen Bradley PlantPax 6.1. PT Scada Prima Cipta (SPC) supported PT Transavia Otomasi Pratama (TOP) during design and project execution and the objective of this project are as follow:

- Convert logic of BPCS to Function Block
- Generate new HMI of BPCS
- Configure FTAC
- Configure Domain (PDC) of BPCS
- FAT, SAT & Commissioning
- Training (BPCS and FTAC)
- Final Report
Scope of Works

1. Basic Engineering
   a. FDS of HMI BPCS
   b. FDS of FTAC
   c. FDS of PDC/Domain

2. Detail Engineering
   a. Finalized Logix of BPCS
   b. Generate HMI of BPCS
   c. Configure FTAC
   d. Configure PDC
   e. Validation & Test
   f. Submitt approval of FAT Document

3. Internal FAT
4. FAT with ConocoPhillips Indonesia (End User)
5. Rectify Punch List
6. Submit approval of SAT Document
7. SAT
   a. Install PLC and cabling system
   b. Integration PLC-OPC-HMI
   c. SAT

8. Commissioning
9. Finalized Project Documentation
Project Name: Wonderware PCN Compliance - CS15701766
Client/End User: ConocoPhillips Indonesia
Year: 2011-2014

Background
ConocoPhillips Indonesia requires engineering and maintenance including the manpower, tools and services to complete System Engineer for supporting Wonderware PCN Compliance service at ConocoPhillips Indonesia’s Areas.

Contractor shall perform the Work at ConocoPhillips Indonesia’s office in Jakarta. However, the Work may require site visits to offshore and onshore production facilities or other remote locations for assessment, data collection, data verification and visual surveys.

Contractor shall have support letter from Wonderware or its Sole Agent in Indonesia.

Scope of Work
The scope of work will include but not limited to as follows:

1. Process Control Network Security
Under directions of ConocoPhillips Indonesia, Contractor shall assess the existing gaps and provide all necessary recommendations for improvement of Process Control Network (PCN) security, especially for all related Wonderware products installed in ConocoPhillips Indonesia’s sites.

2. Automation and Control System Integration
Conduct assessment and provide recommendation of Industrial Automation System Integration that are installed at ConocoPhillips Indonesia’s facilities especially for Wonderware products to other systems, including but not limited to DeltaV, Honeywell DCS, Allen Bradley PLC, Power Automation Systems (Siemens, ABB), etc.

3. Automation and Control System Maintenance, Development and Modification
Conduct the maintenance, modification/development, installation, and/or troubleshooting on Process Control Systems.

4. Enhancement Study for Automation and Control System
Conduct study or assessment of the specified control system or sub system to identify and recommend improvement/enhancement areas. The objective is to improve the safety, performance and capacity of the plant. It shall include “Process Control Network Security” related to all Wonderware products.

5. Alarm Management System Development and Maintenance
Develop and/or maintain/troubleshooting the alarm management system in order to improve the performance of the alarm system. Some examples of the activities include:
   a. Alarm Rationalization/review (comply with EEMUA 191)
   b. Identification and elimination of nuisance alarms
   c. Master Alarm documentation
   d. Alarm Reporting tools (configured by area)

6. Data Reconciliation/Validation
Conduct Data Reconciliation and validation to ConocoPhillips Indonesia’s assets which may consist of the following sequence:
a. Data Collection
b. Pre-processing and screening
c. Classification and solvability
d. Data reconciliation
e. Mass Balance checking
f. Reporting

7. **Enterprise Integration System**
   Wonderware Intelligence Software enables to gather, store, and report on both historical and real-time operational data, using a dashboard to present Key Performance Indicators (KPIs) that are used to visualize, tune and maximize operations.

8. **Replacement/Revamp/New Control Systems Design**
   If required by the ConocoPhillips Indonesia, Contractor shall perform the detail design of new control system or detail design on the existing system to be replaced/revamped. The design should be based on reliability improvement goals. Contractor should have design scheme options and formally presented to the user if required.

9. **Training Programs**
   Conduct training to the appointed ConocoPhillips Indonesia’s personnel to improve their technical competency in the technical discipline. Contractor shall provide suitably qualified discipline specialists for such training.

10. **Automation and Control System Documentation**
    Develop as-built system documentation related with but not limited to Automation System, Network Configuration, Data Flow Diagram, I/O List, Control Narrative, Functional Specification, based on field documentation and field verification, update the documentation such application operating manual, maintenance/troubleshooting manual, or other type of procedures related with ConocoPhillips Indonesia operation and maintenance of Automation System, especially for all Wonderware product installed on ConocoPhillips Indonesia’s sites. The development, revision, and/or update should conform to ConocoPhillips Indonesia standard and International Standard. After development of the procedure, the Contractor will be required to socialize and/or provide training to the user groups.
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**Scada Prima Cipta - Company Profile**
Project Name: Studi Kelayakan dan Pengembangan Security Master Plan (SMP) Serta Implementasi Perbaikan dan Peningkatan Performa Sistem SMP Tahap 1
End User: Badak NGL
Year: 2013-2014

Background
SMP (Security Master Plan) in PT Badak NGL (PTB) is a security monitoring system integration consisting of several sub-systems, namely systems CCTV, Intercom, Access Control and Fence. SMP system centered at SCCC. Each sub-system is built from SMP different systems and integrated through the Human Machine Interface (HMI - IART)

Integrated SMP is installed at PTB facility since 2005. There are some problems that arise as follows:
- The warranty period is up, the less support from contractors
- No software installer, backup of applications and configurations
- Documentation of the installed system is less complete (almost not available)
- There are several components that already and started obsolete
- There have been some damage to components
- Replacement of some components cause the system not running

Scope of Work for Feasibility Study (Year 2013)
The scope of work of the Feasibility Study as follows:

a) the initial field data collection

b) Conduct preliminary design analysis
   To comprehensively map the architecture of the system is installed and create a description of each sub-system and their functions

c) Conduct further field data collection (2nd site survey)
   To complete lack the information needed in order to make a detailed analysis and system configuration details and their functions. All information sub-system deficiencies will be completed during this advanced field data collection.

d) Perform detailed analysis and review of the SMP configuration installed

e) Provide recommendations for improving the performance of SMP

f) Make a draft roadmap and strategy implementation

g) Provide connections in the oil and gas companies for the purpose of benchmarking on the recommendation system upgrade

h) Conduct JSS (Join Study Session) with the PTB’s Team

i) i) Creating documentation consisting of
   - Drawing SMP system installed (detailed data flow from sub-systems SMP)
   - Roadmap for upgrade scenarios and Recommendations
- List of hardware and software to be upgraded
- Draft budgetary and implementation schedule for upgrading SMP

**Scope of Work Implementation Phase-1 (Year 2014)**

The scope of work of the Implementation Phase-1 is as follows:

a) Installation and configuration of hardware and software applications IART
   - Installation of Wizcon Axeda Supervisor application version 9.0 on two (2) units of computers
   - Conduct Wizcon Axeda Supervisor application configuration version 9.0 on 2 (two) new computer unit and 3 units above an existing workstation computer (Existing Client IART) including video viewer application, change the alarm event, tags and scripts necessary.
   - Ensuring the integration of applications Access Control System (Amadeus 5), CCTV Viewer, Perimeter Security System / Fence Alarm System, Intercom System can operate well within specifications there.

b) Installation and configuration of hardware and software applications Access Control.

c) Installation and configuration of hardware and software applications Perimeter Security System / Fence Alarm System

d) Installation and configuration of IP Video Encoder and Network Video Recorder (NVR)

e) Testing and Commissioning

f) Onsite Training
Project Name: Implementation of Reliability Centered Maintenance (RCM) Study Interfacing with Jambi Merang's SAP - PM Module
End User: JOB Pertamina-Talisman Jambi Merang

Year: 2014

Background
JOB Pertamina-Talisman is the developing the Jambi Merang PSC area fields of Sungai Kenawang (SK) and Pulai Gading (PG), to produce gas and condensates reserves for export or domestic sales. Jambi Merang block is located in the province of South Sumatera, approximately 120 km south of the Jambi

The scope of work includes but not limited to the provision of supply Reliability Centered Maintenance (RCM) analysis and application implementation, that integrates with JOB PERTAMINA –TALISMAN CMMS system. The scope of the Reliability Centered Maintenance (RCM) analysis and application implementation shall covers all the identified equipment items in JOB asset register hierarchical structure.

The “RCM Team Consultant” will work in close co-operation with JOB personnel throughout the project phase. A “JOB-RCM team” from internal JOB field operation shall be necessarily assembled and proactively involved in the RCM activities. Consultant will consult the process, maintenance, inspection and safety aspect with respective member of JOB-RCM team, to obtain the information required for the analyses.

Scope of Work
The scope of work presented below is for RCM project execution and implementation.

1. Perform functional review of the equipment and identify the business criticality to its function (Notes: minimum requirement for identification the lowest level asset hierarchy, where the review / analysis shall be conducted, is at equipment tag number / components as part sub-assembly of equipment)
2. Review P&ID and Safe Charts to identify failure consequences.
3. Define system and sub-system boundary, function, and relationships. (Notes: possibility to develop interrelation in such Functional / Reliability Block Diagram (RBD))
4. Perform screening session with the JOB-RCM team. The purpose of this exercise is to focus on identifying and selecting those systems which are most critical to the installation risk and document the low risk systems.
6. Data gathering for RCM software application input. The JOB-RCM team will provide complete asset hierarchy and equipment list in electronic format.
7. Identify equipment functions and equipment type (categorizing).
8. Perform FMEA (Failure Mode & Effect Analysis) and Risk Analysis.
9. Develop RBM (Risk Based Maintenance) strategy for all medium and high risk items using failure cause and root cause analysis.
10. Develop Maintenance Strategy using Consultant task strategy decision logic to mitigate the failure causes and root causes and therefore reducing the risk level.

11. Preparation of RCM analysis report.

12. Conduct RCM training for the Plant RCM Team.

**Deliverables**

The following deliverables will be presented & implemented by Consultant after completion of the RCM study.

- Risk Acceptance Criteria described the details on risk matrices developed for RCM study.
- RCM Screening Report identified critical equipment to the installation.
- Maintenance Strategy Document which consists of FMEA result, task selection to mitigate each failure and maintenance frequency.
- Final Report and list of assumptions.
- RCM software and database, alongside its functional capabilities to interfacing with SAP-PM
- RCM Training packages,
Project Name: Implementation of Risk Based Inspection (RBI) Study interfacing with Jambi Merang's SAP - PM Module
End User: JOB Pertamina-Talisman Jambi Merang
Year: 2014

Background
JOB Pertamina-Talisman Jambi Merang requires engineering service study to perform Risk Based Inspection (RBI) assessment that are currently considered as very important process to give more accurate and detailed map of equipments or assets condition to enhance the integrity of its inspection, operation and maintenance.

The methodology that will be used in this study is mainly based on API 581. It will be used as the main references for the methodology to perform risk based inspection of onshore facilities. Furthermore, as required by JOB Pertamina-Talisman, to support the information integration in this study, PT. SCADA PRIMA CIPTA will use RBI software to support the assessment. The software are developed by PT. SCADA PRIMA CIPTA such that the authorized project personnel related to these applications are generally very familiar with these products and it will not need long time for the software configuration set-up and customization. All of these application-software tools are very flexible and have link capability to other applications that may be performed in both directions (data import and export).

Scope of Work
Following are the detail scope of work of this project:

1. Project Definition Session
2. Perform RBI assessment using API 581 to obtain Risk Ranking for Pressure vessels and pipings.
3. Inspection Plan
4. Joint Study Session
5. RBI Assessment Final Report
   a. Qualitative Analysis
   b. Semi Quantitative Analysis
   c. Quantitative Analysis
   d. Damage Mechanism Summary
   e. Inspection Plan Summary
   f. Work Pack
6. Piping Classification
7. Corrosion Rate Assessment
8. Maintenance Mitigation and Recommendation
9. RBI Software License
10. Training RBI methodology, RBI Assessment, and RBI software
11. Final Report
**Deliverables**
The deliverables of this project is:

1. Risk Ranking
2. Inspection Plan
3. RBI Assessment Final Report
   a. Qualitative Analysis
   b. Semi Quantitative Analysis
   c. Quantitative Analysis
   d. Damage Mechanism Summary
   e. Inspection Plan Summary
   f. Work Pack
4. Join Study Session
5. Piping Classification
6. Corrosion Rate Assessment
7. Maintenance Mitigation and Recommendation
8. RBI Software PROMIA (Probabilistic Management of Integrity Assistant) license evergreen (unlimited)
9. Training RBI methodology and RBI software
**Project Name**: Reliability Centered Maintenance Minas-Duri Corridor

**Project**
End User: Chevron Pacific Indonesia

**Year**: 2016

**Project Overview**

Chevron Sumatra Operations operates and maintains over 530 kilometers of oil shipping and gas transmission pipelines to transport crude oil from the producing fields in South (Minas, Kotabatak and Petapahan) and from producing fields in the North (Duri, Bekasap, Balam, and Bangko) to the terminal tank facility located at Dumai and to deliver gas from numerous gas plants and gas from 3rd party to Duri Gas Turbine (DGT) and Minas Gas Turbine (MGT). Chevron also operates and maintains power transmission lines to support the production facilities in these fields.

Most of the oil pipelines are exceeding their useful life having been in service for >47 years and having severe condition along the entire length of the pipeline. Most of the gas pipelines are also nearing their useful life being in service for over 30 years. The power lines have also been in service for more than 40 years and also exceeding the original design life. Some of this infrastructure is no longer sized appropriately for the current production rate, not properly protected from local community encroachment, and positioned within future community development footprints.

![Figure 0-1: Pipeline & Powerline Route of Minas-Duri Corridor](image-url)
The Asset Integrity Program includes a portfolio for three projects; these include (1) North Corridor; (2) Minas Duri; and (3) Balam Bangko. Each corridor project requires shipping pipeline(s) and/or power line replacement, repair and/or relocation. Currently the Asset Integrity Program is working on FEED phase for Minas Duri Corridor (MDC) project, summary of project scope is as following:

- New crude oil pipeline for Minas-Duri CPS and Kotabatak-Libo, repair (with partial replace) of Libo-Mindal oil pipeline.
- Repair of existing gas pipeline, minor replacement will be done for several locations only.
- New 115kV powerline from Simpang Ayu-Duri and KBJ-Libo-Kotabatak, repair of 115kV for Minas-KBJ segment.
- Integrated ROW for pipeline and powerline with maintenance access road, ROW protection, and warning signs.
- Supporting pipeline infrastructure, i.e. cathodic protection, SCADA system, leak detection system, metering system
- Oil pipeline idling, gas pipeline idling, powerline disconnecting. However, complete decommissioning and abandonment are out of AIP project scope and will be managed by other team.

**Purpose**

The Reliability Centered Maintenance (RCM) is a systematic and structured approach to determine a proactive equipment maintenance plan, strategy and tasks based on risk levels determined for various items. It involves group discussions and consensus decisions facilitated by an experienced RCM facilitator to analyze the equipment failure modes, failure effects, risk in different areas, failure mechanism, causes and tasks. If the failure effects are deemed high risk to the performance objectives, recommendations are developed to mitigate, prevent, delay or detect the failures and the causes of failures.

RCM analysis and equipment maintenance strategy development process were carried out in accordance with the PFD, P&IDs and General Equipment List submitted covering the equipment items such as Pig Launcher and Receiver, Motorized On-Off Valve, PSVs, PCVs, process instrument tags and control etc. of Minas-Duri Corridor (MDC) Project.

As part of RCM, Equipment Criticality Assessment (ECA) has been conducted during RCM Workshop. ECA report as part of RCM is provided in separate document.

The entire RCM study was organized as a series of working sessions organized at the following stages of the project:

- Kick Off Meeting and Data Collection
- RCM Workshop (4 Days)
  - Equipment Criticality Assessment
Failure Mode and Effect Analysis (FMEA)
- Task selection
- Final Report Development

This document is intended for final report of RCM Study for Minas-Duri Corridor (MDC) Project. The RCM workshop for MDC Project was conducted in the premises of Chevron’s Sumatra Operations at Duri site, 16-19 February-2016. See Attachment-1 for the attendance list of this workshop.

Scope of Works

A. Conduct Equipment Criticality Assessment (ECA)
- Define equipment list in MDC facility to be assessed by ECA criteria by refer to SERIP procedure.
- Conduct ECA workshop to each equipment’s in MDC facility by refers to ECA procedure.
- Develop ECA report.

B. Comprehensive RCM Analysis
- Perform RCM2 evaluation and analysis with full comprehensive method (Maintenance Zero Based) at equipment level to review and develop maintenance policy and program for following AIP project facilities but not limited to facilities as follow:
  - Pipeline system include pipeline components of:
    - Pipeline
    - Main Valves and Flanges
    - Electrical and Instrumentation at Pipeline systems :
      - Crude oil metering system at Minas NBS
      - Pipeline leak detection system (PLDS)
      - Pipeline monitoring system (pressure and temperature transmitter, RTU, UPS and communication system) and Pipeline Cathodic Protection (CP) Monitoring System
      - Pipeline accessories (Motor operated valve, pig signal, corrosion coupon, etc.)
      - Pipeline cathodic protection system
  - Power Transmission Line Facility:
    - Fiber optic lines and its accessories
    - Power transmission lines and its accessories

- Equipment function and performance standard definitions, function failure and failure mode identification, failure effect and consequence identification and proactive maintenance task determination shall be Included in the RCM evaluation and analysis

C. ORDC Development
- Perform identification on AIP project facilities that require ORDC refer to ECA, RCM assessment result and develop the required ORDC in standard format.
- Provide recommendation for standard format of ORDC aligned with SERIP Procedure and CPI business requirement
Project Name: RCM (Reliability Centered Maintenance) Study for Joint Operating Body (JOB) Pertamina-Medco E&P Tomori Sulawesi
End User: JOB Pertamina-Medco E&P Tomori Sulawesi
Year: 2016

Introduction

This proposal is submitted to Joint Operating Body (JOB) Pertamina-Medco E&P Tomori Sulawesi (hereafter called as JOB Tomori) regarding the requirement of the company to conduct Reliability Centered Maintenance (RCM) implementation in Tomori block. PT. Scada Prima Cipta (hereafter called as PT. SPC) would intend to offer a project team that will be committed to conduct the required RCM implementation as specified in the scope of work.

This RCM study is based on the asset register. P&IDs and related documents made available at the time of the study.

The RCM study will be conducted based on the risk & reliability approach. Using this methodology, equipment risk is determined based on the combination of the probability of failure and the consequence of failure for all equipment studied. Appropriate mitigation strategies are formed to drive down the risk.

The objective is to develop an optimized preventive maintenance task package to mitigate the failure modes/causes identified for the Tomori facilities. Also the study objectives enable the participants to:

- To gain an in-depth understanding on the requirements of the facility (in terms of safety, reliability, operability)
- To identify the different failures that may cause the above requirements to not be met
- To identify strategies (maintenance, inspection etc) that will prevent, mitigate these failures

Scope of Work

General Description

The scope of work includes the provision of supply Reliability Centered Maintenance (RCM) analysis and application implementation to JOB Tomori. The scope of the Reliability Centered Maintenance (RCM) analysis and application implementation shall covers all the identified equipment items in JOB asset register hierarchical structure.

PT SPC team will work in close co-operation with JOB personnel throughout the project phase. A “JOB-RCM team” from internal JOB field operation shall be necessarily assembled and proactively involved in the RCM activities. Consultant will consult the process, maintenance,
inspection and safety aspect with respective member of JOB-RCM team, to obtain the information required for the analyses.

**Detail Scope of Work**

The scope of work presented below is for RCM project execution and implementation.

1. Preparation, KoM and Data Collection
2. Conduct RCM training for the Plant RCM Team.
3. Perform functional review of the equipment and identify the business criticality to its function  
   (Notes: minimum requirement for identification the lowest level asset hierarchy, where the review / analysis shall be conducted, is at equipment tag number / components as part sub-assembly of equipment)
4. Review P&ID and Safe Charts to identify failure consequences.
5. Define system and sub-system boundary, function, and relationships.  
   (Notes: possibility to develop interrelation in such Functional / Reliability Block Diagram (RBD))
6. Perform screening session with the JOB-RCM team. The purpose of this exercise is to focus on identifying and selecting those systems which are most critical to the installation risk and document the low risk systems.
8. Data gathering for RCM software application input. The JOB-RCM team will provide complete asset hierarchy and equipment list in electronic format.
9. Identify equipment functions and equipment type (categorizing).
10. Perform FMEA (Failure Mode & Effect Analysis) and Risk Analysis.
11. Develop RBM (Risk Based Maintenance) strategy for all medium and high risk items using failure cause and root cause analysis.
12. Develop Maintenance Strategy using Consultant task strategy decision logic to mitigate the failure causes and root causes and therefore reducing the risk level.
13. Preparation of RCM analysis report.

**Notes and Assumptions**

- It is assumed that total tag number in CMMS which will be analyzed approximately less than 8,000 tags
- It is decided that Point of Origin during this project is “Jakarta”. The proposed cost includes all transportation, accommodation and any cost incurred from Bandung to Jakarta only
- Kick Off Meeting can be conducted at Jakarta or site as per Company’s request
- Join Study Session (JSS) or Group Session Discussion between RCM Team and Company Team will be conducted in Jakarta, approximately 2 times as following  
  - JSS-1 for 5 days, 2 days for Introduction to RCM Training and 3 days for Process interview & Screening analysis  
  - JSS-2 for 5 days “FMEA and Maintenance Strategies Development”
- Any cost incurred for this JSS, is excluded in this proposal
• This price exclude purchasing of RCM software. PT SPC will use their own RCM software during study and analysis

Technical Description

Methodology

The proposed methodology will uses risk based approach for the predictive assurance methods for Reliability Centered Maintenance to develop Risk Based Asset Management Strategies. Reliability Centered Maintenance takes as its starting point a hierarchical structure where plant and main systems are broken down into sub-systems (equipment) and tags (components). The methodology after a screening process proceeds with a detailed RCM analysis at tag level with reference to the system's/sub-system's function and mode of operation. Subsequently FMEA & risk analysis is done to determine loss of function and events (failure modes) at component level that can give increased risk level will be subject to a risk assessment with reference to pre-defined acceptance criteria. Depending on the calculated risk level a set of recommended maintenance strategies (task, interval, manning) will be developed, which contribute to reducing the risk for each event that occurs and associated loss of function.

The RCM methodology utilized in this project is an enhanced version of traditional or widely applied RCM methods in that risk analysis and risk mitigation are the determining factors for developing and testing the developed strategies. Also, the RCM process develops operation and inspection strategies, in addition to maintenance that forms the basis for a complete program for asset management of the facility being analyzed.

The detailed RCM evaluation for maintenance strategy development in proposed streamlined RCM process has the following major steps.

- System/equipment boundary definition
- Identification of system/equipment functions
- Identification of functional equipment and equipment types
- Failure Mode Effect Analysis (FMEA) and Risk Analysis
- Maintenance Strategy / Task package development

The outline of the RCM process followed for this project is as follows:

- Data Collection and Data Management
- Process interview (group session held with user)
- Establish the Risk Acceptance Criteria document (group session held with user)
- Define facility, systems, sub-systems/major equipment, equipment functions and equipment component hierarchy.
- Perform failure modes, failure effects, and risk analysis.
- Review / FMEA analysis (group session held with user)
- Identify dominant failure causes for those failure modes analyzed for medium to high risk.
• Conduct Task selection session (group session held with user)
  - Develop strategies to mitigate, delay, prevent or identify failures that lead to high risks in order to lower the risks.
  - Identify the personnel, frequency to carry out the maintenance task and critical spares required.

• Carry out final task review and bundle into a complete Planned Preventive Maintenance (PPM). The logical routing to execute the recommended task is determined in this process by mapping to standard SAP (or other CMMS) business functions as follows:

  - The task bundling strategy during SAP (or other CMMS) mapping activity is done based on the following rules:
    - General tasks that can be applied across the facility against particular tag type are grouped into a single Maintenance Plan. Thermography survey, Flange leak survey, soil resistance test are examples of the task mentioned above.
    - Tasks as part of statutory inspection and calibration will be grouped into a single Preventive Maintenance (PM) activity. Any components included in this activity will also be recorded as Object List in SAP Maintenance Item (or other CMMS) as well as in the Preventative Maintenance Routines (PMR) or Maintenance Check list. The example of this grouping is applied to fire & gas detection inspection and testing, PSVs, oil and gas metering units.
    - The grouping of various tasks by referring to the stream isolation plan and logical inspection will be done on the system or skid level. The intension is to meet work safety requirements as well to minimize plant downtime due to off-line inspection or maintenance.
- Individual task by having one to one relation on task list, maintenance item, and maintenance plan is set up based on the tag interdependencies to other asset. An egress route, life saving equipment inspection lays in this category.
  - Document the findings and incorporate this process as the basis for establishing a full asset management strategy for future maintenance, operation and inspection activities.
  - Reporting

**Maintenance Strategy**

The Maintenance Strategy is developed using task strategy decision logic to mitigate the failure causes and root causes and therefore reducing the risk level below the acceptance criteria. Typical recommendations might be:

- Condition based maintenance where it is possible to observe equipment degradation
- Time based maintenance performed at fixed time regardless condition of equipment
- Functional testing
- Corrective maintenance used when preventive maintenance is not economical
- Redesign or operational changes if preventive actions required

**Software Functional Requirement for Analysis & Implementation of RCM System**

PT. SPC will not provide RCM software for this analysis. The software shall be provided by Company.

During the analysis, we will use Reliasoft or other software as agreed by Company as RCM software.

**Deliverables**

The following deliverables will be presented & implemented by PT SPC after completion of the RCM study.

- RCM Training packages
- Risk Acceptance Criteria described the details on risk matrices developed for RCM study.
- RCM Screening Report identified critical equipment to the installation.
- Maintenance Strategy Document which consists of FMEA result, task selection to mitigate each failure and maintenance frequency.
- Final Report and list of assumptions.

All of the above mentioned will be delivered in hard copy (files) and electronic (Native Files-such spreadsheet, database, or word format and as well as in PDF format).
PROJECT EXPERIENCE DETAIL

Project Name : Implementasi Reliability Control Program
End User : PT. Perusahaan Gas Negara (Persero) Tbk (PGN)
Year : 2016

EXECUTIVE SUMMARY

A. Pendahuluan

Reliability Centered Maintenance Analysis (RCM) untuk Stasiun Kompresor Pagardewa telah dilakukan oleh SENA untuk memenuhi persyaratan yang digariskan pada pekerjaan “Penerapan RCP PGN II, 2016”.

Persiapan pekerjaan RCM telah dilakukan dengan terlebih dahulu melakukan kunjungan lapangan dan mengumpulkan data asset Stasiun Kompresor Pagardewa yang dibutuhkan untuk melakukan analisis RCM tersebut. Demikian pula wawancara dengan bagian operasi dan perawatan juga telah dilaksanakan pada waktu kunjungan lapangan.

Pelaksanaan analisis RCM untuk Stasiun Kompresor Pagardewa dilaksanakan dengan menggunakan perangkat lunak dari Reliasoft yaitu RCM++ versi 10 milik PGN.

B. Dasar-dasar RCM

Reliability Centered Maintenance (RCM) yang dilaksanakan pada pekerjaan ini dirancang untuk menetapkan jenis perawatan terjadual untuk menghindarkan kegagalan serta memitigasi konsekuensi kegagalan apabila kegagalan tersebut terjadi (schedule maintenance) dari peralatan proses Stasiun Kompresor Pagardewa, serta menetapkan kegiatan corrective yang perlu dilakukan (corrective maintenance) untuk mengembalikan kondisi equipment seperti kondisi sebelumnya.

Analisis RCM yang dilakukan dapat menghitung pula biaya-biaya yang terkait dengan pelaksanaan perawatan terjadual maupun perawatan corrective termasuk biaya material yang digunakan serta biaya Loss of Opprotunity ataupun Commodity Loss apabila data biaya yang diperlukan untuk penghitungannya tersedia. Biaya-biaya ini sangat diperlukan dalam penentuan Key Performance Indicator (KPI) yang terkait dengan Maintenance Cost, Material Cost, serta penghitungan Plant Life Cycle Cost.

Selain itu dalam analisis RCM ini issue yang sangat membutuhkan pemahaman tentang Condition Maintenance untuk menanggulangi kegagalan dan telah dilakukan, terutama untuk mengatasi masalah-masalah yang paling serius atau paling kritis yaitu masalah yang terkait dengan issue safety dan environment.

C. Pelaksanaan FMEA

Perlu dicatat di sini bahwa analisis RCM memanfaatkan analisis FMEA secara keseluruhan terutama terhadap hal-hal yang menyangkut fungsi, kegagalan fungsi, penyebab kegagalan / mode kegagalan, efek dan kosekuensi kegagalan. Sehingga pembagian Stasiun Kompresor Pagardewa ke dalam system dan subsystem seperti yang dilakukan dalam analisis FMEA digunakan pula dalam analisis RCM. Kemudian disusun hierarchy masing-masing subsystem ke dalam komponen yang lebih kecil lagi yang disebut sebagai maintainable item. Pada maintainable item inilah akan dicari kegagalan yang mungkin
bisa terjadi, mengingat seluruh kegagalan equipment bersumber pada maintainable item ini bukan pada equipment-nya.

Barulah kemudian dilaksanakan kegiatan analisis decision logic pada masing-masing kegagalan dalam rangka mencari scheduled maintenance yang paling tepat untuk menghindari atau memitigasi kegagalan tersebut. Seperti yang telah disebutkan terdahulu, maka apabila kegagalan tersebut mengakibatkan dibutuhkan perawatan corrective maka perangkat lunak RCM++ yang digunakan dapat membantu perencanaan kegiatan perawatan koreksinya lengkap dengan kebutuhan material maupun sumber daya lainnya termasuk manusia.

Analisis dimulai dengan menanyakan apakah kegagalan tersebut mempengaruhi atau memiliki konsekuensi safety atau environment, bila tidak maka pertanyaan dilanjutkan dengan menanyakan apakah kegagalan tersebut berpengaruh pada atau memiliki konsekuensi operational, bila tidak maka dilanjutkan lagi dengan pertanyaan apakah kegagalan tersebut berpengaruh pada atau memiliki konsekuensi non operational dan yang terakhir apakah kegagalan tersebut memiliki sifat tersembunyi?

Pada setiap jawaban dari pertanyaan-pertanyaan tersebut akan ditetapkan secara logis apakah kegiatan condition monitoring bisa diterapkan untuk menghindarkan atauupun memitigasi konsekuensi tersebut. Bila tidak akan dilanjutkan dengan menanyakan bagaimana dengan kegiatan preventive maintenance, bila juga tidak bisa dilakukan maka akan dilanjutkan lagi dengan keputusan (decision) untuk melakukan redesign atauupun tidak melakukan kegiatan apapun. Run to fail (RTF) akan diberlakukan untuk kegagalan yang tidak berpengaruh pada masalah operasional sistem.

Dengan perantaraan RCM decision logic ini maka kita akan mendapatkan strategi perawatan yang paling tepat untuk menangani kegagalan, bahkan pada kegagalan yang mungkin bisa terjadi. Strategi tersebut akan terdiri dari strategi perawatan condition maintenance, preventive maintenance, redesign dan run to failure secara mix.

Mengingat untuk seluruh konsekuensi kegagalan yang pertama kali ditekankan adalah apakah untuk proses mitigasi konsekuensi tersebut bisa ditangani oleh condition maintenance, maka diharapkan sebagian besar dari jenis kegiatan perawatan hasil analisis RCM adalah condition monitoring. Ini sangat diinginkan mengingat biaya condition maintenance jauh lebih kecil dari biaya preventive maintenance maupun corrective maintenance sehingga biaya perawatan asset yang mengandalkan pada strategi yang didasarkan pada hasil-hasil analisis RCM akan memiliki harga yang lebih rendah dibandingkan dengan strategi perawatan lainnya.

D. Hasil Analisis RCM Stasiun Kompresor Pagardewa

Hasil analisis RCM yang perlu ditekankan di sini dikelompokkan pada tabel-tabel berikut:
1. Hierarchy dari system dan subsystem dari sistem komponen Stasiun Kompresor Pagardewa
2. Hasil analisis RCM Failure, Effect dan Cause
3. Corrective & Scheduled Maintenance
4. Pengelompokkan kegiatan perawatan terhadap Jenis Perawatan dan Interval
5. RCM Worksheet hasil analisis RCM menggunakan RCM++10

Rekomendasi
Untuk penyempurnaan dari analisis RCM sehingga dapat memudahkan upload ke CMMS yang akan dibangun maka masih diperlukan penanganan hal-hal berikut ini:

1. Perlu kontribusi yang lebih banyak dari para Subject Matter Expert (SME) PGN dalam menetapkan fungsi dan proses operasi Stasiun Kompresor Pagardewa

2. Perlu meng-input-kan data operasional Stasiun Kompresor Pagardewa berupa Opportunity Loss, Commodity Loss, biaya sumber daya dan harga maintainable item (spare parts)

3. Masih perlu untuk menyempurnakan nilai severity (s), occurrence (a) dan detectability (d) apabila telah terkumpul yang lebih lengkap catatan dari history kegagalan pengoperasian, serta penetapan interval waktu kegiatan perawatan.

**RUANG LINGKUP ANALISIS RCM**

**1. RUANG LINGKUP**

Sebetulnya equipment yang akan diikutsertakan dalam analisis RCM untuk mendapatkan strategi perawatan yang paling tepat dibatasi hanya untuk equipment yang paling kritis (highly criticality), baik yang didapat dari analisis RAM-HAZOP maupun yang didapat dari penerapan matrix kekritisan (Risk Matrix). Sedangkan equipment lainnya, strategi perawatannya diturunkan dari analisis FMEA (untuk high & medium criticality) ataupun disusun secara generic (untuk low criticality).


Akan tetapi pada analisis RCM yang dilakukan di Stasiun Kompresor Pagardewa, analisis RCM telah dilakukan untuk seluruh equipment yang ada di Stasiun Kompresor Pagardewa kecuali beberapa equipment yang tidak berpengaruh sama sekali pada produksi atau transmisi gas.

Adapun cakupan analisis RCM dalam laporan ini termasuk tetapi tidak terbatas pada butir-butir berikut:

- Persiapan dan Perencanaan analisis RCM (Menyiapkan panduan untuk RCM Leader, RCM Analyst, dan anggota tim RCM lainnya).

- Pemilihan equipment yang menjadi obyek analisis RCM (Didasarkan pada analisis RAM, HAZOP, terutama ECR)

- Hardware partitioning (Sesuai dengan ISO 14224 yaitu membagi sistem menjadi subsistem, membagi subsistem menjadi equipment, dan membagi equipment menjadi maintainable item untuk dilakukan analisis FMEA pada level sistem atau level item lainnya yang dipilih, dengan mempertimbangkan juga harga MTTR)

- Failure Modes & Effect Analysis (FMEA) (Menghasilkan informasi dari setiap failure mode yang mungkin bisa terjadi dari item yang dianalisis)
• Pemilihan fungsi yang signifikan (Kajian untuk menentukan apakah kegagalan dari suatu fungsi memiliki efek yang buruk pada keselamatan, lingkungan, operasi atau ekonomi).

• Pemilihan strategi perawatan dan mengemas kegiatan (Melalui Decision Logic Tree untuk mendapatkan pekerjaan perawatan proaktif atau pekerjaan perawatan lainnya yang dapat menangani secara efektif mode kegagalannya)

• Penyusunan basis data dari planned preventive maintenance (PPM), prosedur dari perawatan rutin (PMR) yang direkomendakan oleh RCM.

• Data mapping untuk uploading hasil-hasil analisis RCM ke Oracle eAM (Hal-hal yang perlu dilakukan untuk memasukkan hasil analisis RCM program perawatan di Oracle eAM)

• Terus menerus memantau program perawatan hasil analisis sebelumnya (on going) untuk dilakukan penyempurnaannya melalui kegiatan Maintenance Change Request (MCR).

Gambar di bawah ini, menunjukkan tempat kedudukan RCM dalam suatu program pengendalian keandalan, yang biasa disebut sebagai Reliability Control Program (RCP). RCP menjelaskan tentang alur pengendalian kegagalan akan pentingnya RCM pada alur tersebut. Seperti terlihat pada diagram tersebut, pelaksanaan analisis RCM, membutuhkan Management target, dan syarat (HAZOP, P&ID, Taxonomy, ECR) serta hasil yang ingin dicapai yaitu Planning & Scheduling dari kegiatan perawatan yang didapat melalui RCM.

Gambar: Decision Logic Tree.

Hasil analisis RCM yang baik akan dapat langsung diterapkan di lapangan dengan terlebih dahulu memasukkannya pada Computerized Maintenance Management System di CMMS.
2. HASIL ANALISIS RCM / DELIVERABLES

Deliverables dari analisis RCM termasuk tetapi tidak terbatas pada butir-butir berikut (diambil dari Reliasoft RCM++ Report):

- General Report Summary Criteria and Analysis Plan Details
- Items Summary
- Risk Discovery
- FMEA Spreadsheet using one of the World FMEA Standards
- RCM Functional Failure Analysis & Failure Effect Categorization
- RCM Maintenance Task Selection
- RCM Tasks
- Work Packaging & Workload Leveled Results
- The Assumption and specific reliability issue (among others from OREDA, Reliability Handbook and Historical Data (compared to OREDA))
TRAINING COURSE

INFORMATION & REGISTRATION

Training Division
PT. SCADA PRIMA CIPTA
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Reliability Improvement Toward World Class Maintenance Company

Pelatihan Silabus

Day-1: Introduction and Basic Reliability Concept
- Introduction to World Class Maintenance
- Basic Concept of Maintenance & Reliability (Reliability, Availability, Maintainability, MTTF, MTBF, etc)
- System Reliability Block Diagram (Series, Parallel, K out of N)
- Basic Statistic for Reliability
- Hands-On

Day-2: Reliability Improvement Process-1
- Improvement Flow Chart
- Asset Management System Overview – PAS-55 & ISO-55000
- Equipment Taxonomy Overview
- Equipment Criticality Assessment Overview
- FMEA and RCM Overview

Day-3: Reliability Improvement Process-2
- Reliability Modeling Overview
- RAM Analysis Overview
- Reliability Growth Analysis Overview
- Weibull Analysis Overview
- Maintenance Key Performance Indicators (KPIs)

Fasilitas Pelatihan

Fasilitas pelatihan ruang untuk pelatihan, coffee break, makan siang, dan setiap peserta akan menerima sertifikat, materi pelatihan dan souvenir.
Risk Based Inspection (RBI)

Day One
- RBI Methodology Review
- Introduction to API RP 580
- Introduction to API RP 581
- Basic Risk Assessment Concepts
- Operating boundaries and limitations
- RBI Study: Estimating resources and time
- Data sources, data quality, data needs
- Assessing probability of failure
- Assessing consequences of failure

Day Two
- Risk determination, assessment, and management
- Common RBI problems and pitfalls
- API 581: Scope and definitions
- API 581: Probability of Failure and Methodology
- API 581: Consequence of Failure and Methodology
- Damage Mechanisms
- Corrosion Monitoring
- Risk analysis and inspection planning
- RBI on Pressure vessels and piping

Day Three
- Risk-Based Inspection Planning
- Inspection plan development and implementation
- RBI rollout and management
- Risk-based decision making fundamentals and tools
- Case studies and calculation examples
- Inspection plan examples
- RBI key points and topics review and joint discussion

Objek Pelatihan
Pada akhir kursus, peserta akan dapat:
- Percaya diri menjelaskan perbedaan antara Level 1, Level 2 dan Level penilaian 3 RBI
- Memahami alasan dan manfaat dari pelaksanaan RBI
- Melakukan implementasi RBI praktis yang cepat
- proyek RBI Rencana sukses
- Siapkan rencana inspeksi berbasis risiko dan mengoptimalkan interval pemeliharaan dan inspeksi
- Merekomendasikan tindakan mitigasi risiko yang cocok

Fasilitas Pelatihan
Fasilitas pelatihan ruang untuk pelatihan, coffee break, makan siang, dan setiap peserta akan menerima sertifikat, materi pelatihan dan souvenir.
TRAINING COURSE

Safety Instrumented System (SIS)

Pelatihan Silabus

Day One
1. Introduction
   • Standards – IEC 61508, IEC 61511, ISA 84.01
   • Philosophy of Safe Design
   • Introduction to the Safety Lifecycle
   • What are Safety Instrumented Systems?
   • Basic Ideas about SIS
   • Functional Safety
   • Instrumented Systems & Safety Instrumented Systems
   • BPCS
   • BPCS and SIS
   • Safety Instrumented Function
   • Typical architecture
   • Integrated BPCS & SIS
   • Differences between BPCS & SIS

2. Safety Lifecycle
   • Safety Lifecycle phases
   • Activities within each phase
   • Documentation requirements

Day Two
3. Hazard and Risk Management
   • Tolerable Risk
   • Components of Risk
   • Consequence
   • Likelihood
   • Risk Matrix and Risk Graph
   • Risk Reduction

4. Process Risk
   • Incidents – Causes & Consequences
   • Preventative Controls (reduce frequency)
   • Mitigative Controls – (reduce consequence)
   • Bow-Tie Diagrams

Day Three
5. Analysis Phase
   • Determination of Tolerable Risk
   • Hazard Identification
   • Risk Analysis (frequency and consequence)
   • Identifying Safety Instrumented Functions (SIF)
   • Determining the Safety Integrity Level (SIL) using Layer of Protection
   • Analysis (LOPA)
   • Writing the Safety Requirement Specification
   • Other Design Considerations

6. Realization Phase 1
   • System Technologies – Relay, Solid State, Programmable
   • Subsystems – Sensor, Logic Solver, Final Element
   • Architectures – 1oo1, 1oo2, 2oo2, 2oo3, 1oo2D
   • Sensor Subsystem
   • Logic Solver Subsystem
   • Final Element Subsystem
   • Effects of Field Devices on SIF Performance
   • Common Cause – Separation, Diversity, Physical Environment

Day Four
7. Reliability
   • Reliability Definition
   • Failure Rate
   • MTTF
   • MTTR

8. Realization Phase 2
   • SIL Verification – PFDavg and Architectural Constraints
   • Factory Acceptance Testing
   • Commissioning

SCADA PRIMA CIPTA - COMPANY PROFILE
Day Five

9. Operation Phase
   • Maintenance
   • Decommissioning
   • Documentation
   • Management of Change

10. Functional Safety Management

Fasilitas Pelatihan

Fasilitas pelatihan ruang untuk pelatihan, coffee break, makan siang, dan setiap peserta akan menerima sertifikat, materi pelatihan dan souvenir.

Catatan: Semua peserta pelatihan harus membawa laptop.
Supervisory Control and Data Acquisition (SCADA)

Description

SCADA is not a specific technology, but a type of application. SCADA stands for Supervisory Control and Data Acquisition — any application that gets data about a system in order to control that system is a SCADA application.

A SCADA has two elements: The process/system/machinery to be monitored. This can be a power plant, a water system, oil and gas plant, and others. The other SCADA element is a Network of an intelligent device that interfaces the first element through sensors and control output. This network, which is SCADA system, gives the ability to measure/monitor and control any specific or overall components on the first element of SCADA.

This course provides overall SCADA knowledge. All major aspects of SCADA are covered by classroom presentations and laboratory exercises.

The objective of this course is to equip operators/engineers/supervisors/managers with skills which will enable them to implement SCADA system which will have a definite economic and engineering benefit for process operations. This practical course explains SCADA concepts, SCADA system communications, and visualization.

Objectives

Students completing these courses receive a good grounding in SCADA principles and strategies, Sketch out a SCADA system for potential application in your industry, SCADA HMI development, and various SCADA components.

Duration

4 Days

Course Materials

Course note set with slides from course modules

Course Outline

- SCADA Introduction
  - Overview
  - Latest advance on SCADA System
- SCADA System Components
  - MTU, RTU
  - SCADA protocols
- SCADA Visualization
- HMI Overview
- DDE, IO and OPC
- Web Based HMI Development
- Historical Data
Description

In the early stages of automation processing, most SCADA/ and historian manufacturers had drivers running directly in their client applications. Although most of these drivers were for their own hardware set, some common protocols were occasionally included (like Modbus).

The problem that end users encountered was that one manufacturer’s client software often could not communicate with another manufacturer’s hardware or PLC/DCS. This meant that end users were limited to the product offerings from a single hardware manufacturer. It also limited the potential market for Automation suppliers, who faced challenges selling their hardware to plants that had specialized in a different brand.

This course provides overall OPC knowledge. All major aspects of OPC are covered by classroom presentations and laboratory exercises.

Objectives

Students completing these courses receive a good grounding in OPC principles and strategies, diagnostics, and troubleshooting OPC.

Syllabus

1. **OPC Concept Introduction**
   - Connectivity before and after OPC
   - OPC structure introduction
   - OPC DA

2. **DCOM Introduction**
   - Introduction to OPC DCOM connectivity
   - OPC and DCOM error

3. **Configuring DCOM**
   - DCOM Quick Start
   - DCOM – Secure by default
   - Security Policy and Firewall

4. **OPC Application**
   - Creating OPC Project Channel
   - Creating OPC Project Device
   - Creating OPC Project Tag

5. **OPC System Tags**
   - OPC Component Add-ons
   - OPC Tunneling
   - OPC Data Logger

6. **Laboratory Exercise**
   - DCOM Configuration
   - OPC Configuration
   - OPC DA
   - OPC Tunelling
   - OPC Data Logger
OPC (OLE for Process Control)

Course Description
In the early stages of automation processing, most SCADA/HMI and historian manufacturers had drivers running directly in their client applications. Although most of these drivers were for their own hardware set, some common protocols were occasionally included (like Modbus).
The problem that end users encountered was that one manufacturer’s client software often could not communicate with another manufacturer’s hardware or PLC/DCS. This meant that end users were limited to the product offerings from a single hardware manufacturer. It also limited the potential market for Automation suppliers, who faced challenges selling their hardware to plants that had specialized in a different brand.
This course provides overall OPC knowledge. All major aspects of OPC are covered by classroom presentations and laboratory exercises.

Course Outline
• OPC Concept Introduction
  • Connectivity before and after OPC
  • OPC structure introduction
  • Understanding OPC quality field
• DCOM Introduction
  • Introduction to OPC DCOM connectivity
  • OPC and DCOM error
• Configuring DCOM
  • DCOM Quick Start
  • DCOM—Secure by default
• OPC Application
  • Creating OPC Project Channel
  • Creating OPC Project Device
  • Creating OPC Project Tag
  • OPC System Tags
• Troubleshooting
  • Optimizing OPC Projects
  • Benchmarking OPC Projects
• Diagnostics
  • Using and Understanding Channel Diagnostics
  • Using and Understanding OPC Diagnostics
  • Using and Understanding Wireshark
• OPC Component Add-ons
  • OPC Tunneling
  • OPC Data Manager
  • OPC Redundancy
  • OPC Data Logger

Laboratory Exercise
• OPC Software
• Simulator

Objectives
Students completing these courses receive a good grounding in OPC principles and strategies, diagnostics, and troubleshooting OPC.

Who should attend?
This class is ideal for instrument and control system engineer, process engineer, supervisors, plant floor operators and other individuals charged with the responsibility of deploying and/or maintaining Process Control System.

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OSI PI - OSISOFT

Course Description
We offer a comprehensive portfolio of courses to suit delegates with varied levels of PI system knowledge and experience.
Our highly interactive classroom-based training courses are led by industry experts to provide the best mix of experience and practice in a professional learning environment, we can offer courses at locations preferred by our clients, with flexible dates, to enable several people to attend at one time.

Course Outline
PI Server
- PI System Components
- System Architecture (High Availability, Failover) + Data Flow
- PI Interfaces Management
- Data Archive Management
- PI Buffer Sub System
- PI System Security Management
- PI Connectors
- Maintenance (Backup, Data Validation, Monitoring Healthiness)

Asset Framework
- Element, Attribute & Template
- Modelling & Organizing Assets
- Analytics & Calculation
- Event Frame Generation
- Analyzing Events
- Maintenance (Backup, Import / Export)

PI Vision
- Recap of PI Vision
- Searching data from AF
- Advanced Features of PI Vision Display
- Managing PI Vision Display
- Analyzing & Comparing Related Events
- Maintenance (Backup / Restore, Migration)

Laboratory Exercise
- PI Server
- PI AF
- PI Vision

Who should attend?
- This class is ideal for instrument & Control Engineer, Process Engineer, Production Engineer, Maintenance Engineer, Supervisor, manager and other individuals charged with the responsibility of deploying and /or Maintaining Process /Production

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Pipeline Simulation / Hydraulic Analysis

Course Description
Pipeline Simulation delivers rapid and accurate offline Pipeline management design, planning and hydraulic analysis for natural gas and liquid pipelines through advanced state-of-the-art simulation techniques. The combination of both steady-state and transient hydraulic simulation within a feature graphical interface enables better understanding of even the most demanding problems by providing appropriate analysis of the process. Pipeline Simulation has been proven to be an effective decision support tool that really can deliver financial benefit to your organization. The optimization of the design of a pipeline to transmit fluids and gas involves a number of variables, which include pipe diameter, pressure, temperature, line length, space between pumping or compressor stations, required inlet and delivery pressures and delivery quantity. Each of these parameters influences the overall operating cost in some degree and the selection of one or more will determine the economics of the construction and operation of the system.

Course Outline
- Pipeline System Introduction
- Pipeline Transmission System
- Pipeline Distribution System
- Real-time Monitoring System
- Pipeline Optimization
- Pipeline Simulation and Calculation:
  - Flow Assurance
  - Hydrate Detection
  - Condensate Formation
  - Wax Deposition
  - Debottlenecking Problem
  - Line pack Calculation
  - Pressure Drop calculation
  - Pressure Distribution Analysis
  - Compositional Tracking
  - Maximum pipeline capacities
  - Compressor Optimization

Laboratory Exercise
- Pipeline simulation software

Objectives
- The fundamental knowledge you need to design and specify gas pipelines and components
- Provide understanding of online/ real-time gas transmission & distribution monitoring systems
- Provide understanding pipeline optimization of gas transmission & distribution

Who should attend?
- Engineers responsible for pipeline design or providing pipeline O&M support
- Manager / Engineers responsible for pipeline operations and maintenance

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PLC (Programmable Logic Controller)

Course Description

This course is designed to give participants a good understanding of Programmable Logic Controllers (PLC's). This course places a heavy emphasis on understanding the logic and operation of the PLC. The course also typically covers installation and troubleshooting of the PLC including PLC platforms (such as Allen-Bradley, Siemens, etc.) plus improve productivity, efficiency, safety, and product quality.

Course Outline

- Introduction to PLC
  - PLC Hardware Component and architecture
  - Communicating with a Controller
  - Identifying Numering Systems and Converting Numeric Values
  - Understanding Programming Languages and Instructions
- Basic Design
  - Create project, tag and monitoring
  - Basic Instruction
  - Programming language and instruction
  - Timer and Counter
  - Program control instruction
  - Compare instruction
  - Compute and Match instruction
  - Programming Move instruction
- Function Block
  - Timer and Counter
  - Analog
  - Device Driver
  - PID
- Maintenance
  - Troubleshooting
  - Diagnostic
  - Online Modification
  - Backup and Restore

Objectives

After completing this course, the participant will gain the PLC knowledge necessary to programming basic PLC system elements.

Laboratory Exercise

ControlLogix 5000
RSLogix 5000
Simulator

Who should attend

This class is ideal for instrument and control system engineer/technician, supervisors and other individuals charged with the responsibility of deploying and/or maintaining PLC.

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RISK BASED INSPECTION

Course Content
This course presents a comprehensive and practical introduction and application of the latest techniques in Risk Based Inspection (RBI) analysis of inspection results based on API BRD 581, and API RP 580 standards. It discusses practical techniques for application of RBI for the analysis of equipment, equipment defects and degradation. The focus of the course is on predicting degradation in service, setting optimum inspection intervals, projecting remaining life based on generic data corrected for plant specific conditions and assumptions, and applying qualitative/quantitative analysis for degraded conditions to determine upon a 'risk basis' time to next inspection or failure.

Course Outline
- Introduction to RBI (Risk Base Inspection)
- Risk & Safety Terminologies (risk, hazard, danger, accident, incident, hierarchy of hazard control, etc)
- Risk Base Inspection (RBI) Concept (API & DNV Concept, RBI scope, screening, qualitative, semi quantitative, quantitative analysis, etc)
- Risk Analysis (fundamental, hazard identification, probability assessment, consequence analysis, etc)
- Qualitative RBI Analysis Detail (likelihood category, damage consequence category, health consequence category, workbook, etc)
- Overview of Quantitative RBI (toxic effects, flammable effects, risk calculation, etc)
- Consequence Analysis (representative fluid, hole sizes, release rate & type, post-leak response, etc)
- Likelihood Analysis (generic failure frequencies, equipment modification factor, management systems evaluation factor, etc)
- Damage Mechanism & Corrosion Rate (genral & localized corrosion, SSC, HTHA, remaining life, etc)
- Inspection Programs Development (inspection technique, inspection effectiveness, measuring risk associated with existing inspection system, etc)
- RBI Software Application / PROMIA (data modules, upload data, risk assessment, inspection plan, RBI report, link to sap, link to ultrapipe)
- Discussion and Case Study

Objectives
At the end of the course, attendees will be able to:
- Confidently explain the differences between Level 1, Level 2 and Level 3 RBI assessments
- Understand the reasons for and benefits of implementing RBI
- Undertake rapid practical RBI implementation
- Plan successful RBI projects
- Prepare risk-based inspection plans and optimize maintenance and inspection intervals
- Recommend suitable risk mitigation actions

Laboratory Exercise
RBI software

Who should attend
- Refining and petrochemical engineers and inspectors.
- Engineers and inspection personnel from the pulp and paper, oil and natural gas, and chemical industries may also find the course beneficial.
- A working knowledge of basic equipment is recommended.

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RCA (Root Cause Analysis)

Course Description
Root Cause Analysis (RCA) is a method of problem solving that tries to identify the root causes of faults or problems that cause operating events.

RCA practice tries to solve problems by attempting to identify and correct the root causes of events, as opposed to simply addressing their symptoms. By focusing correction on root causes, problem recurrence can be prevented. This intensive workshop is intended for Oil & Gas engineers, in order to prepare them to be Principal Investigators who have the competence to lead RCA investigations effectively.

This training is not associated to a particular brand. Rather, the participants will be provided the core concepts, applied methodology and be guided in simulated practices of a real-world RCA.

Course Outline
- The importance of RCA’s
- Introduction to RCA methodologies: (Failsafe, Taproot, etc.), and categories (Mini/Midi/Maxi)
- Typical RCA work process
- Types of Evidence & Causations
- The roles of Principal Investigators
- Actual RCA examples
- Study cases

Objectives
During this 4.5 day class, the participants will be guided to find the root causes of any problem in the operations, and systematically eliminate the defects.

Who should attend?
- Engineers – process, process safety, and mechanical
- Operations and Maintenance Staff – senior operators, maintenance technicians, supervisors
- Process reliability staff
- Process quality control/assurance staff

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Reliability Centered Maintenance

Course Description
Risk-Based Reliability Centered Maintenance [RCM] sets out to highlight and formalise the identification, categorisation and management of risk as part of the development of failure management and maintenance management plans. Risk-Based RCM is focussed on firstly identifying the risks involved with possible failures, and then quantifying these risks. After that, the most appropriate and effective way of dealing with these direct physical and economic risks can be determined. In this way, the consequences of a failure can be avoided altogether, or they can be reduced to a tolerable level.

Course Objectives
To provide candidates with an introduction to the philosophy, theory and practical experience needed to implement and perform RCM analyses.

Course Outline
Introduction to Maintenance
- The History of Maintenance.
- The role of Maintenance in the new generation plants and operations.
- The effect of automation and mechanisation on required availability and reliability.
- The effect of automation and mechanisation on the requirement for safety and environmental integrity.
- The effect of automation and mechanisation on the requirement for product and service quality.
- The effect of automation and mechanisation on maintenance costs.

The Development of RCM
- Traditional view.
- RCM development history.

The Nature of Failures
- Failure patterns.
- Failure mechanisms associated with direct wear.
- Failure mechanisms associated with erosion, corrosion, metal fatigue, etc.
- Failure mechanisms associated with situations where initial forces are exerted on equipment during startup periods.
- Failure mechanisms where there are no relationship between operating age and the likelihood of failure.
- Typical cover-up work in shutdowns.
- Failure mechanisms associated with some form of human error.

The Meaning of Maintenance
- Definition of maintenance.
- Opportunity for maintenance to play a meaningful role.
- Objective of maintenance.
- The role of RCM in maintenance.

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