



by



with the support of the European Space Agency



Predictive Maintenance

reducing downtime to zero



Stay Ahead,
Prevent
Downtime:
Embrace
Predictive
Maintenance!

the new way of
performing
maintenance

www.cds-wireless.com

What is Predictive Maintenance?



REACTIVE Maintenance also known as breakdown maintenance or corrective maintenance, refers to a type of maintenance strategy where repairs or interventions are performed on equipment or systems after a failure or breakdown has occurred. It is a responsive approach that focuses on restoring functionality rather than preventing failures in advance.

PREVENTIVE Maintenance refers to the practice of regularly inspecting, servicing, and maintaining equipment, machinery, or systems to prevent potential failures, breakdowns, or costly repairs. It aims to identify and address any issues or deterioration before they escalate and cause significant disruptions or safety hazards.

PREDICTIVE MAINTENANCE is the newest method of performing maintenance without a set schedule using Industry 4.0 devices (sensors, gateways, AI apps, robots, 5G and satellite communications) that monitor assets and equipment 24/7 storing the data in the cloud from where they are analyzed and monitored in order to detect anomalies and provide maintenance forecasts to reduce unscheduled stops to zero and generating ROI.



- increased equipment reliability
- cost savings
- asset availability
- data-driven decision making
- increase workers safety



Why Predictive Maintenance?

With the advent of the Fourth Industrial Revolution, also known as Industry 4.0, traditional maintenance systems had to embrace the advancements in technologies such as artificial intelligence, advanced robotics, machine-to-machine communication, and the Internet of Things (IoT). The outcome of these collaborations and the willingness to embrace new concepts gave rise to the development of predictive maintenance systems, hereafter referred to as PdM.

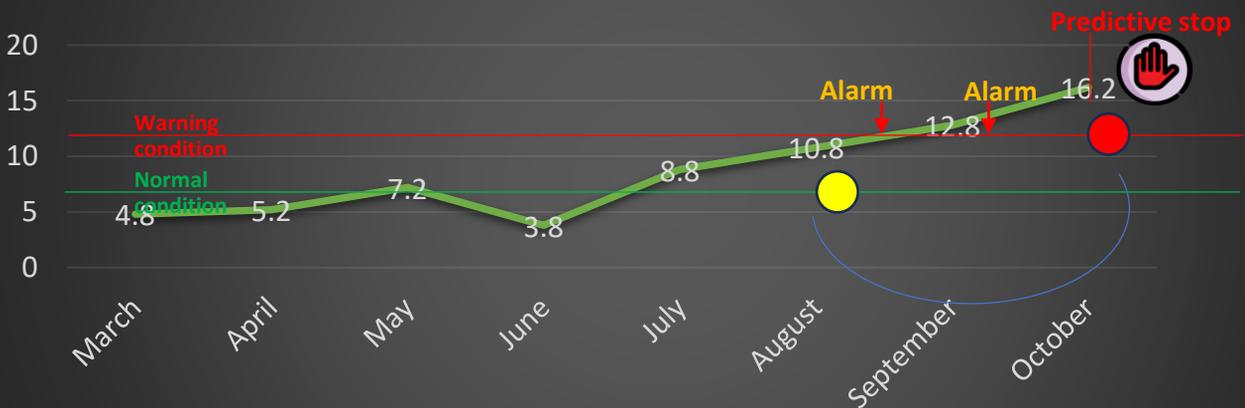
The *CDS Wireless* proposal in terms of PdM addresses to the oil and gas industry (on shore & offshore), the wind industry and environmental monitoring with numerous applications and services related to plant monitoring, process monitoring, energy efficiency, safety and sustainability.

To gain a deeper comprehension of the concept of predictive maintenance and particularly the advantages and return on investment (ROI) it yields, we will examine several studies that present the outcomes and effects of implementing predictive maintenance.

The first example is a study performed by the *General Electric Company (GE)*, [*GEA 32876(11/2016)*] in October 2016, named: *The impact of digital on unplanned downtime - an offshore oil and gas perspective*.

The second study is performed by *CDS Wireless*, a simulation of losses due to unscheduled downtime in a big offshore Oil & Gas maritime platform .

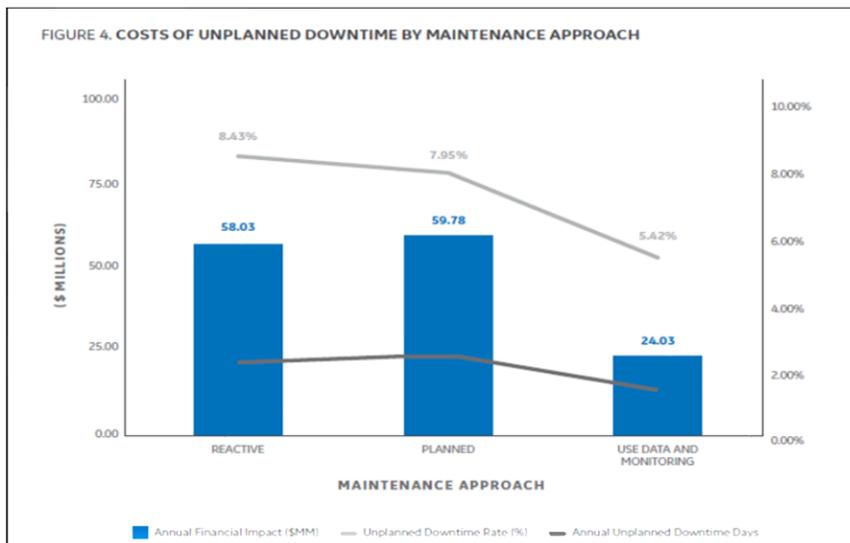
Equipment monitoring chart



The above chart illustrates the monitoring of equipment, depicting normal operating conditions and highlighting areas of warning that provide information about potential failures to predict downtime. When comparing this graph in terms of preventive and predictive maintenance, we can observe a two-month interval between the recommended point for preventive maintenance and the predictive stop. This gap between the two maintenance approaches has implications for cost efficiency and the asset availability.

The GE (General Electric company) study on The impact of Digital on unplanned downtime on offshore oil & gas perspective, reveals that:

- an offshore Oil & Gas organization experience on average \$ 49 million annually in financial impacts due to unplanned downtime. For the worst performers the negative financial impact can be upwards of \$ 88 million.
- operators using a predictive data-based approach experience 36% less unplanned downtime than those with a reactive or preventive approach. This can result in, on average \$ 17 million dropping to the bottom line annual.



Fewer than 24% of operators describe their maintenance approach as a predictive one based on data and analytics.

Over three-quarters either take a reactive or time-based approach.

Fig.1. Cost of unplanned downtime by maintenance approach

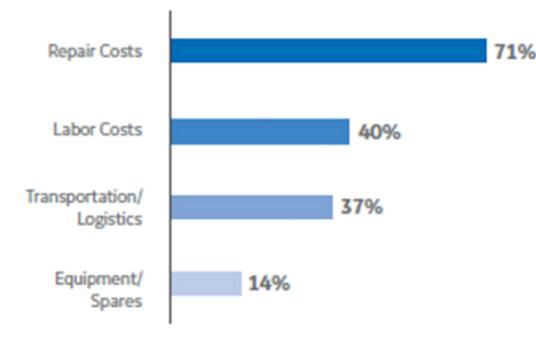


Fig.2. Major expenses with unplanned downtime



Fig.3. Approach to equipment repair and maintenance

A study was undertaken by CDS Wireless to explore the advantages of PdM, with a focus on production-related data. In the study, we employed a straightforward equation to compare production data with maintenance and equipment repair costs. We analyzed the production and cost data of Perdido, which is the second largest offshore oil and gas platform.

Production: 100.000 oil barrels/day \$ = 8-10 M \$/day
+200 M mc gas

Maintenance costs = 100.000-300.000 \$/ day
35-100 M / year

Considering the hypothetical scenario of eliminating downtime entirely, the results are:

Asset availability 5-15%

Maintenance costs 18-25% = 7-20 M \$ / year

Unscheduled stops saving costs 8-10 M \$ / day

Employees safety

Environmental damage in case of disaster eliminated

18-25%



maintenance cost

5-15%



asset availability

McKinsey and Co., a global management consulting firm, reported that a prominent offshore oil & gas operator successfully created a predictive maintenance (PdM) strategy based on 30 years of platform operations data. After identifying the crucial assets to protect from failure, the company implemented this approach in one platform and later expanded it to their entire fleet. The outcomes demonstrated an average decrease of 20 percent in downtime and production gains exceeding 500,000 barrels of oil per year.

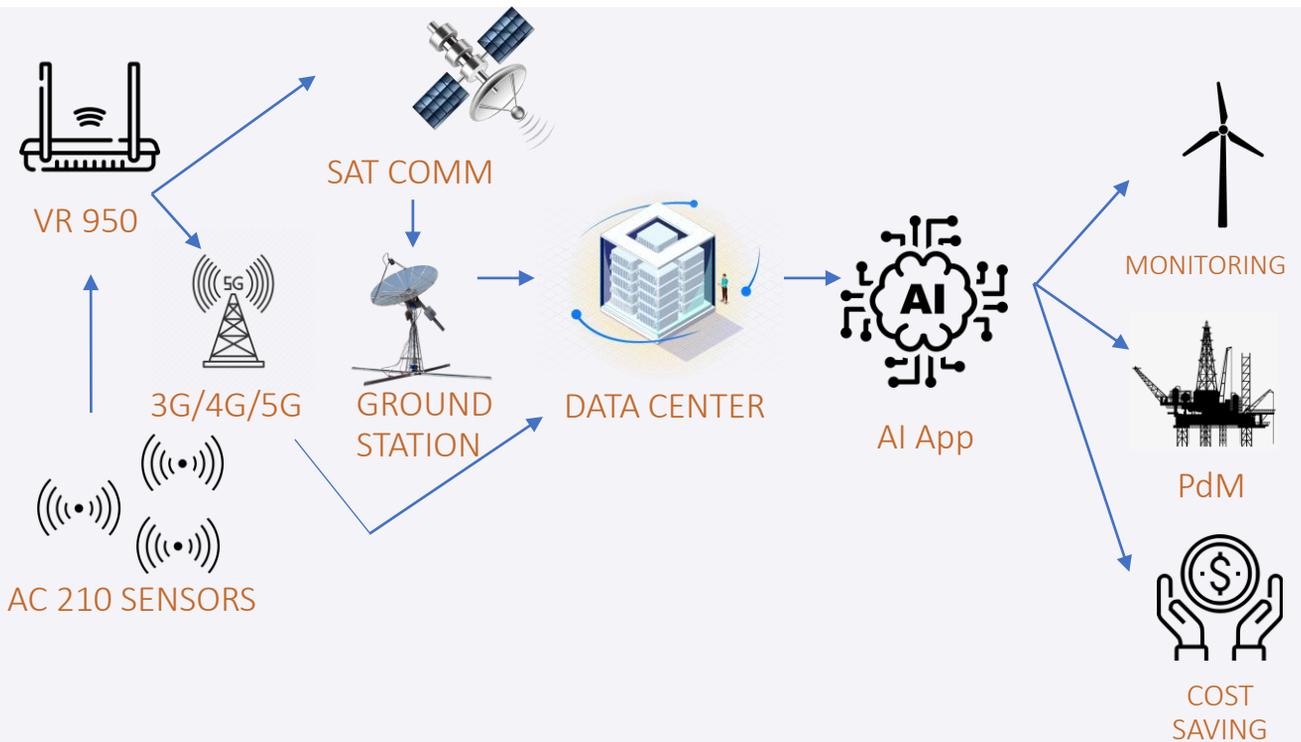


Perdido oil platform (courtesy of Shell)
Source: Wikipedia

- real-time asset monitoring
 - early failure detection
- automated critical alerts and notifications

Best way to do your Predictive Maintenance

SatADAPT PdM Architecture



...the way we do it

STEP 1	STEP 2	STEP 3	STEP 4
COLLECTING DATA	COMMUNICATIONS	DATA STORAGE DATA PROCESSING	RESULTS
AC 210 VIBRATION SENSORS * **	VR 950 INDUSTRIAL ROUTER * **	CLOUD DATA AI APP *	PREDICTIVE MAINTENANCE PLANT MONITORING COST SAVING

- Our products are developed by CONTROL DATA SYSTEMS with the support of European Space Agency (ESA) 

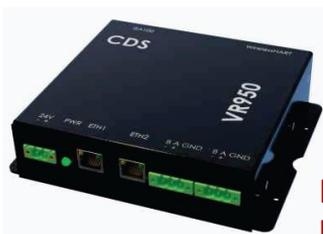
** ATEX zone II certification



Our Predictive Maintenance Products



An AI based Predictive maintenance solution based on vibration monitoring combined with AI technology using the CDS state-of-the-art products, developed with the European Space Agency.



VR 950-RTU

Designed for mission critical, suitable for Predictive maintenance the VR 950-RTU an all-in-one, dual standard infrastructure device architected to manage both ISA 100 and WirelessHART network simultaneously, with an ATEX zone II certification



AC 210

A complex instrument which pre-processes acceleration samples using FFT algorithms and delivers filtered spectrograms along with time synchronized temperature and rotation speed data for Predictive maintenance

TC 210 - T



An industrial wireless temperature transmitter designed to acquire temperature measurements from type T thermocouples and transmit them wirelessly using either one of the open standards ISA100 Wireless or WirelessHART, the TC 210-T delivers valuable thermal data for test and validation, process control, and safety applications.

- Our products are developed by CONTROL DATA SYSTEM with the support of European Space Agency (ESA) 

** ATEX zone II certification



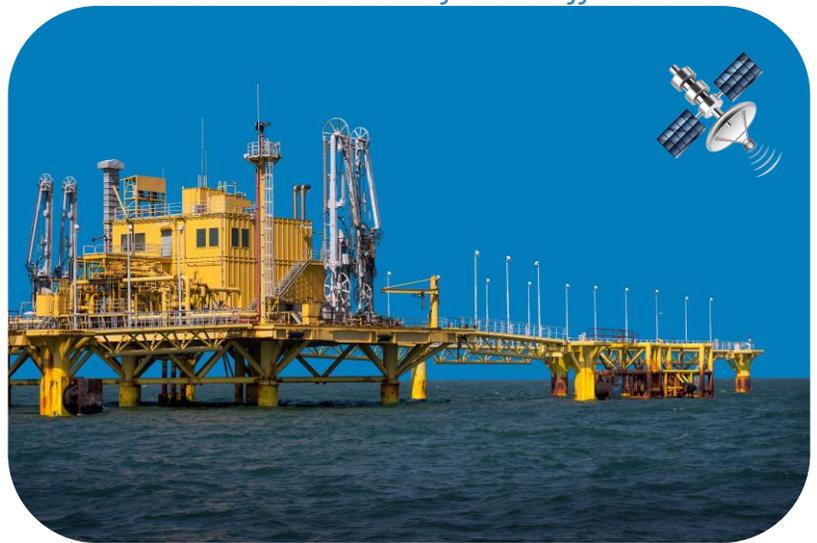
Oil & Gas Industry

Oil and gas predictive maintenance refers to the use of data analysis techniques and advanced technologies to anticipate equipment failures and perform maintenance activities proactively in the oil and gas industry. By leveraging historical and real-time data, predictive maintenance aims to optimize maintenance schedules, reduce downtime and improve operational efficiency.

Satellite communications for the offshore zone

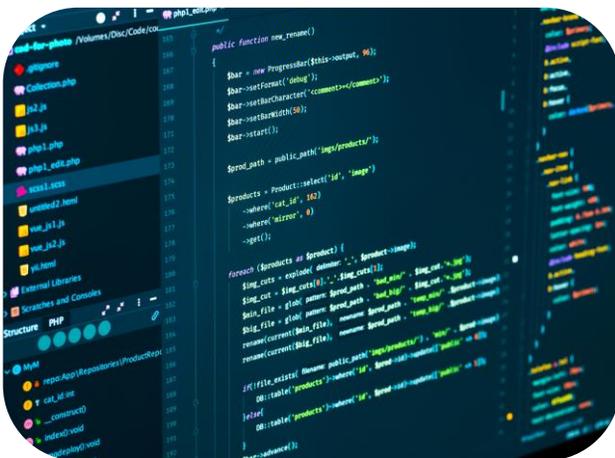


developed by CONTROL DATA SYSTEMS with the support of European Space Agency (ESA) 



The key aspects of Oil & Gas Predictive Maintenance:

1. Data collection and monitoring
2. Data analysis and modelling
3. Condition monitoring
4. Predictive alerts and notification
5. Maintenance optimization
6. Integration with asset management systems



Wind Industry

Optimizing wind energy production with wireless sensors for vibration, rotation, and temperature monitoring. Our AI-based Predictive Maintenance solution combines monitoring and machine learning to prevent wind turbine failures, especially in offshore installations with high downtime repair costs.

Satellite communications for the offshore zone

SatADAPT is

developed by CONTROL DATA SYSTEMS with the support of European Space Agency (ESA) 



Our products have ATEX zone 2 Certification

Benefits of wind energy predictive maintenance include increased turbine availability, reduced maintenance costs, improved safety, and optimized energy production. By proactively addressing potential failures and planning maintenance activities more efficiently, wind energy operators can maximize the productivity and profitability of their wind farms while minimizing unplanned downtime.



AC 210 SENSORS



Environmental Monitoring

Environmental monitoring plays a crucial role in assessing and ensuring sustainability by providing valuable data and insights about the state of the environment. It involves the systematic collection, analysis, and interpretation of data related to various environmental parameters.



The key aspects of the environmental monitoring for sustainability:



- **Air Quality Monitoring:** Monitoring air quality helps in assessing the levels of pollutants and understanding their impact on human health and the environment. (Chemical pollution monitoring projects with the Environmental Protection Agency)
- **Water Quality Monitoring:** Monitoring the quality of water bodies such as rivers, lakes, and oceans is essential for assessing their health and identifying potential sources of pollution.
- **Remote Sensing:** Remote sensing technologies, such as satellite imagery and aerial surveys, provide a comprehensive view of large-scale environmental changes, including deforestation, land use changes, and natural disasters.
- **Environmental Impact Assessments**

By incorporating environmental monitoring into sustainability initiatives, policymakers, businesses, and communities can make informed decisions, develop effective environmental management strategies, and promote sustainable practices.

Monitoring enables early identification of environmental issues, facilitates compliance with regulations, and supports the conservation and preservation of ecosystems for present and future generations.

Railway Safety

By implementing comprehensive railway safety monitoring systems, railway operators can detect potential safety risks in real-time, take preventive measures, and enhance the overall safety and reliability of train operations. These systems contribute to minimizing accidents, ensuring passenger and employee safety, and maintaining the integrity of railway infrastructure.



Train Monitoring Systems: Trains are equipped with monitoring systems that gather real-time data on various parameters, including speed, acceleration, braking, wheel condition, and equipment status

Track Monitoring: Continuous monitoring of the railway tracks is crucial to identify track defects and potential hazards.

Signalling and Communication Systems: Monitoring the signaling and communication systems is essential for ensuring proper train control and safe operation.

Level Crossing Monitoring: Level crossings are critical points where road traffic intersects with railway tracks. Monitoring these crossings includes the use of sensors and surveillance systems to detect vehicles or pedestrians on the tracks and ensure timely activation of warning signals and barriers.



the new way of performing maintenance



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