



Q&A WITH...



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Mike has been with Brüel & Kjær Vibro for the past 32 years. Here, he has worked on developing various machine monitoring techniques and is currently working with strategic marketing development, analysis, and communications. He has written numerous articles, papers, and webinars on machine condition monitoring. He is also the convener of an ISO workgroup for creating standards for condition monitoring and diagnostics of machines.

01 Does selecting the type of monitoring solution depend on the application within an LNG process?

Yes. There are many different machines used in the different LNG processes, such as power generation, gas treatment, and liquefaction, and each will have its own particular level of criticality. This, therefore, requires different monitoring solutions. There are also different operating conditions under which the monitoring is done, which also includes cryogenic.

Moreover, the monitoring solutions also depend on the particular potential failure modes to be detected and diagnosed and the relevant monitoring techniques and automatic decision support tools needed to achieve this. This not only includes vibration monitoring, but also process parameters, performance monitoring parameters for condition monitoring, as well as monitoring for protection. The monitoring solutions that can fulfil these requirements can include a combination of plantwide rack-based systems, field monitors, and wireless systems, and all must comply with stringent requirements for cybersecurity, data management and interfacing, safety integrity levels, vibration monitoring standards, etc.

02 Do you expect there to be an increase in future demand for LNG monitoring solutions?

Absolutely. There is a growing need to use natural gas as a transitional energy source to fossil fuels such as coal and diesel, which all have more greenhouse gas emissions. There are many smaller LNG plants being built to meet the increasing demands for LNG production, and many LNG terminals being built for regasification of LNG and transport for fulfilling energy and consumer needs.

As the LNG industry learned from past experience, more production agility will also be needed to avoid overproduction and underproduction. This puts extra demand on the machines for the variable loading and

thus requires monitoring to be done under different operating conditions to increase monitoring reliability in order to reduce maintenance costs and downtime.

03 What role can new technologies play in LNG monitoring solutions in the future?

Enterprise-wide data storage and management is replacing standalone proprietary systems. Plant-wide service-based analytics, for example, are more transparent than what is offered by proprietary systems and more readily accessible and easier to fine tune. More reliable and faster maintenance decisions and lifecycle predictions can then be made when a fleet of assets can be accessed together with process data for correlation.

Moreover, all this enormous amount of data can then be more effectively employed in artificial intelligence and machine learning algorithms with more reliability and accuracy, thus resulting in better asset health and lifecycle decision-making.

04 How can Brüel & Kjær Vibro's products support companies looking to decarbonise and optimise their LNG operations?

Natural gas releases much less carbon dioxide (CO₂) and other greenhouse emissions than all other fossil fuels, but CO₂ can still be reduced even more during the entire chain of processing, liquefaction, transportation, regasification, and transport. All the machinery for these added processes to remove CO₂ will also have to be monitored.

CO₂ extraction, such as from an acid gas removal unit, can be reinjected into underground storage using reciprocating compressors. Reciprocating compressors are, in fact, used in many other CO₂ reduction processes, such as hydrogen production and compression for power generation. These machines, however, require special monitoring solutions.

Therefore, effective monitoring solutions also play an important role in the decarbonisation of LNG. **LNG**