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VAIL-PLANT

ASSET INTEGRITY MANAGEMENT SOFTWARE

VAIL-PLANT is a leading fully certified (API 580 and ASME B31.8S) Asset Integrity Software Solution specifically designed for Oil & Gas, Power and Petrochemical industries which facilitates inspection and maintenance management cycles by using RBI, RCM, SIL and FMECA approaches. VAIL-Plant is an effective asset management tool that contributes to ensuring the company’s assets health and performance by enabling the plant operators to improve overall control of their asset condition by optimizing inspection, asset monitoring and linking to their maintenance systems.

VAIL-Plant helps maintain history and records, evaluates asset conditions, identifies highest risk assets, prevents plants from damage and corrosion, prioritizes and manages the efforts of an inspection program and calculates the man-hour resources planning.
VAIL-Plant Certifications

VAIL-Plant Software has been certified to meet the requirement of Industry Standards API 580, ASME B31.8S and IEC61508 Software Development requirement that ensures the integrity of Software. VAIL-Plant is also SAP-certified for Integration with SAP ERP System.

API 580: 2016
Risk Based Inspection process compliance

ASME B31.8S : 2012
Compliance with ASME B31.8S & Geographical Information System (GIS)

VAIL-Plant SAP Integration:
VAIL-Plant is certified to be integrated with SAP PM-PCS for ECC5.0/ ECC6.0

IEC 61508:
Software Development Process Certification
VAIL-Plant PIMS Onshore module is capable of managing and monitoring semi-qualitative risk assessment and Inspection planning for pipelines. Based on API 580, this module can be integrated with GIS to display data on geographical maps (e.g. pipeline route, equipment location, pipeline sections).
VAIL-PLANT MODULES

- Asset Performance Management System
- Pressurized Equipment Management System
- Pipeline Integrity Management System
- Electrical, Instrumental & Rotary Management System
- Pressure Safety Valve & Relief Valve Management System
- Lifting Equipment Management System
- Wellhead Integrity Management System
- Civil Integrity Management System
- Cathodic Protection Management System
- Hull Integrity Management System
- Flexible Pipeline Integrity Management System
- Enterprise Resource Planning Interface
- Inspection Scheduling Management System
- Computerized Maintenance Management System
- Control Panel
Touch Points:

**VAIL-PLANT ASSET INTEGRITY MANAGEMENT SOFTWARE**

Modular Approach - different modules specific to user requirements.

Hierarchy Recording and Management.

Asset Performance Management - Graphical Dashboard overview.

Equipment Condition Monitoring.

Covers a wide range of equipment types: Pressure vessels, columns, drums, process piping, pipelines, lifting equipment, electrical/instrumentation & control systems, steel structures, rotating equipment, hull/FPSO, wellheads and cathodic protection).

Root Cause Analysis to handle the analysis of different types of failures.

Equipment Inspection, Maintenance, Failure, and Replacement History management.

Identification and Evaluation of Integrity KPIs (Inspection and Maintenance).

Risk Matrix Configuration.

Facilitates the process of Risk Based Inspection, Reliability Centered Maintenance, Failure Mode Effects & Criticality Analysis, Safety Integrity Levels and Safety Relieve Management.
VAIL-PLANT ESSENTIALS

Following features of VAIL-Plant application are available for each module:

**Inspection Maintenance**
- Workflow configuration for Inspections.
- Customizable inspection/maintenance business process.
- Inspection management with identified user roles.
- Integrity Operating Window (IOW).

**Search and Custom Query**
- Flexible Form Based search functionality with full text and wild card Search.
- Custom Query functionality with user defined criteria on an ad-hoc basis.

**Integration**
- ERP Integration with SAP, MAXIMO, Infor EAM, Oracle ERP, EPICOR ERP etc.
- Integrated with Arc GIS to display Geographical Data.
- Interface with Inspection Data logger, Outlook, AutoCAD, Third party RBI software and Active Directory.
- Integrated with Mobile Application for Inspection.

**Document Interface**
- Reference Libraries (P&ID’s, PFD’s, Sketches, SOP’s, Manuals, Isometrics, etc.).
- Interface with Document Controllers (SharePoint, Envision, OmniDocs, etc.).
- Drawings Management (Sample Sketch Isometrics, GA Drawings, PFD Drawings, etc.).

**Reporting**
- Reporting Trends (Risk Levels, Leaks, Failures, Remnant Life, Corrosion Rates, Replacements, etc.).
- Standard Reporting.
- Ad-hoc Reporting.
- User list View with Graphical Representation.

**Data Reliability**
- Overall Management Dashboards.
- Bulk Loading.
- Data Importing/Exporting Templates.
- Data Security, Role-based Security.
RBI ASSESSMENT PROCESS

1. Collection of Engineering Data for each component.
2. Allocate Damage Mechanisms for every component.
3. Assessment of Probability of Failure (PoF) based on questionnaire specific to each damage mechanism.
4. Assessment of Consequence of Failure (CoF) based on questionnaire for each of the consequence categories: Business, Safety, Reputation, and Environment.
5. Assessment of Risk for each component by looking up the PoF and maximum CoF on the Risk Matrix.
6. Assignment of Inspection Effectiveness score and rating to each component based on a questionnaire.
7. Calculation of Next Inspection Date from Equipment Risk, Inspection Effectiveness, Historical Corrosion Rates, and remnant life.

VAIL-Plant modules covering RBI Assessment Process:

- Pressurized Equipment Management System (PEMS)
- Pipeline Integrity Management System Onshore (PIMSON)
- Pipeline Integrity Management System Offshore (PIMSOFF)
- Civil Integrity Management System (CIMS)
- Hull Integrity Management System (HIMS)
- Structure Integrity Management System (SIMS)
FMECA ASSESSMENT PROCESS

1. Collection of Engineering Data for each component.
2. Allocate Failure Modes for every joint.
3. Assessment Probability of Failure (PoF) to shortlist the failure modes to be considered in the FMECA ability and consequence.
4. Every failure mode is analyzed with respect to its effects and consequences. Subsequently, it is assigned Problem code, damage code, PMR and recommendations are given.
5. Every failure mode is assigned a Probability of Failure (PoF).
6. Every failure mode is assigned a consequence value for safety, business, environment, and capital aspects. Subsequently, it is assigned a maximum Consequence of Failure (CoF).
7. A Risk Rank is calculated for each failure mode and subsequently for the equipment.

VAIL-Plant modules covering FMECA Assessment Process:

- Pressure Safety Valve & Relief Valve Management System (PSVMS)
- Electrical, Instrumental and Rotary Management System (EIRMS)
- Well Integrity Management System (WIMS)
- Lifting Equipment Management System (LEMS)
- Cathodic Protection Management System (CPMS)
- Flexible Pipeline Integrity Management System (FPIMS)
VAIL-Plant APMS module is an operator’s single window specifically designed to equip oil and gas organizations to monitor the overall status of System Integrity parameters such as Remnant Life, Inspection Activities, Leaks/Failures, Risk Ranking, Corrosion Rate, and Replacements via the dashboard. It allows the operator to perform extensive filtering to preview the desired output in form of graphs and reports for data analysis.

Module contains following main features:

- Single dashboard for RBI, RCM, Pipeline, Structure and Process Information Historian studies.
- View overall status of VAIL-Plant modules individually and altogether.
- Filter out the graphs with respect to the area and modules on the navigation tree.
- User defined graphical charts and data.
- View Total Tag Counts, Total number of completed RBI studies and Total number of completed FMECA studies on the screen.
- View the relevant details of the metric by clicking any graph or reported figure.
- Redirect to the modules to view the particular metric details.
PRESSURIZED EQUIPMENT MANAGEMENT SYSTEM (PEMS)

VAIL-Plant PEMS module contains a comprehensive database for Piping and Pressurized Equipment such as Vessels, Tanks, Heat Exchangers, etc. It covers complete Risk Assessment Process and Facilitates Inspection Planning to predict the asset remaining life and next inspection date.

Module contains following main features:

- Engineering data capturing along with Hierarchy Management and capturing of Drawings, Isometrics, PFD’s and P&ID’s.
- Inspection History Recording with respect to multiple positions and TML’s.
- Semi quantitative RBI methodology for risk evaluation and inspection planning against identified damage mechanisms compliance with API 580.
- Estimated Corrosion Rate Models based on API 581.
- Failure and replacement history recording.
- KPI’s identifications & calculation/ evaluations.
- Short/Long Term Corrosion Rate and Remnant Life Calculations.
- Plant Inspection Requirements (PIR’s) generation.
- Root Cause Analysis (RCA) against failures.
- Time, Cost & Resources (CTR) Management.
- Data importing from excel workspace templates.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.
VAIL-Plant PIMS modules for Onshore and Offshore pipeline is capable of managing and monitoring semi-qualitative Risk Assessment and Inspection planning for pipelines. Based on API 580, this module can be integrated with GIS to display data on geographical maps (e.g. pipeline route, equipment location, pipeline sections, etc).

Module contains following main features:

- Pipeline Profile Recording & Plotting.
- Probability of Failure (PoF) calculation and plotting along the pipeline (PoF Vs TIME) against applicable damage mechanism.
- Consequence of Failure (CoF) calculation against applicable damage mechanism.
- Risk Assessment against Stress Corrosion Cracking (SCC).
- External and Internal Corrosion Direct Assessment (ECDA & ICDA).
- Risk Assessment against third party damages.
- Corrosion calculation (NORSOK M-506).
- Scheduling of Integrity Management and Inspection.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
ELECTRICAL, INSTRUMENT AND ROTARY MANAGEMENT SYSTEM (EIRMS)

VAIL-Plant EIRMS module is based on standards BS 60812, IEC 60812, SAEJA 1011 & SAEJA 1012 and facilitates Reliability Centered Maintenance (RCM) and is capable of maintaining and organizing maintenance records and details of equipment such as Engine, Generators, Transmitter and Pressure Gauge etc. The hierarchy of data is based on ISO 14224.

Module contains following main features:

- Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR) calculations.
- Failure Mode, Effect and Criticality Analysis and their Criticality Matrix.
- Reliability Operator and Reliability Generic Data Recording.
- Hierarchy Recording and Management.
- Design/Operational Data Capturing.
- Functional Data Recording.
- Plant Maintenance Routines (PMR) generation.
- Work Order and Work Packs Generation.
- Inspection History Recording.
- Maintenance History Recording.
- Failures and Replacements Recording.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.
PRESSURE SAFETY VALVE MANAGEMENT SYSTEM (PSVMS)

VAIL-Plant PSVMS module is based on API 576 and API 527 technology. It facilitates FMECA Assessment of different PSVs/PRVs and is capable of maintaining & organizing Maintenance records, Datasheets, Drawings, Specification and Inspection Plan of Safety Relief Devices.

Module contains following main features:

- Integrity Management Dashboard to view overall Inspection Status for all the assets.
- Structural Hierarchy Management.
- Design Engineering Data Management.
- RBI Analysis for PSVs.
- Identification of Failure Mode.
- Failure Modes Effects Criticality Assessment.
  - Failure Mode.
  - Failure Effects.
  - Development of Risk Matrix for Safety, Environment and Economy.
  - Influencing factors/ causes/ maintainable items.
  - Generic Failure Data.
- Risk Evaluation for each Identified Scenario.
- Inspection Planning and Risk Management.
- Determination of PoF & CoF.
- Inspection History Recording.
- Failure and Replacement History Recording.
- Cost, Time & Resource management.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.
Structure Integrity Management System (SIMS)

Module contains following main features:

- Maintains the hierarchical tree to provide better understanding of the structure’s components according to their levels.
- Complete history recording of previously done inspections.
- Plant Maintenance Routines and Logistics Requirements.
- Facility Information.
- RBI Assessment.
- FMEA Analysis.
- Inspection Management.
- Inspection Flow Management.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.

VAIL-Plant SIMS module facilitates the Risk Based Inspection and Inspection Planning of structures like Onshore and Offshore steel structures. Based on Industry Standards AISC and API RP2 SIM, this module enables the operator to perform Risk Based Inspection and Inspection Planning of Structure.
VAIL-Plant LEMS module has been developed to inspect the status of Lifting Equipment e.g. Crane, Clamps, Forklifts, Hoists etc. in Oil and Gas Industry. Based on industry standard API 2C, this module provides a lifting gear inspection checklist thus making it easier for the operator to carry out lifting equipment testing.

Module contains following main features:

- Organization of a systematic hierarchy using two approaches – Plant wise as well as Discipline wise.
- Maintenance of reliability model to estimate the failure frequency and trends of lifting equipment.
- Assessment of equipment operator historical data/Generic reliability data.
- FMECA Assessment which focuses on:
  - Primary and Secondary Functions
  - Total or Partial Functional Failures
  - Failure Modes.
  - Failure Effects.
  - Failure Characteristic (age or not age-related failures).
  - Failure Classification (Hidden or evident).
  - Influencing Factors (root causes).
  - Failure Criticality on Safety, Environment, Production and Capital.
- Operator Historical Data vs Generic Reliability Data comparison.
- Generation of PMR (Preventive Maintenance Routines).
- Production of maintenance & inspection recommendations to reduce the possibility of occurrence.
- Comprehensive checklists for most types of lifting equipment to facilitate Inspections.
- History Maintenance & calculation of MTBF and MTTR based on failures & replacements.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.
WELLHEAD INTEGRITY MANAGEMENT SYSTEM (WHIMS)

Module contains following main features:

- Hierarchy Recording and Management.
- Design / Operational Data Capturing.
- Functional Data Recording.
- Reliability Operator and Reliability Generic data Recording.
- Failure Mode and Effect Analysis based on equipment type.
- Failure Mode, Effect and Criticality Analysis and their Criticality Matrix.
- Plant Maintenance Routines (PIR) generation.
- Work Order and Work Packs Generation.
- Inspection History Recording.
- KPI Calculator.
- Maintenance History Recording.
- Failures and Replacements Recording.
- Mean Time between Failures (MTBF) and Mean Time to Repair (MTTR) calculation.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.

VAIL-Plant WHIMS module equips the organizations with the facility to manage the risk of loss of good containment over the well lifecycle. Based on API SPEC 6A, WIMS module enables the operator to perform FMECA analysis and Inspection Planning of various wellhead equipment.
Based on standard SEI/ASCE 11-99, VAIL-Plant CIMS module is dedicated for assessment and inspection management of civil natures like Concrete Structures, Pipe Sleeper, Flare, Water Well, Fencing, Culvert, Foundations, Roads & Paving, Buildings and Pipe Track Foundation, etc.

Module contains following main features:

- Engineering and layout information of all civil nature.
- Maintains the hierarchical tree to provide better understanding of the civils’ components according to their levels.
- Defect Assessment, Risk Ranking and recommended repairs.
- Calculation of total defected area, estimated man-days & their cost and overall cost for the recommended repairs.
- Inspection Planning & logistics requirements.
- Complete history recording of previously done inspections.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.
CATHODIC PROTECTION MANAGEMENT SYSTEM (CPMS)

Based on NACE, VAIL-Plant CPMS module maintains the Engineering Data and allows the operator to perform Risk Assessment and Inspection Management for different types of Cathodic Protection (CP) equipment such as Transformer-Rectifiers, Ground Beds, Anode Junction Boxes, Test Points, and Coupons, etc.

Module contains following main features:
- Dashboard for Management Review
- Seven levels Hierarchical Tree for CP System database
- CP System Design and Construction database
- Manages multiple types of CP inspection and surveys
- Schedules Routine Field Data Test & Monitoring
- Graphical Display for Quick View, and Trend Analysis
- Failure Mode Effects and Criticality Analysis (FMECA)
- Plant Maintenance Routines (PMR) generation
- Drawings Management
- Graphical Trends
- Effective Reporting
- Custom Query
VAIL-Plant HIMS module provides a rationalized approach to perform inspections of Hull structure and identifies the general and critical area for inspection activities. It is based on industry standards DNV-OSS-102, DNV-OSS-103 and DNV-OSS-304.

Module contains following main features:

- Six inspection criteria (Coating Condition, General Condition, Pitting/Grooving, Deformation Fractures and Cleanliness) have been identified for each compartment & these are inspected for each zone.

- Compartments are divided into zones for inspection and grading of inspection criteria.

- Identification of Critical structural areas for a compartment/zone based on engineering analysis and in-service experience.

- The inspection criteria are graded with a score (rating) from 0 to 5. The scores are added for each zone and rolled up to get a normalized score for the compartment.

- Capability to identify the general inspection activities and inspection activities for critical areas.

- Damage Mechanisms Identification for each zone & Risk Evaluation.

- Inspection, Maintenance, Replacements, and Failure History Recording.

- Hull Inspection Routines (Inspection Packs) definition and execution.

- Drawings Management.

- Graphical Trends.

- Effective Reporting.

- Custom Query.
FLEXIBLE PIPELINE INTEGRITY MANAGEMENT SYSTEM (FPIMS)

VAIL-Plant FPIMS module allows to specifically to manage and process information regarding flexible pipeline’s risk assessment and inspection planning. This module is based on API 17J and helps to assess the integrity of the pipeline and its immediate threats.

Module contains following main features:

- Identification of Degradation Mechanisms with reference to API 17B for exhaustive list of failure modes and possible defects for flexible risers.
- Division of Flexible Pipeline into subsystems and degradation loops.
- Probability of failure and consequences for each equipment.
- Evaluation of the impact of changes in process conditions and materials on installation risk and inspection program.
- Risk Analysis for each degradation mechanism.
- Determination of Confidence Grading.
- Development of detailed inspection plan.
- Risk Analysis of Flexible Pipeline.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.

Module contains following main features:

- Identification of Degradation Mechanisms with reference to API 17B for exhaustive list of failure modes and possible defects for flexible risers.
- Division of Flexible Pipeline into subsystems and degradation loops.
- Probability of failure and consequences for each equipment.
- Evaluation of the impact of changes in process conditions and materials on installation risk and inspection program.
- Risk Analysis for each degradation mechanism.
- Determination of Confidence Grading.
- Development of detailed inspection plan.
- Risk Analysis of Flexible Pipeline.
- Drawings Management.
- Graphical Trends.
- Effective Reporting.
- Custom Query.
ENTERPRISE RESOURCE PLANNING INTERFACE (ERPI)

VAIL-Plant ERPI module allows the organizations to interface with other ERP software systems that they use to manage their business. VAIL-Plant ERPI System provides an interface to link with external applications very easily allowing the operator to exchange data, update and share information.

Module contains following main features:

- VAIL-Plant can be fully integrated with ERP software such as Oracle, SAP, InforEAM and MAXIMO.
- VAIL-Plant has been certified for integration with SAP ECC 6.0 based on ICC integration assessment in SAP PLM.
- VAIL-Plant can be integrated with Document Management System to exchange data.
- VAIL-Plant can be integrated with any third party RBI software to compare RBI results.
- VAIL-Plant Pipelines is integrated with Arc GIS and has the capability to display geographical data.
- VAIL-Plant has the capability to be integrated with Inspection Data logger: ULTRASONIC THICKNESS GAUGE (38DL PLUS).
- VAIL-Plant supports full integration to MS Office - Excel, Word Export/Import, and PDF Documents.
VAIL-Plant ISMS module coordinates with other VAIL-Plant modules to facilitate their Inspection planning and recordings. With ISMS, operator can schedule and execute inspection schedules generated while documenting the inspections to create work orders.

Module contains following main features:

- Capable to manage inspection activities for all types of assets/equipment (tags). The system allows performing inspections on groups of tags, platforms and corrosion loops.
- Allows users to plan, schedule and execute PIR’s. It automatically extracts inspection plans from CMMS such as SAP.
- Allows users to create work scopes, work packages for execution of PIR on a tag or a set of tags (package like boilers, pipe). Drawings, documents, specifications, previous history schedule date, previous readings, previous anomalies etc. summarized in one document.
- Allows Reviewers and Approvers to enter remarks and comments and preserves the history of these remarks.
- Allows the monitoring process of the PIR Plan.
- Bulk data importing from excel workspace templates for fast data feeding.
- Role based access, audit trails, data security and integrity.
- Comprehensive configuration ability to allow users to configure the system to adapt it to organizations’ processes.
- Color coding to have a one-look summary of the status of inspections.
COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEM (CMMS)

VAIL-Plant CMMS module addresses the complete lifecycle of a technical object including Notification and Work order creation until inspection maintenance closeout. Using VAIL-Plant CMMS, it gets easier for operators to create and track work activities, parts usage, and asset lifecycle.

Module contains following main features:

- Improved planning and scheduling.
- Proper Preventive Maintenance reduces equipment downtime.
- Allows operator to plan, manage, schedule maintenance, and approve requests and work orders and continue to the next step.
- Protects and extends the life of assets.
- Helps operations and maintenance staff be more productive.
- Maintaining asset/equipment inventory.
- Scheduling of “preventive” maintenance through a formal service and WO process.
- Tracking of “unscheduled” repairs.
- Tracking the cost of labour and materials.
- Managing parts and materials inventory.
- Budgeting for equipment maintenance and repair.
- Recording the equipment history from installation to replacement.

![CMMS Interface](image-url)
VAIL-PLANT

CASE STUDIES
CASE STUDY
INSPECTION MANAGEMENT SYSTEM

Client: ADNOC LNG
Location: Abu Dhabi, UAE
Region: Middle East

SERVICE(S):
Software Services

OBJECTIVE:
ADNOC LNG intends to appoint a contractor to supply a customized Inspection Management System software package, assist the user department to migrate and clean up the existing inspection and other relevant data, train the user department on administering the system, installation of the system and provide post implementation maintenance and support of the system.

SCOPE OF WORK:
The services included, but not limited to the followings;

- Supply an off-the-shelf software package for the Inspection Management System.
- Customization of the software package to meet the user requirements.
- Assist users to clean up and migrate the existing inspection and other relevant data.
- Train the users in using/administering the system.
- Provision of services for installation of the system.
- Post implementation maintenance and support of the system.
- Documentation

DELIVERABLES
Velosi successfully submitted the following deliverables:

- VAIL-Plant Inspection Management System following seven (07) modules:
  - Pressurized Equipment Management System (PEMS).
  - Pressure Safety Valves Management System (PSVMS).
  - Structure Inspection Management System (SIMS).
  - Lifting Equipment Management System (LEMS).
  - Miscellaneous Equipment Management System (MEMS).
  - Cathodic Protection Management System (CPMS).
  - Inspection Scheduling Management System (ISMS).
- Hands on Training of VAIL-Plant Software.
- Annual Maintenance and Support.
- Submission of User and Admin Manuals.
CASE STUDY
INTEGRITY MANAGEMENT SOFTWARE DEVELOPMENT

Client: Dragon Oil
Location: Turkmenistan
Region: Central Asia

SERVICE(S):
Software Supply & System Implementation Documentation, training & support

OBJECTIVE:
Dragon Oil required a robust Asset Integrity Management Software tool to manage the integrity of assets support all of its assets Onshore & Offshore Pipeline, Pressurized Equipment, Structures, PSVs, Electrical & Rotatory equipment.

SCOPE OF WORK:
- Software System Supply
- Documentation
- Maintenance and Support
- System Implementation
- Training
- Pilot study for Topside Equipment (94), Process Piping (160), Structures Platforms (3) & Pipeline (5)

The software should be able to integrate into the Oracle E-business Suite applications database and handle inspection records for the following asset types:
- Pressurized Equipment & Piping
- Pressure Safety Valves (future)
- Onshore Pipelines
- Jacket Structures
- Offshore Pipelines

DELIVERABLES
VAIL-Plant Software, which is an Asset Integrity & Inspection Management Application developed on modular approach to meet all the objectives of Dragon Oil Turkmenistan Limited. The following modules of VAIL-Plant were successfully implemented for Dragon Oil Turkmenistan Limited along with training, User Acceptance Testing and pilot study:
- Pressurized Equipment Management System (PEMS)
- Pipeline Integrity Management System Onshore (PIMSON)
- Pipeline Integrity Management System Offshore (PIMSOFF)
- Structure Integrity Management System (SIMS)
- Asset Performance Management System (AIMS)
- Inspection Schedule Management System (ISMS)
- Pressure Safety Valves Integrity Management System (PSVIMS)
- Electrical Instrumentation Rotary Management System (EIRMS)
- CMMS Interface (ORACLE interface module)
CASE STUDY
RBI IMPLEMENTATION AND PROVISION OF SOFTWARE

**Client:** Groupement Berkine  
**Location:** Algeria  
**Region:** Africa

**SERVICE(S):**
- Risk Based Inspection (RBI) FMECA Study Analysis Software Provision, Implementation & Management

**OBJECTIVE:**
Customization of Asset Integrity Management System (AIMS) Software to enable GB to schedule, prioritize and execute the inspection plan along with database management and data collection for Risk Assessment.
Strategize a Risk Based Inspection (RBI) Program and FMECA Study Analysis for Groupement Berkine HBNS and El-Merk field assets in order to equip GB with an efficient and cost effective working method to identify degradation mechanisms and respective failure modes while proposing a credible risk mitigation plan.

**SCOPE OF WORK:**
- **VAIL Plant Software:** Provision, Implementation and Management of VAIL Plant Software to continually manage assets for GB HBNS and El-Merk Facilities.
- **Training:** Comprehensive Training and hands on familiarization of GB Engineers during implementation and development of designated software at GB Facilities.
- **RBI:** Establish a comprehensive Risk Based Inspection (RBI) Program for Pipelines, Pressurized Equipment and Piping at HBNS and El-Merk facilities based on best practices and industrial standards to effectively manage corporate assets in order to gain maximum value, profitability and returns while safeguarding personnel, the community, and the environment.
- **FMECA:** Implementing an FMECA based Risk Assessment Methodology for Pressure Safety Valves and Wellheads at HBNS and El-Merk facilities to optimize the preventive maintenance activities.

**DELIVERABLES**

Velosi submitted the following deliverables to Groupement Berkine:

**Asset Integrity Management System:**
- PEMS – Pressurized Equipment Management System.
- PIMSON – Pipeline Integrity Management System – Onshore.
- PSVMS – Pressure Safety Valve Management System.
- ISMS – Inspection Schedule Management System.
- Hands on Training of VAIL-Plant Software.
- Risk Based Inspection (RBI) Study at GB HBNS and El-Merk Facilities along with Results and Conclusions for the following assets: FMECA Study & Maintenance Plan for Wellheads and PSVs at HBNS and El-Merk Facilities along with Results and Conclusions.
- Preparation of Standard Operating Procedures (SOPs).
**Client:** LUKOIL  
**Location:** Iraq  
**Region:** Middle-East

## OBJECTIVE:

The development, implementation and support of RBI programs for field production facilities and pipelines during phase 1 and phase 2 development of the West Qurna-2 Field.

Implementation and maintaining RBI system properly, improves plant reliability and safety while reducing unplanned outages and repair costs.

Implementation of RBI helps to:

- Select cost effective and appropriate maintenance and inspection tasks.
- Shift from a reactive to proactive maintenance regime.
- Produce an auditable system.
- Implement a risk management tool (VAIL-Plant)

## SCOPE OF WORK:

- Development of Asset Integrity Management Systems.
- Perform specific corrosion study for each equipment, piping & pipelines. Implement the RBI program for inspection data management and RBI analysis.
- Development of Written Scheme of Examination.
- Development of RBI software with inspection data management capabilities.
- Integration of RBI Software with ERP system (SAP).

### DELIVERABLES

**Asset Integrity Management System:**
- Comprehensive RBI Program for Equipment, Piping & Pipelines, along with Results and Conclusions.
- Remnant Life Assessment.
- Inspection Plan.
- Failure Rate and Risk Allocation.
- Written Scheme of Examination.

**VAIL Plant Software Modules:**
- PEMS – Pressurized Equipment Management System.
- PIMSON – Pipeline Integrity Management System – Onshore.
- ISMS – Integration of VAIL Plant Software with SAP.

### Asset Count

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<td>Total</td>
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</table>

**DELIVERABLES:**

- Comprehensive RBI Program for Equipment, Piping & Pipelines, along with Results and Conclusions.
- Remnant Life Assessment.
- Inspection Plan.
- Failure Rate and Risk Allocation.
- Written Scheme of Examination.
- PEMS – Pressurized Equipment Management System.
- PIMSON – Pipeline Integrity Management System – Onshore.
- ISMS – Integration of VAIL Plant Software with SAP.
CASE STUDY
PIPELINE INTEGRITY MANAGEMENT PROGRAM FOR SNGPL

Client: SNGPL
Location: Pakistan
Region: Asia

OBJECTIVE:

Development of Pipeline Integrity Management (PIM) Software in accordance with ASME B31.8S.
Strategize a Pipeline Integrity Management Program (PIMP) for SNGPL’s pipelines and stations in order to equip SNGPL with a transparent and auditable working method to identify degradation mechanisms while proposing effective risk mitigation of earmarked assets.

SCOPE OF WORK:

VAIL Plant Software: Development of customized software in accordance with ASME B31.8S for various modules.
Training: Comprehensive Training and hands on familiarization of SNGPL Engineers and IT Officer during development, implementation of PIM Manual and designated software.

PIMP: Development of Pipeline Integrity Management Manual in line with ASME B31.8S. Implementation of PIM Program (PIMP) includes all the required field surveys & activities for 2 Buried Pipelines, Sales Metering Station & 1 Over Head Rover Crossing Line.

DELIVERABLES

Velosi successfully submitted the following deliverables to SNGPL:

VAIL-Plant Software Modules:
- PEMS – Pressurized Equipment Management System.
- PIMSON – Pipeline Integrity Management System - Onshore.
- ISMS – Inspection Schedule Management System.
- EIRMS – Electrical Instrumentation Rotary Management System.
- CPMS – Cathodic Protection Management System.

Asset Integrity Management System:
- Implementation of PIM Program (PIMP).
- PIM Manual (ASME B31.8S).
- Comprehensive Training and hands on familiarization of VAIL-Plant.
- Preparation of Standard Operating Procedures (SOPs).
CASE STUDY
ASSET INTEGRITY MANAGEMENT SYSTEM FOR ONSHORE AND OFFSHORE TANAP ASSETS

Client: TANAP  
Location: Turkey  
Region: Europe

SERVICE(S):
VAIL-Plant Asset Integrity Management System (AIMS) Software Implementation & Management.

OBJECTIVE:
Development of an Asset Integrity Management Software to enable TANAP to schedule, prioritize and execute the inspection plan along with database management and data collection for Risk Assessment. Integration of AIMS Software with TANAP’s SAP, GIS & Envision.

SCOPE OF WORK:
- Provision and Implementation of VAIL-Plant Software modules to facilitate TANAP requirement for efficiently managing the corrosion and inspection data as part of the Asset Integrity Management System.
- Transfer of data to Computerized Maintenance Management System (CMMS) ensuring that inspection plans are fully implemented as planned during the Operations.
- Integrate with Geographic Information system to view the Pipeline Locations in GIS map.
- Interface with TANAP Document Management System to establish the related links between Client’s DCC, AIMS and CMMS.
- Detailed training courses to Client staff to ensure the program adoption and software usage are well understood by Client personnel and hands-on experience of AIMS software is transferred to TANAP staff.

DELIVERABLES
Velosi successfully submitted the following deliverables:

- VAIL-Plant Asset Integrity Management System Software Modules:
  - PEMS – Pressurized Equipment Management System.
  - PIMSOFF – Pipeline Integrity Management System - Offshore.
  - PIMSON – Pipeline Integrity Management System - Onshore.
  - PSVMS – Pressure Safety Valves Integrity Management System.
  - ISMS – Inspection Schedule Management System.
  - Control Panel.
- Integration of VAIL-Plant system with SAP Plant Maintenance Module.
- Integration of VAIL-Plant with ArcGis for Geographical Interface.
- Integration of VAIL-Plant with enVision Document Management System (EDMS).
- GO LIVE of VAIL Plant Software.
- Training of VAIL-Plant Software at the client site.

PEMS – Pressurized Equipment Management System.
PIMSOFF – Pipeline Integrity Management System - Offshore.
PIMSON – Pipeline Integrity Management System - Onshore.
PSVMS – Pressure Safety Valves Integrity Management System.
ISMS – Inspection Schedule Management System.
ISMS – Inspection Schedule Management System.
Control Panel.

Velosi successfully submitted the following deliverables:

- VAIL-Plant Asset Integrity Management System Software Modules:
  - PEMS – Pressurized Equipment Management System.
  - PIMSOFF – Pipeline Integrity Management System - Offshore.
  - PIMSON – Pipeline Integrity Management System - Onshore.
  - PSVMS – Pressure Safety Valves Integrity Management System.
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- Integration of VAIL-Plant with enVision Document Management System (EDMS).
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PEMS – Pressurized Equipment Management System.
PIMSOFF – Pipeline Integrity Management System - Offshore.
PIMSON – Pipeline Integrity Management System - Onshore.
PSVMS – Pressure Safety Valves Integrity Management System.
ISMS – Inspection Schedule Management System.
ISMS – Inspection Schedule Management System.
Control Panel.
DELIVERABLES

Velosi developed following Interface for the integration of Velosi’s VAIL-Plant system with ADNOC SAP S4 HANA:

- Asynchronous Equipment from SAP S4/HANA to VAIL-Plant System. (Outbound)
- Asynchronous Functional Location from SAP S4/HANA to VAIL-Plant System. (Outbound)
- Automatic creation of notifications from VAIL-Plant System to SAP S4/HANA.
- Retrieving Notification details from SAP S4/HANA to VAIL-Plant.
- Retrieving Work Order details from SAP S4/HANA to VAIL-Plant.
- Retrieving Equipment List from SAP S4/HANA to VAIL-Plant.
- Retrieving Functional Location List from SAP S4/HANA to VAIL-Plant.
CASE STUDY
PROVISION OF RISK BASED INSPECTION

Client: Binh Son Refinery
Location: Vietnam
Region: Southeast Asia

OBJECTIVE:
Development of RBI Methodology and Establish Computerized Inspection Management System (CIMS) applied for all equipment and piping system in BSR Refinery with reasonable combination of qualitative, semi-quantitative and quantitative assessment. CIMS software must be full integration with BSR exist CMMS Maximo.

SCOPE OF WORK:
Supply Computerized Inspection Management System (CIMS) for execution RBI analysis / Inspection Management of all Static & Pressurized Equipment and Piping System in BSR Refinery (such as Pressure Vessels, Tankages, Piping).

Required interface software module (interface with CMMS) which used to exchange data between CIMS and CMMS (transfer Inspection Request/Inspection Work Order / Inspection Report);

Supply training documents and train BSR for administration and operation of CIMS.

DELIVERABLES
Velosi successfully submitted following deliverables to BSR:

- VAIL-Plant Software Modules:
  - Pressurized Equipment Management System (PEMS)
  - Inspection Scheduling Management System (ISMS)
- End User Training
- Training manuals/documents
- VAIL-Plant Integration with Maximo
CASE STUDY
PROVISION OF ASSET INTEGRITY MANAGEMENT SYSTEM

Client: BAPCO
Location: Sudan
Region: North-East Africa

SERVICE(S):
VAIL-Plant Asset Integrity Management System implementation. VAIL-Plant Integration with EPICOR ERP and Omni Docs.

OBJECTIVE:
Development of Asset Integrity Management System (AIMS) in order to enhance the plant safety, integrity and availability to meet operational and long term production requirements. The pipeline facilities consists of central processing facility, five pump stations distributed along 1128 km, 32 inch pipeline and a marine terminal located in Bashayer II, Port Sudan, Sudan.

SCOPE OF WORK:
- Preparation of Asset Integrity Management System
- Preparation of Operating Manuals
- Preparation of Inspection Procedures
- RBI of Static Equipment, Piping, Onshore & Offshore Pipelines and Pressure Relieving Devices
- RCM Analysis for Rotary, Electrical Equipment, and Instrumentation
- SIL Classification and Verification Study
- Supply of Asset Integrity Management Software
- Supply of SIL software
- Supply of Hardware for Asset Integrity Management Software and SIL
- Integration of AIMS Software with ERP system and Document Management System
- Facilitate Training program for End-users

DELIVERABLES
Velosi successfully submitted following deliverables to BAPCO:
- VAIL-Plant Software Modules:
  - Pressurized Equipment Management System (PEMS)
  - Pipeline Integrity Management System Onshore (PIMSON)
  - Pipeline Integrity Management System Onshore (PIMSOFF)
  - Pressure Safety Valve Management System (PSVMS)
  - Electrical Instrumentation and Rotary Management System (EIRMS)
- VAIL-SIL software
- End User Training
- Training manuals/documents
- VAIL-Plant Integration with EPICOR ERP System.
- VAIL-Plant Integration with OmniDocs Document Management System
CASE STUDY
RISK BASED INSPECTION PROGRAM DEVELOPMENT FOR PETRONAS FLNG 1 (L) LTD. TOPSIDE STRUCTURE AND HULL

Client: PETRONAS
Location: Malaysia
Region: Southeast Asia

OBJECTIVE:
Establish Risk Based Inspection (RBI) Program for Topside Structure Including Turret, Hull Structure Including Cargo Tanks, Mooring System and Flexible Riser by carrying out comprehensive risk analysis.

Integration of recommended RBI IRP with class survey requirement including endorsement/approval from the current Class Society.

SCOPE OF WORK:
The scope of work for the Risk Based Inspection Program Development for Petronas FLNG 1 (L) LTD Topside structure and Hull Structure:

- Topside Structure Including Turret
- Hull Structure Including Cargo Tanks
- Mooring System
- Flexible Riser
- RBI Software

VAIL Plant Software: RBI Software Package for risk assessment and recording of RBI data including inspection plan with database which shall be valid throughout the FLNG1 design life.

DELIVERABLES

Risk Based Inspection Program:

- Comprehensive RBI Study for Topside Structure.
- Tag Marked Drawings for SIMS and HIMS.
- Failure Rate and Risk Allocation
- RBI Report with results and conclusions.
- Recommendation on additional safeguards and action(s) where required.
- Inspection plan comprising of inspection method, coverage and frequency.

VAIL Plant Software Modules:

- SIMS
  Structure Integrity Management System
- HIMS
  Hull Integrity Management System
- ISMS
  Inspection Scheduling Management System
- Integration of VAIL-Plant Software with SAP

Asset Count

<table>
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<tr>
<th>Asset Description</th>
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<tr>
<td>Topside Structure</td>
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<tr>
<td>Flexible Riser</td>
<td>1 Flexible Riser</td>
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<tr>
<td>Mooring Chain</td>
<td>12 Mooring Chains</td>
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SERVICE(S):
Implementation of FIMS (Facilities Integrity Management System)
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