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Machine Condition Monitoring Market by Technique (Vibration Monitoring, Thermography, Oil Analysis, Ultrasound Emission), Offering (Vibration Sensors, Infrared Sensors, Spectrometers, Corrosion Probes, Spectrum Analyzers), Region - Global Forecast to 2029

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Abstracts

The global machine condition monitoring market size is expected to grow from USD 3.1 billion in 2024 to USD 4.7 billion by 2029, at a CAGR of 8.3% from 2024 to 2029. Condition monitoring focuses on monitoring the real-time conditions of machines, while predictive maintenance focuses on detecting and repairing faults before a failure occurs. Predictive maintenance is becoming popular in manufacturing firms globally owing to the benefits of this technique. For example, maintenance is carried out only when plant machinery requires repair services to avoid impending failures. Thus, the necessary, cost-effective downtime can be scheduled according to convenience.

“Motor current analysis segment is projected to grow at significant CAGR during the forecast period.”

The motor current analysis monitoring technique senses electrical signals that contain current components. These components are byproducts of unique rotating flux components caused by faults such as air gap eccentricity, broken rotor bars, and shorted turns in low-voltage stator windings. Motor current analysis enables the detection of such faults at an early stage, thereby avoiding the complete failure of machines. In the motor current analysis, current signals are processed to obtain the frequency spectrum, usually referred to as the current signature. To analyze this data and diagnose faults in machines, various advanced techniques are used, namely FFT,

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Short-time Fourier Transform (STFT), Gabor transform, and wavelength transform.

' Online machine condition monitoring segment is projected to grow at an impressive CAGR during the forecast period.”

Online machine condition monitoring systems are deployed to monitor the health of critical equipment such as turbines, blowers, critical pumps, and compressors that directly impact the safety, environment, and production in different industrial plants. Online condition monitoring systems include a series of sensors permanently mounted on critical machines such as monitors, analyzers, and central servers of industrial plants to track their performance constantly. They transmit data to plant operators through either a wireless or a cabled network.

'Power generation industry is expected to hold largest market share during the forecast period.'

The modern power plants are comparatively complex, with sophisticated machinery and control systems and owing to the complexity of these plants it become more challenging to monitor the health of every equipment in the plants and identify potential problems before they lead to failures. machine condition monitoring systems helps to provide real-time data on the condition of critical equipment, and also provide the support to prevent unexpected downtime and improve overall plant reliability. Moreover, power generation companies are under increasing pressure to operate their plants reliably and efficiently. Machine condition monitoring systems can help to achieve these goals by providing early warning of potential problems, allowing for timely maintenance and repairs. This can help to prevent forced outages and reduce maintenance costs.

'The market in Europe is expected to grow at a impressive CAGR during the forecast period.'

Germany is one of the key economies in Europe. The country is specifically known for its strong automotive manufacturing sector. The Government of Germany has undertaken many initiatives to computerize its process industries to enhance resource efficiency and industrial output. The technological base for this project is cyber-physical systems, cloud computing, and the IoT. Its goal is to increase digitalization through smart factories and IoT. This will ultimately offer advanced solutions to carry out predictive maintenance and condition monitoring and prevent machine failures to increase operational efficiency. The increasing use of smart sensing technologies and

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Industry 4.0 has significantly improved the monitoring techniques in Germany. Industry 4.0 helps digitalize industrial processes and improve plant performance and efficiency.

Breakdown of the profiles of primary participants:

By Company Type: Tier 1 - 40%, Tier 2 - 35%, and Tier 3 - 25%

By Designation: C-level Executives - 45%, Directors - 30%, and Others - 25%

By Region: North America - 35%, Europe - 30%, Asia Pacific - 25%, and RoW – 10%

Major players profiled in this report are as follows: Emerson Electric Co. (US), Honeywell International Inc. (US), SKF (Sweden), Amphenol Corporation (US), PARKER HANNIFIN CORP (US), General Electric (US), Rockwell Automation (US), Schaeffler AG (Germany), Siemens (Germany), Teledyne Technologies Incorporated (US), Analog Devices, Inc. (US) and others.

Research Coverage

The machine condition monitoring market has been classified by applications, equipment procurement, deployment type, offering, monitoring process, monitoring technique, industry and region. The market by applications has been classified into pumps, chillers, motors, bearings, and other. The offering segment is divided into hardware, software, and services. The market has been divided into original equipment manufacturers and end-users by equipment procurement segment. The market by monitoring technique has been classified into vibration analysis, thermography, oil analysis, corrosion monitoring, ultrasound emission, and motor current analysis. The market by monitoring process has been classified into portable condition monitoring and online condition monitoring. Based on deployment type the market has been segmented into on-premises and cloud. Furthermore, the industry segment includes oil & gas, power generation, metals & mining, chemicals, automotive, aerospace, food & beverages, marine, and other Industries. The study also forecasts the market size in four key regions—North America, Europe, Asia Pacific, and RoW.

Key Benefits of Buying the Report:

The report provides insights on the following pointers:

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Analysis of key drivers (Advent of secured cloud computing platform to fuel market growth, Rising inclination towards wireless communication technology, Growing adoption of predictive maintenance techniques to reduce sudden breakdowns of equipment, Rising number of smart factories worldwide), restraints (Reliability issues in prediction capabilities of machine condition monitoring systems, Lack of availability of technical expertise to carry out data analysis), opportunities (Integration of big data analytics and machine learning in machine condition monitoring, Emergence of IIoT to drive new growth opportunities), and challenges (Unavailability of technical expertise at remote locations, High cost associated with integration of machine condition monitoring systems with other maintenance systems) influencing the growth of the machine condition monitoring market

Product Development/Innovation: Detailed insights on new products, technologies, research & development activities, funding activities, industry partnerships, and new product launches in the machine condition monitoring market

Market Development: Comprehensive information about lucrative markets – the report analyses the machine condition monitoring market across regions such as North America, Europe, Asia Pacific, and RoW.

Market Diversification: Exhaustive information about new products & technologies, untapped geographies, recent developments, and investments in the machine condition monitoring market

Competitive Assessment: In-depth assessment of market position, growth strategies, and product offerings of leading players like Emerson Electric Co. (US), Honeywell International Inc. (US), SKF (Sweden), Amphenol Corporation (US) and among others in the machine condition monitoring market

Strategies: The report also helps stakeholders understand the pulse of the machine condition monitoring market and provides information on key market drivers, restraints, challenges, and opportunities.

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About

According to the new market research report on the "Machine Condition Monitoring Market by Monitoring Technique (Vibration Monitoring, Thermography, Oil Analysis, MCA), Deployment (On Premise, Cloud), Monitoring Process (Online, Portable), Offering, Industry, and Region - Global Forecast to 2024", The machine condition monitoring market is estimated to grow from USD 2.38 Billion in 2018 to USD 3.50 Billion by 2024, at a CAGR of 6.7% between 2018 and 2024. Factors such as the development of a secure cloud computing platform, increased use of wireless communication technology for condition monitoring of equipment, and inclination of end users toward predictive maintenance are driving the growth of the machine condition monitoring market at present.

Major players operating in the machine condition monitoring market include:

ALS Limited (Australia),

Emerson Electric (US),

General Electric (US),

Honeywell (US),

Meggitt (UK),

National Instruments (US),

Parker-Hannifin (US),

Rockwell Automation (US),

Schaeffler (Germany),

SKF (Sweden),

Azima DLI (US),

Bruel & Kjaer (Denmark), and

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Fluke (US).

The motor current analysis technique is expected to witness the highest CAGR during the forecast period

The market for the motor current analysis technique is expected to grow at the highest CAGR between 2018 and 2024. Defects such as current imbalance and loading issues in motors, circuitry and motor insulation degradation, rotor damage, eccentricity in rotors, belt defects, and gearing defects can be detected by the motor current analysis technique, thereby resulting in high demand in the machine condition monitoring market.

The market for software is expected to grow at a higher CAGR during the forecast period

The market for software is expected to grow at a higher CAGR during the forecast period. Machine condition monitoring software help companies to calculate equipment reliability parameters such as rotating speed, vibration frequency, bearing faults, shaft misalignment, and temperature of machines. Also, machine condition monitoring software generates a comprehensive report of the final result after executing the analysis of all algorithms. The diagnostic report helps plant operators to predict an impending failure and avoid any breakdown situation.

The market for cloud-based machine condition monitoring solutions is expected to grow at a higher CAGR during the forecast period

Cloud-based monitoring is expected to exhibit a higher CAGR in the machine condition monitoring market during the forecast period. Cloud-based deployment benefits organizations with the increased scalability, speed, 24/7 service, and enhanced IT security. The growing adoption of Software-as-a-Service (SaaS) applications by enterprises is bringing out huge growth prospects for cloud-based machine condition monitoring solutions.

The market for online machine condition monitoring solutions is expected to

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grow at a higher CAGR during the forecast period

The market for online machine condition monitoring solutions is expected to grow at a higher CAGR during the forecast period. Online machine condition monitoring provides real-time data to operators in the plant and is the most preferred monitoring process in critical plants that work continuously and are highly prone to defects.

The market for the automotive industry is expected to grow at the highest CAGR during the forecast period

The market for the automotive industry is expected to grow at the highest CAGR during the forecast period. The automotive industry depends on the performance of assets to effectively perform their core business activities as a system downtime can affect the revenue of the organization. In the automotive industry, time plays a crucial role, and any unplanned asset breakdown can heavily impact its brand image and sales, resulting in the high adoption of the machine condition monitoring technique in the automotive industry.

The market in APAC is expected to grow at the highest CAGR during the forecast period

China and India are the fastest-growing economies that are witnessing a rapid penetration of Internet of Things (IoT) in APAC. High high adoption of modern technologies for smart manufacturing, reduction in operational costs, and importance of security measures at workplaces drive the demand for machine condition monitoring solutions in the APAC region, thereby making this region the fastest-growing market for machine condition monitoring solutions.

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