NEXCOM
The Intelligent Systems

White Paper

Industry 4.0 Smart Services Dawn with Predictive Maintenance

Smart manufacturing is undoubtedly in the limelight of Industry 4.0. Smart service, however, is at another end of the spectrum. Leveraging the industrial internet of things (IIOT), big data analysis, and expert systems, machinery makers can identify potential failures in advance and notify customers to schedule maintenance, maximizing productivity.

Predictive maintenance (PM) breaks routines of repair schedule and breakdown maintenance, thus enhancing equipment availability, performance, and quality. Keys to these are real-time vibration analysis via IIoT and quality analysis tools, which monitor asset status and signs of falling productivity.

Early-stage Failure Monitoring with Predictive Maintenance

Vibration analysis has long been used to evaluate machine component conditions. At early times, its adoption was restrained because expert examiners were rare, service areas were limited, and data integration was too difficult to turn analytical knowledge into expert systems. "With Industry 4.0, IIoT, and big data overcoming these bottlenecks, predictive maintenance is to be applied in manufacturing industries," said Joe Lin, GM of IoT Automation Solutions Business Group, NEXCOM.

Today, sensor technology transforms frequencies into vibration spectrum for follow-up analysis to identify machinery components with the potential defects. Via IoT gateways, vibration data can be transferred to private enterprise clouds or cloud platforms. Combined with analytical tools or third party application programming interfaces (API), PM engineers can remotely monitor machinery condition during production.

Once detecting abnormal vibration, engineers will notify customers to adjust production in advance to avoid the rejection of defective, semi-finished or finishing products. Maintenance engineers can shorten system down time by accurately pinpointing and repairing worn parts instead of ineffectively identifying problems among thousands of components. Machines can be back on line soon, increasing equipment availability.

Product quality analysis is another way to enhance equipment performance and yield rate. "For CNC and SMT equipment that are challenging for sensor deployment, the shop flow control system could be used with defect analysis and traceability systems so that component issues can be traced and fixed," said Lin.

Smart Services Turn Knowledge into Revenues

Cloud platforms and big data analysis help establish expert systems that use systematic approaches to reason, store, and manage the expertise of senior personnel and perform analysis with this knowledge base. Besides providing recommendations and solutions like professionals, expert systems autonomously improve analytical accuracy through self-learning. Under the cloud framework, expert systems provide centralized monitoring over dispersed machines around the world without geographical limit.

The collected manufacturing data not only innovates PM but also many smart service applications. For machinery makers, these operating data can be translated into machine utilization patterns based on which they can offer recommendations to improve machine efficiency and best suitable successors prior to asset retirement. In case of malfunction, error message can be collected by IoT gateways to be used for design refinement.

PM can further be applied to facilities including manufacturing machinery, water chillers, air compressors among others. NEXCOM's comprehensive PM solutions cover hardware/

software integrations and vibration analysis, which are already introduced to semiconductor manufacturing and soon to be extended to petrochemical, paper, and electronics industries for smart services.

Powered by Industry 4.0 and IIoT, value-added smart services are expected to become revenue generators for machinery makers, which transforms from sole product selling to cross-selling with smart manufacturing and services.

Founded in 1992, NEXCOM integrates its capabilities and operates six global businesses, which are Multi-Media Solutions, Mobile Computing Solutions, IoT Automation Solutions, Network and Communication Solutions, Intelligent Digital Security, and Medical and Healthcare Informatics. NEXCOM serves its customers worldwide through its subsidiaries in five major industrial countries. Under the IoT megatrend, NEXCOM expands its offerings with solutions in emerging applications including IoT, robot, connected cars, Industry 4.0, and industrial security.

www.nexcom.com