

VIBRATION MEASUREMENT & ANALYSIS SERVICES

Unwanted vibration is a common problem in operating process plant with results varying from increased noise levels, to the more silent but dangerous degradation of plant integrity, resulting in plant unreliability and premature failure. The solutions to vibration problems are frequently not straightforward. A clear understanding of the vibration excitation mechanism, the dynamic response of the pipework or structure and the effects of all other loadings are required so a good understanding of the whole system integrity is obtained and an appropriate quantified solution can be found. Simply comparing a velocity measurement against a limiting velocity chart as a safety criteria, has no basis, it is misleading and can give you a false belief that your plant is safe! Plant life and proposed solutions need to be quantified and there is no easy or simple approach to use. Industry believes that a complex vibration can be quantified by a single measurement compared to a perceived limiting value. This is wrong and it is vital to recognise that the effects of vibration have wide spread implications to the whole piping or structural system, not just the location where it is being measured and therefore, there is no easy assessment to be made. Simple solutions such as adding further supports or damping frequently exacerbate the problem or move it to another area. IDEAS' Integri-Tech™ technology provides the complex 'Fitness for Service' (FFS) solution, offered in a simple service form.

More than a simple field measurement service, with our instrumentation, measurement and dynamics analysis groups, IDEAS is well placed to offer correctly engineered solutions to your vibration problems. The IDEAS instrumentation and measurement group primary role is to support the Integri-Tech™ service in areas such as design, code compliance, integrity and problem-solving activities but can be used to provide as a stand-alone service to provide data to customers.

IDEAS instrumentation services also include the design and installation of a range of permanent monitoring systems to support IDEAS' Integri-Tech™ service including monitoring systems for use in hazardous areas.

VIBRATION PROBLEMS

One off, periodic or continuous vibration measurement or modal surveys to:

- Determine excitation source - mechanical, flow, pulsation/slugging
- Determine resonant response levels of simple structures - e.g. Small Bore Branches as part of an Integrity, BS, MTD or API **FFS** assessment.
- Determine resonant responses of complex structures - modal surveys of process plant piping systems

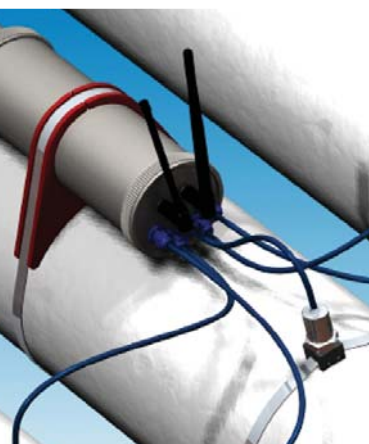
Temporary or permanent continuous monitoring systems to:

- Monitor vibration, fatigue & plant life.
- Identify infrequently occurring (transient) vibration events
- Map vibration environment over a wide range of operating conditions on installed plant and monitor ageing plant integrity and life.
- Provide daily Integrity & plant life assessments using Integri-Tech™
- Full API gas compression or reciprocating plant system integrity monitoring, code compliance & plant life monitoring

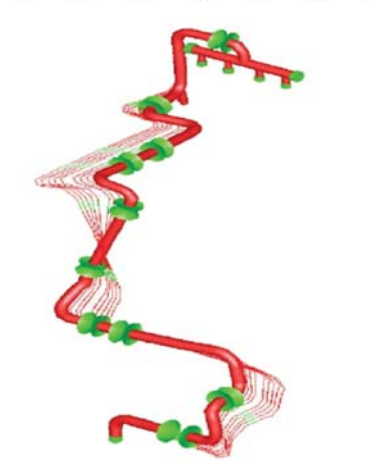
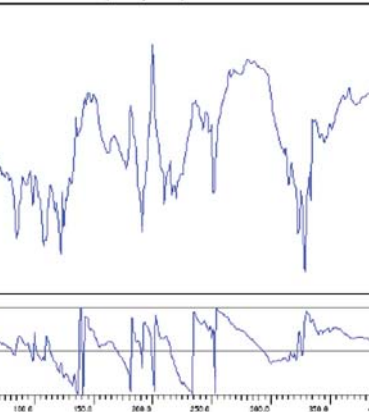
VIBRATION SOLUTIONS

- Identification and analysis of specific excitation mechanisms and levels
- Solution method (internal/external) quantified, dependant on excitation mechanisms, vibration source and frequency range
- Acoustic and Mechanical Vibration Assessments and quantified solutions
- Plant pipework support 'tuning' to reduce or eliminate resonant vibration
- Quantify levels of vibration and dynamic post analysis to determine fatigue damage and life estimates.
- Establishing safe operating levels or permanent monitoring of critical plant for safe operation
- Quantified gas compression acoustic pulsation & vibration solutions





Frequency Response Function



VIBRATION MEASUREMENT

Vibration measurement is not limited to the measurement of acceleration. IDEAS use a number of transducer and recorder types for measurement and analysis of vibration including the use of existing process sensors.

- Linear Acceleration - High sensitivity ICP and IS devices
- Velocity - Angular and Rotational measurement using inductive and rate gyro devices
- Displacement - Angular and Rotational using potentiometric or LVDT/RVDT types
- Pressure - Bridge and 4 to 20mA transmitter
- Load - Bridge Type load cells
- Strain - Foil and high temperature strain gauges
- Temperature - Contact thermocouple or platinum, non-contact IR
- IDEAS Ltd's own WEMS™ Wireless Monitoring & Sensor technology

Simple one-off field measurements can be taken or depending on the application either temporary or permanent monitoring sensors are used; temporary installation as part of a vibration survey, permanent as part of an operational vibration and load mapping project or as part of an *Integri-Tech™* plant life & integrity monitoring system. A wide range of recording equipment is available from simple hand held measurement devices including spectrum analysers to custom assembled logging systems for permanent monitoring or for use in hazardous area. IDEAS Ltd's own WEMS™ Wireless Monitoring & Sensor technology can offer lower cost monitoring where its application is suitable.

Vibration Analysis & Assessment – what do we do that is different?

Integri-Tech™ can assess the effects of vibration, combine them with the effects of other loadings and degradation, predict plant life, accurately predict if the plant is safe, when & where it will fail, and when Inspections are required. It does not rely on any simple comparison criteria. Vibration measurement isn't where our service ends. IDEAS has a wide range of analysis tools to turn the recorded vibration data into meaningful results that in problem solving applications can be turned into robust and quantifiable solutions. These include:

- Spectral analysis of the vibration data to determine the frequency components present and their amplitudes
- Modal analysis of multi-channel vibration data from impulse or forced excitation to determine mode frequencies, shapes, transfer functions and damping
- *Integri-Tech™* plant integrity monitoring using multi-channel vibration data to monitor plant integrity & life, quantify fitness for service & inspection needs.
- Multiple options for vibration assessment and quantification of its effects
- Flow Transient or Acoustic Pulsation and Vibration Monitoring using our *Integri-Tech™* technology
- Fatigue damage estimates from dynamic modelling and operating vibration measurement for FFS surveys where the standard models don't apply
- *Integri-Tech™* quantifies the key issue in Vibration, is the Piping Fit for Service?

Call us now for more information on the above services:



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