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INTEGRITY OPERATING WINDOW FIELD MANAGER (IFM)




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Integrity Operating Window Field Manager (IFM)

Intelligent – Secure – Scalable.

- IFM uses IoT sensors, AI, and ML for real-time data analysis and predictive insights, replacing manual methods with proactive maintenance and enhanced safety measures.
- IFM monitors FPSOs, pipelines, and distillation columns for integrated corrosion management, ensuring efficient risk mitigation, prioritized actions, and extended asset lifespan.
- **Streamlined Data Management:** Real-time sensor data acquisition and automated preprocessing.
- **Intelligent Insights:** ML models predict corrosion/degradation trends and maintenance needs and monitor for static equipment.
- **Scalable Infrastructure:** Cloud integration and renewable energy sources support large-scale monitoring while bridging the gap between Technical Integrity Framework (TIF) and inspection data.



Future-Proof Predictive Maintenance

- **Time-series analysis:** ARIMA and LSTM models ensure precise predictions while optimizing corrosion barrier performance.
- **Prediction Algorithms:** Random Forests and Gradient Boosting Machines optimize maintenance schedules, reducing reliance on manual data collection and periodic inspections.
- **Anomaly Detection:** Techniques like Isolation Forests and CNNs identify potential threats in real time, providing actionable insights and immediate alerts.
- **Explainable AI:** Enhances model transparency and decision-making processes.

Actionable Data at Your Fingertips

- **Interactive Dashboards:** Real-time monitoring with customizable visualizations, offering real-time data insights and alerts.
- **Automated Alerts and Reports:** Immediate alerts and comprehensive maintenance reports streamline operations. Threats and Barriers monitoring.
- **Data Analytics:** Big data analytics provide actionable insights, optimizing corrosion barrier performance and reducing manual data collection efforts.
- **Cloud Integration:** Remote access and collaboration via cloud-based storage further streamline operations and enhance efficiency.

Application Features

- Real-time integrity monitoring.
- Interactive P&ID.
- Integrated corrosion management.
- Dynamic data analysis and visualization.



- Threat and barrier monitoring.
- Automated alerts and notifications.

IFM Application Specifications

Hardware Components

- **Processing Monitor Sensing:** Pressure, temperature, flow rate, vapour pressure, oxygen concentration, bacteria concentration, chlorides concentration, hydrogen sulphide concentration, corrosion rate sensors.
- RECM Units
- CISO Units
- Online wall thickness sensors

Component Integration

- Process Monitoring Sensors transmit real-time data to the Data Acquisition Unit (DAU).
- RECM units transmit data to the Data Acquisition Unit (DAU).
- CISO units transmit data to IFM
- Edge Computing Devices perform preliminary data processing.
- Solar Panels provide a sustainable power supply.
- Gateway ensures secure data transmission.



- ATEX Rated Batteries provide reliable power in hazardous environments.
- Seamless Integration with Client Data (DCS, Local Server, etc.)

IOT Architecture

- Centralized communication pathway, server, and security infrastructure.

Software Design Core Functionalities

- Data Acquisition from various sensors and units.
- P&ID User Interface display
- Data Preprocessing & Validation.
- Real-time Monitoring & Visualization.
- Data Analytics & Corrosion Prediction.
- Alerting & Reporting.
- Cloud Integration for centralized data management.
- Security measures for data protection.

Industry 4.0 Enhancements

- ML for Corrosion/Degradation Prediction.
- Digital Twin Integration.
- Big Data Analytics.

Actionable Data at Your Fingertips

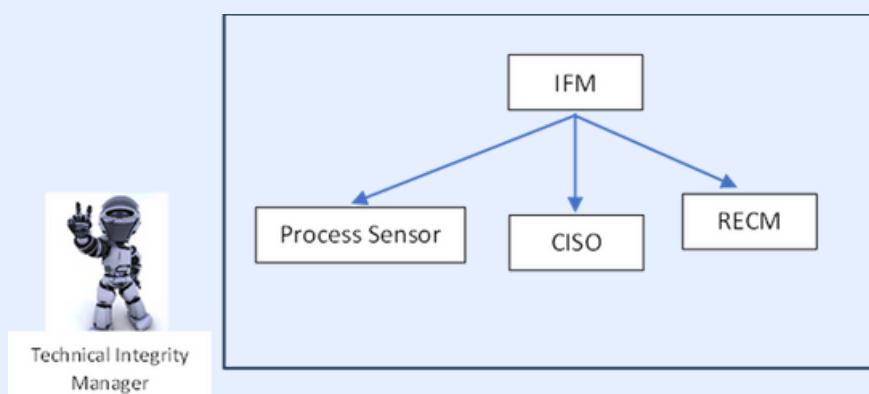
- The IFM system ensures continuous and accurate data readings, surpassing the sporadic nature of manual inspections.



- Gain access to capabilities that allow for remote oversight and tracking of your entire system of sensors and monitoring units.
- Reduce expensive and time-consuming in-person monitoring efforts.
- The IFM system offers the fastest path to compliance.
- Centralize data acquisition from various sensors with real-time monitoring displayed on interactive dashboards.
- Advanced data analytics powered by machine learning predict integrity trends and optimize system usage.
- Comprehensive analysis of historical data for long-term performance insights and immediate alerts for critical excursions.
- Secure cloud integration with seamless integration to cloud platforms for centralized data management and remote access.

Machine Learning: Predictive Protection Modelling

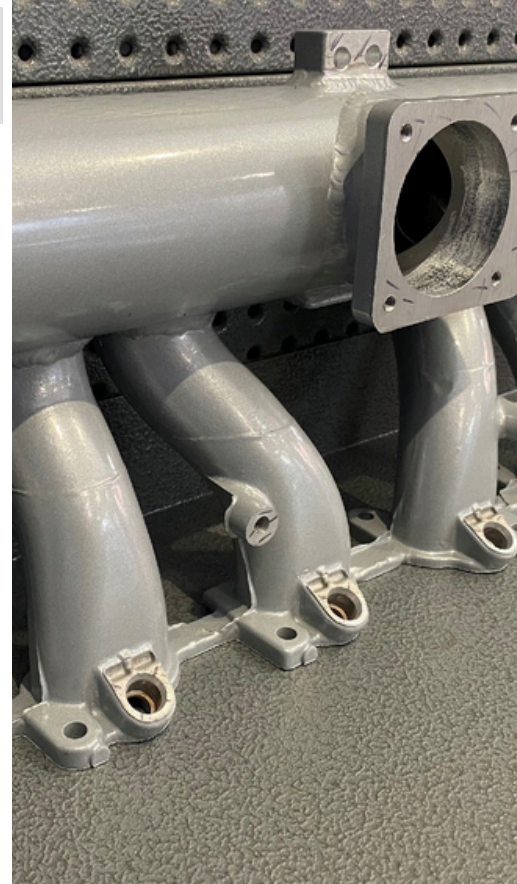
- Time-Series Analysis.
- Prediction Algorithms (Random Forests, Gradient Boosting Machines).
- Anomaly Detection and Threat Monitoring (Isolation Forests, One-Class SVM).
- Additional Techniques (Reinforcement Learning, Explainable AI).



Application Benefits

- Enhanced Asset Integrity and Performance.
- Cost Reduction and Operational Efficiency.
- Enhanced Safety and Compliance.
- Remote Technical Expert Support and Collaboration.
- Data-Driven Decision Making and Strategic Planning.
- Zero leak and emission
- AI-enabled Technical Integrity Manager (TIM) for asset

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