



Condition Monitoring Reliability Services

Full Time, Up Time

INTRODUCTION

- Do you have?
 - Unpredicted Faults
 - Inadequate Reliability
 - Unexplained Machine Issues
- Leading to
 - Emergency Breakdown Maintenance
 - High Maintenance Cost
 - Loss of Production
- IRISS provides
 - Improved functionality & efficiency
 - Improved maintenance practice
 - Maintenance Planning

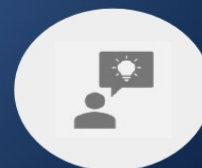
What We Do



Enhance system reliability through Condition Monitoring technique(s) by applying health-based maintenance



Improve machine and system function ability - keep production running for longer



Determine failure mechanisms of the system - then derive their associated Relevant Condition Predictor(s)



Apply Condition Monitoring strategies and technologies that will indicate the condition and performance of the system(s)



Drive the maintenance task and planned interval(s). Review performance

How We Can Help You

When a client requires support with or development of Health based Maintenance we work in partnership

Up skill your internal workforce in

- Ultrasound Airborne and Structural Borne
- Infrared Thermography-Low Voltage, Mechanical and Process
- Vibration Analysis
- General Maintenance Practices
- Practical Reliability Engineering

Contracted Reliability Services

Contemporary Condition Monitoring consultancy to assist clients with the management of their Health Based Maintenance program

Technologies & Services

Thermography

- Bearings
- Overheating
- Steam Traps
- Valves
- Flammable Gas leaks
- Electrical Wiring Faults
- Heat Exchanger
- Blockage Refractory
- Digital Radiography

Ultrasound

- Electrical Inspections
- Air Leak Inspections
- Compressor Testing
- Heat Exchangers, Condensers & Chillers
- Valves
- Steam Traps
- Hydraulic Systems
- Mechanical Inspections

Technologies & Services

Online Condition Monitoring

Delta-T Alert™ system with Software

- Automated Status Reporting
- Alarm Notifications
- Critical monitoring
- Reporting
- Rapid Setup
- Regenerative Networking



Technologies & Services

E Sentry Intelligent Asset Management

Intelligent Asset Management Features

- Designate & Manage Users
- Build & Assign Inspection Routes
- Review & Analyze Temperature Trends
- Send & Receive Notifications
- Generate Custom Reports



Technologies & Services

Active Thermography

- Detection of layer structures, delamination and inserts in plastics, for instance of wind turbines or CFRPs of the automotive and aerospace industry
- Investigation of interior structures, for instance of breakage or impacts on Honeycomb lightweight constructions
- Recognition of deeper material deficiencies, such as blowholes or ruptured laser welding seams



Technologies & Services

Motion Amplification Using RDI

Non-contact Motion Amplification system for rotating equipment & machineries.

Allows users to see – in real time – motion that is invisible to human eye. Our proprietary Motion Amplification software lets you see the invisible.

It produces easy to understand videos of the actual movement across your equipment or machinery which enables far more effective communication between technical and non-technical personnel, enhancing decision making.



Technologies & Services

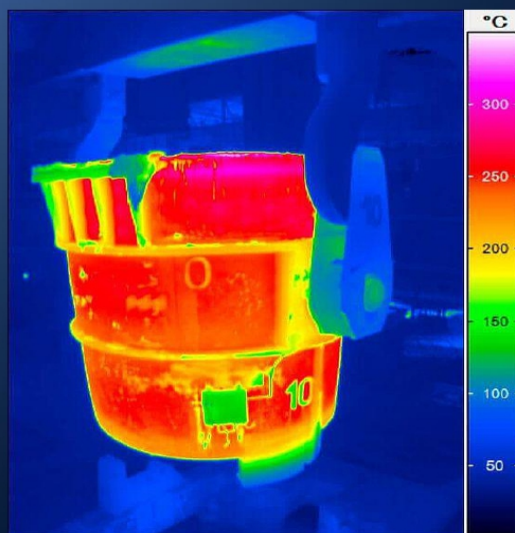
Furnace Thermography/ Internal Thermography

Infrared thermography can be used to inspect and monitor various components of a furnace such as:

- Refractory bricks and insulation
- Burners and combustion chambers
- Heat exchangers -Flue gas ducts
- Boiler tubes -Furnace walls and roofs

The technique allows identifying areas of abnormal heat that can indicate problems such as:

- Refractory failures
- Insulation defects
- Combustion inefficiencies
- Hot spots
- Thermal bridging

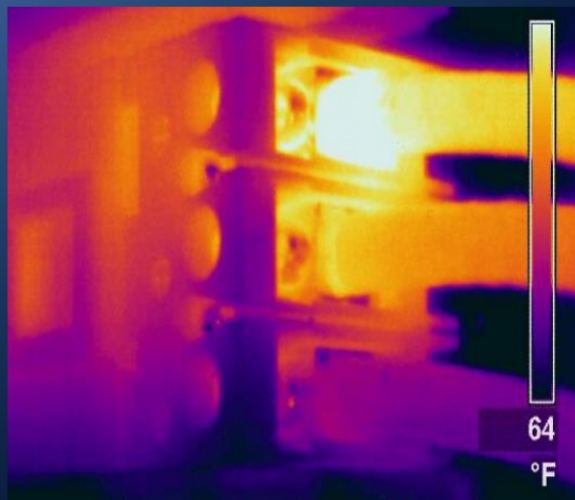


Technologies & Services

External Thermography

External thermography can be used to detect a wide range of problems such as:

- Loose or damaged electrical connections
- Overheating bearings
- Imbalanced machinery
- Insulation defects
- Leakages
- Friction



Technologies & Services

Vibration Analysis For Rotating Equipment

1. **Unbalance:** Unbalance in a rotating machine can cause excessive vibration and can lead to damage and premature wear of the equipment.
2. **Misalignment:** Misalignment of shafts and other components can cause vibration and can lead to damage and premature wear of the equipment.
3. **Looseness:** Loose bolts, connections, and other components can cause vibration and can lead to damage and premature wear of the equipment.
4. **Wear and tear:** Wear and tear of bearings, gears, and other components can cause vibration and can lead to damage and premature wear of the equipment.
5. **Resonance:** Resonance is an abnormal vibration caused by the machine operating at or near its natural frequency.
6. **Mechanical defects:** Mechanical defects such as cracked shafts, broken gears, and other issues can cause vibration and can lead to damage and premature wear of the equipment.



Technologies & Services

Vibration Analysis For Piping Equipment

1. Vibration analysis for piping equipment is a specialized technique used to detect and diagnose problems in equipment that is connected through pipes such as compressors, pumps, and valves. Piping equipment is subject to a wide range of problems, such as leaks, corrosion, and mechanical damage, which can cause excessive vibration and lead to damage and premature wear of the equipment.
2. Vibration analysis for piping equipment typically involves the use of accelerometers, proximity probes, and other sensors to measure the vibration levels of the equipment. The data collected by the sensors is then analyzed using specialized software to identify patterns and trends. The results of the analysis can be used to predict potential failures, optimize equipment performance, and schedule maintenance.



Contact Us

North America HQ

Tel: +1 (941) 907-9128

Email: info@iriss.com

Qatar Free zone Branch

Mobile: +974 7033 4057

Email: j.chandra@iriss.com



R K Pillai
President and CEO

AIIPL Tech. Pvt. Ltd.
Corporate Office

Akshar Business Park, Z1 Wing,
Office No. 1089 and 1090,
Plot No.03, Sector 25,
Vashi, Navi Mumbai - 400703,
Maharashtra, INDIA.
M: +91 9867368076

E: rkpillai@aiipltech.com

W: www.aiipltech.com

[LinkedIn](#)

www.iriss.com

Motion Amplification® Services

Our RDI Technologies Services Department harnesses the power of Motion Amplification® for a wide range of applications in research, product, and quality assurance testing, as well as in the predictive maintenance sector. Motion Amplification® is the first non-contact, camera-based technology that allows users to see - in real time motion that is invisible to the human eye or can be difficult to measure with traditional sensors. Our Motion Amplification® Certified Service Engineers use this technology to see and measure motion, which in turn helps them make decisions about critical applications and systems based on real data. They are able to quickly measure, visualize, and communicate vibrations with technical and non-technical users. Whether troubleshooting, screening, commissioning, or mentoring, the RDI Services Department is committed to providing the expertise and resources needed to help you define, execute, and support a world-class reliability program.

AEROSPACE & DEFENSE

AUTOMOTIVE

MANUFACTURING

MEDICAL MANUFACTURING

METALS & MINING

OIL & GAS

POWER GENERATION

PULP & PAPER

STRUCTURES AND SUPPORTS

TELECOMMUNICATIONS

TEST & MEASUREMENT

WASTEWATER AND UTILITIES



How Motion Amplification[®] Fits into Your R&D, Test, Quality, and Reliability Programs

For Aerospace, Defense, and
Space Organizations

SCAN TO
LEARN
MORE



REQUEST A DEMO >

+1 865.606.1080

rditechnologies.com

CAPTURE, VIEW, AND ANALYZE DATA IN JUST MINUTES VERSUS HOURS AND DAYS WITH SENSORS

Designing and manufacturing advanced aerospace products for commercial, defense and space applications requires bringing these products to market safely and cost-effectively while meeting stringent testing, certification, and quality demands. From design to quality, reliability and performance, every stage of the development process requires specified mechanical and material testing to ensure safety and durability requirements.

Leading commercial and military aerospace organizations were among the first to adopt RDI's **Motion Amplification** technology several years ago, and they continue to play a significant part in advancing features, innovations, and add-ons, as valued customer partners. Today, RDI Technologies is a respected global leader in **Motion Amplification** in the aerospace, defense, and space industries.



IRIS M[®] with Motion Amplification

FIRST, WHAT IS MOTION AMPLIFICATION?

Motion Amplification is a patented camera-based technology developed by RDI Technologies that allows users to see - in real time - motion that is invisible to the human eye or can be difficult to measure with traditional sensors.

Motion Amplification technology turns every pixel in the camera's view into a sensor capable of measuring vibration or motion with unparalleled levels of accuracy. It can resolve motions as small as <math><0.01\text{ mils}</math> (0.25 Microns) at 1 meter and can be performed live and in real-time on even a modest laptop, making it suitable for a range of applications from product design and testing to field-based machinery fault diagnosis and structural testing.

By amplifying and visualizing these small movements, **Motion Amplification** can provide aerospace engineers with insights into the health and performance of new and existing products including identifying potential issues before they become critical problems.

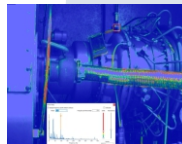


HOW MOTION AMPLIFICATION WORKS

Motion Amplification works by using high definition and high dynamic range video cameras where every pixel becomes an independent point sensor creating millions of continuous data points in an instant. This essentially turns a high-definition camera into a full-field vibration acquisition device with over 2.3 million independent sampling locations. This makes it a great troubleshooting tool, a quick and effective alternative to traditional ODS, an effective decision making and communication tool between technical and non-technical personnel.

With **Motion Amplification** software you can quickly analyze and understand the vibration frequencies, amplitudes, and waveforms in the scene. **Motion Amplification** videos can be immediately analyzed by applying Frequency Filtering, Motion and Phase Color Maps, and Vectors. The Frequency-based Filtering feature enables filtering the video data sets to show motion only at a particular frequency. Motion and Phase Color Maps allow for a rapid way to analyze the motion and relative phase in a field to quickly understand the dynamics and motions present along with relationships of motion. Vector overlays are a useful way in which to visualize complex motion across a full-field of view.

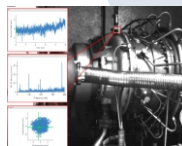
Motion Amplification visualization provides a unique communication channel when reviewing and sharing test results with technical and non-technical personnel.



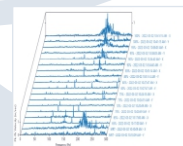
Motion Map Motion Map in RDI software uses color to draw attention to where motion is present.



Phase Map in RDI software uses color to convey the phase relationship between the different components of an asset.



Annotation feature in RDI software enables you to plot and incorporate vibration data into **Motion Amplification** videos.



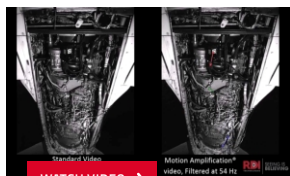
Historical Data Analysis enables you to compare data from different data sets.

100% COVERAGE OF TEST ARTICLE & TEST RIG

RDI's **Motion Amplification** is used for a wide range of non-contact and non-destructive measurement applications in research, product, and quality assurance testing. There is no painting, gluing, or surface modification required, which makes Motion Amplification a good fit for modal and reliability testing.

The technology produces full-field data vs. single point measurements, provides 100% coverage, allowing you to test the entire test article, including a test rig.

Videos and data are produced within seconds of data collection, saving you time and money while accelerating your time to market.



WATCH VIDEO >

Jet engine non-contact vibration measurement.



VISUALIZE

Detect subtle displacement (as small as 0.25 Microns) with RDI's proprietary video processing software; converts movement to a level visible to the naked eye.



MEASURE

Measure and quantify mechanical or structural assets that a camera can see with the same accuracy as an industry-standard accelerometer.



COMMUNICATE

Enhance your understanding through helpful videos and provide a communication tool between technical and nontechnical resources.



TROUBLESHOOT

Filter data and visualize motion at specific or overall frequencies to find the real source of a problem and position your team to fix it.



MOTION AMPLIFICATION IN AEROSPACE



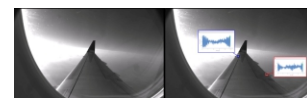
EASE OF USE. POINT-AND-CLICK WITHOUT TOUCHING THE STRUCTURE.

- Millions of pixels are converted to non-contact virtual sensors that measure vibration amplitude and frequencies.
- Camera setup, recording measurements/videos and data processing usually take less than 10 minutes.
- Full-Field vibration testing (100% asset coverage)
- Visualize the entire asset in one collection
- Every point is measured and quantified. No guessing between points



GROUND VIBRATION TESTING (GVT)

Visualize and troubleshoot entire aircraft, helicopter or space vehicle including airframe, landing gear, engines, and rotors to ensure that components are working as designed.



DYNAMICS AND STRUCTURAL ANALYSIS

Drill down to regions of interest (ROIs) for a detailed look at vibration frequency, amplitude, phase, orbit plots, and time waveforms.

MOTION AMPLIFICATION SOLUTION SUITE



Iris M
Video-based Sensors



IRIS CM
Continuous Monitoring



Iris MX™
Extended Frequency



Modal Amplified®
Modal Test & Analysis



Iris M + Spot™
Robotics



Stereo Vision
Simultaneous,
3-dimensions/axes



External Laser
Tachometer



Iris M Traveler™
Rugged On-the-Go

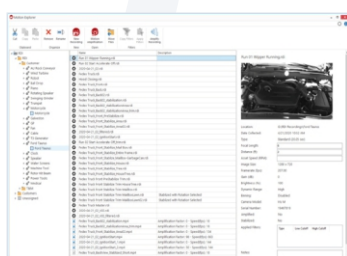


Color Camera
Iris M Add-on



Fastec™
High-speed
Cameras

MOTION AMPLIFICATION SOFTWARE SUITE



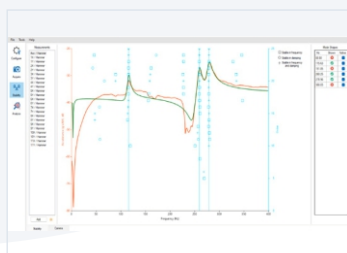
MOTION EXPLORER
Database set-up and file management



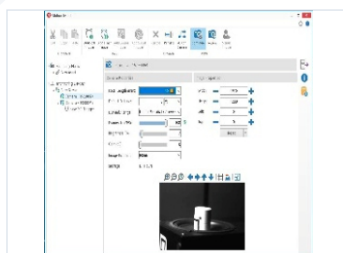
ACQUISITION
Camera configuration, live MA, initiate
new recordings



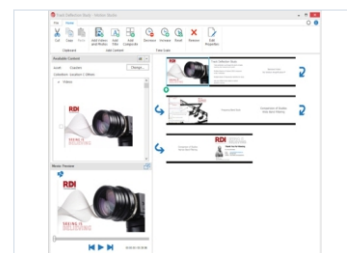
MOTION AMPLIFICATION
Motion Amplification tools for analysis
of recordings



MODAL AMPLIFIED
Modal test and analysis with impact
hammers and shakers



MOTION MONITOR
Iris CM set up and configuration for
continuous monitoring



MOTION STUDIO
Easy to use video editor to enhance
communications and reporting

TEST FIXTURES & TEST CELLS

Vibration test cells for components, engines and power transmission equipment are typically instrumented with many single point contact sensors to capture data. In most test rig applications, sensors are cost and labor intensive, and it's challenging to have one hundred percent sensor coverage. As a non-contact and camera-based solution, **Motion Amplification** reduces set-up time and labor while allowing users to acquire millions of simultaneous vibration measurements in one platform.

If the test requires the use of contact sensors, **Motion Amplification** adds value by quickly helping to see what is moving where to figure out optimum placements of strain gauges and sensors. This will save time and reduce costs by knowing the node locations and or eliminating some strain gauge and sensor placements.

IRIS CM[®] - CONTINUOUS MONITORING IN TEST CELLS

Considering that many test cells are performing long duration vibration tests under various environmental and operating conditions, with the **Iris CM**, you can continuously monitor your test cells while you are away. This tool connects traditional vibration inputs and RDI's patented video-based vibration measurements to ensure you never miss anything in your test labs. Numerous cameras can be networked to capture simultaneous data and offer multiple views of a process, test, or piece of machinery.

As a powerful acquisition device, the Iris CM can acquire and store HD data for each connected camera along with external sensor data from accelerometers, tachometers, and any 4-20 mA input. Users can trigger video and data recordings based on external inputs, virtual camera-based regions of interest, and thresholds for movement.

With Iris CM test lab engineers can quantify vibration, amplitude, phase, and frequency for anything visible in the recorded video. Iris CM uniquely allows you to perform live **Motion Amplification**, troubleshoot transient events and visualize your test article over longer periods of time like no tool has before. The Iris CM does not have to be permanently mounted and does not have to touch any of your equipment. With the Iris CM, you now have to ability to see what is happening on your equipment 24/7 even when you are away.

TEST RIG PERFORMANCE

Motion Amplification has been used to pre-screen 100% of test fixtures and cells for imbalances, mechanical looseness, misalignments, and other vibration problems that can impact the overall performance and reliability. Operating a test cell with minimal vibrations also helps to improve the data quality of test articles.

ENGINE AND SUB-COMPONENT TEST

Motion Amplification is used to measure and visualize vibrations on full or partial engines, sub-components and rigs in test cells or on shaker tables.



ROTATING EQUIPMENT INSPECTION

Rotating components such as couplings, rotors and blades can be challenging to measure because the vibrations and motions of interest often present themselves only when the components are undergoing rotation. Measuring vibration is somewhat limiting, proximity probes can be used for a point measurement of a rotating shaft, but they are cumbersome and limited to ferrous material and only measure one point. Likewise, laser vibrometers can measure point locations but are limited in use as well. Finally, contact sensors such as strain gauges require affixing to the shaft securely and wireless data transmission to retrieve the information.

Several techniques are available with **Motion Amplification** and leveraging the camera for full field measurements. They are broken into two techniques, **Rotating Components Inspection** and **Synchronously Triggered Motion Amplification and Subsequent Measurement**.

ROTATING COMPONENTS INSPECTION

The camera can be put in a special mode that accounts for the turning speed of the rotating components and images in the scene at a rate that allows the rotating component to be visible and non-blurred despite the rate of rotation being much faster than the camera frame rate. This allows for a visual inspection of a shaft, coupling, rotor or blade. This can be advantageous when the machine cannot be stopped at a convenient time, or the inspection needs to be done during operation as the element that could indicate a fault only does so during operation.



WATCH VIDEO >

SYNCHRONOUSLY TRIGGERED MOTION AMPLIFICATION AND SUBSEQUENT MEASUREMENT

Another technique involving rotating components and blades is synchronous triggering acquisition. This technique allows for the camera frame rate to be synchronized with an external signal such as a laser tachometer that pulses each revolution at the same rotational position. The result is the acquisition being acquired at synchronous speeds effectively freezing the rotating element.

Motion Amplification can then be applied along with time waveform and spectral measurements to image and visualize nonsynchronous motion such as mode shapes or torsional motion.

ROTOR BLADE TESTING

Changes in rotor blade concepts, design and materials make the need for testing more critical. Iris M Tach Sync offers a unique method to freeze synchronous motion of a shaft or blade, the remaining motion can then be amplified.

3-DIMENSIONAL & MODAL TESTING

Simplify the process from capture, to analyze, to action for faster time to market.

MOTION AMPLIFICATION AND STEREO VISION

Iris M + Stereo Vision is a two-camera **Motion Amplification** system that will enable full-field vibrational measurements to be taken simultaneously in all directions (3 dimensions/ axes). Iris M + Stereo Vision uniquely gives users the ability to acquire synchronized waveform and spectral data in 3 dimensions for virtually any region of interest, anywhere on the asset, in just one data capture.

This multidimensional measurement is engineered to function as one system, helping to avoid over- or under-testing problems caused by single-axis vibration tests. Iris M + Stereo Vision increases visibility, and efficiency and helps users see patterns, trends, and non-obvious relationships in just a single test.

VIBRATION SHAKER TESTING

Vibration shaker testing are critical for ensuring the safety and reliability of aerospace components and vehicles during operation. **Motion Amplification** Stereo Vision allows for set-up of single or two calibrated Stereo Vision cameras (3-dimensional measurements) to measure frequency, amplitude, and direction of the vibration. For longer duration vibration tests, a **Motion Amplification** Continuous Monitoring solutions can continuously monitor and perform triggered acquisitions of vibration testing while you are away.

IMPACT TESTING /MODAL ANALYSIS

With **Modal Amplified**, our Modal Test and Analysis solution, you can leverage simultaneous measurement of the force input with the response measured directly from the camera. This allows you to use the camera and impact hammers to quickly acquire data to detect bending modes, natural frequencies and resonances.

Uses can immediately visualize the resulting modes shapes, and they can place an unlimited number of modes across the structure through virtual regions of interests. Virtual sensor measurements include waveform, spectrum, coherence maps, FRF, phase, and force input. Stability plots also show where mode shapes are stable in frequency and damping.

This approach allows users to have modal results in a matter of minutes, from capture to visualizing the modes shapes, complete with dozens, even hundreds of sensors measured across the structure.

DESIGN VALIDATIONS, MODELING AND SIMULATION

Use **Motion Amplification** videos to validate computer modeling of new and existing components in test rigs that simulate complete units.



SEE MOTION AS IT REALLY IS... Seeing is Believing[®]

ABOUT RDI TECHNOLOGIES[®]

As a leading global vibration technology and visualization solutions innovator, RDI Technologies enables reliability and test and measure programs to make faster, safer, and more informed decisions through intelligent vibration equipment, data analytics, robotics, and services, driven by its proprietary **Motion Amplification** measurement platform. With 200 years of reliability and test and measurement industry experience, RDI Technologies helps clients in more than 60 countries and 40 industries gain greater speed to insight while reducing risk and cost. Over 700 corporate and government global customers including Google, Nissan, Duke Energy, Newmont, Amazon, Chevron, and US Navy rely on RDI's breakthrough **Motion Amplification** platform to see and measure motion previously impossible to visualize by contacting sensors.

Follow us on [LinkedIn](#), [Twitter](#), [Instagram](#), and [YouTube](#) for the latest news, or visit our website www.rдитеchnologies.com for more information.

©2023 RDI Technologies – All Rights Reserved. RDI Technologies, **Motion Amplification** and Seeing is Believing are registered trademarks of RDI Technologies Company.

REQUEST A FREE DEMO >

+1 865.606.1080 rditechnologies.com

