

Vibration monitoring system of primary and secondary circuit components (VMS)

Assessment of component vibrations during plant operation identifies incipient damages at an early time, enables aimed inspections and prevents unplanned shutdowns.

The challenge

A change in the vibration behavior of a component is one of the most sensitive indicators for changes in its mechanical condition. Therefore it is essential to monitor and assess the component vibrations during plant operation to validate the mechanical integrity and to ensure a reliable plant operation with high availability.

Our solution

VMS detects changes in the vibration behavior of primary/secondary circuit components, reactor pressure vessel internals and reactor coolant pumps in pressurized water reactors at an early stage by frequency and amplitude monitoring of the mechanical component vibrations. It meets the requirements of KTA 3204, KTA 3201.4, DIN 25475-2, IEC 61502, ISO 7919 and ISO 10816.



Special high-sensitive absolute displacement sensor for applications in harsh environments (measuring RPV vibrations at closure head)

VMS measures the component vibrations by means of suitable absolute displacement, relative displacement, velocity, acceleration and pressure fluctuation sensors. Additionally the excore/incore neutron flux noise signals are decoupled from the operational instrumentation for monitoring within the VMS. The system is a fully integrated and automated system including the control of measurement chains, data acquisition, data analyses, monitoring and trending up to the point of automatic alarm generation.

System Features

- Special absolute displacement sensors for monitoring RPV internals vibrations
- Special relative displacement sensors for monitoring loop component vibrations
- Special pressure fluctuation sensors for monitoring coolant dynamics
- Relative shaft displacement sensors for monitoring RCP shaft vibrations
- Velocity sensors for monitoring RCP frame vibrations
- Acceleration sensors for monitoring secondary circuit piping vibrations
- Automatic control of measurement chains including calibration during plant operation
- Continuous machinery protection monitoring for RCPs in time domain
- Cyclic early warning monitoring in frequency domain
- Automated analyses and reporting
- Analog and digital interfaces to the plant's process automation system
- Large-scale functionality for expert offline analyses

Your performance
is **our** everyday **commitment**

A Complete Solution from Design to Service

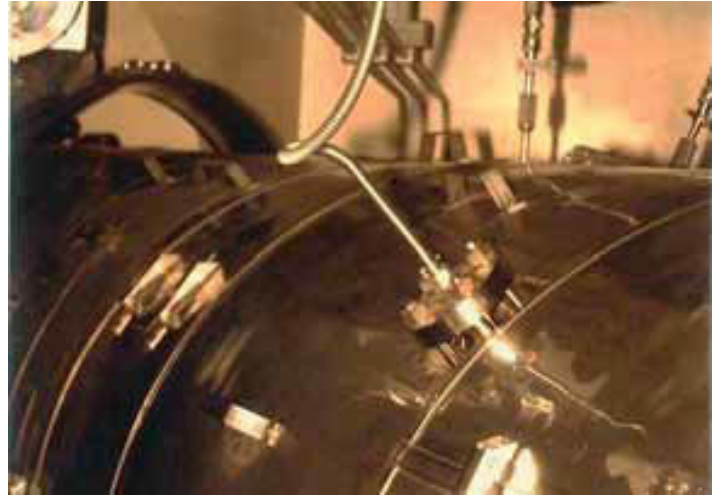
Framatome GmbH has more than 30 years of experience with design, engineering, manufacturing, installation and commissioning of vibration monitoring systems as well as with system outage/operational services applied in PWRs, VVERs and EPRs™. By using VMS the plant operator can take advantage of the wealth of this experience which has been integrated in the system performance. Up to now more than 30 systems are currently in operation/installed.

Framatome's scope of supply and services comprises all activities necessary for successful implementation and operation of vibration monitoring:

- Design, projecting, engineering and manufacture
- Delivery of complete systems (“from sensor to printer”)
- Installation and commissioning
- Outage services, maintenance and repair
- Assessment of operational monitoring
- Training and consulting



Special relative displacement sensors for measuring loop vibrations and quasi-static loop displacements



Special pressure fluctuation sensor for measuring coolant fluctuations

VMS contributes considerably to a safe and cost effective plant operation

Your Benefits at a Glance

- Early detection of incipient damages
- Initiation of suitable corrective measures in good time
- Prevention of consequential damages
- Validation of structural integrity
- High-sensitive measurement of RPV, RCP and loop vibrations
- Fully automated and integrated system
- High reliability and availability of the system (self-test)
- Expert functionality for off-line analyses

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