QUARTET

Rugged, Versatile and Sensitive
All Surface Types

LASER ULTRASONICS FOR NON-DESTRUCTIVE TESTING

www.soundnbright.com

Sound & bright

The Quartet is a multi-purpose laser receiver well suited for a wide range of acoustic and ultrasonic applications from the laboratory to the factory and available in the visible or infrared. Based on our patented multi-channel random quadrature detection technology, this receiver is designed for remote detection of sub-nanometer displacements. It offers high sensitivity, requires low to no maintenance, can be fitted with a variety of laser wavelengths, and is capable of rapid scans and measurements.

Robust & Versatile

Because the technology does not require control over the length of the optical path within the system, the Quartet is not subject to stability issues common to most long cavity and path-stabilized interferometers. It does not require high accuracy optical components or positioning, making it exceptionally rugged.

Fiberized Optical Head

A relatively small and versatile fiberized optical head is easily mounted to fit a variety of measurement conditions and can be set-up for a wide-range of stand-off distances. Its front lens can be easily changed or replaced if necessary.

Precision

The Quartet produces an analog signal that is proportional to surface displacement.

High Sensitivity on all Surface Types and Materials

Multiple detectors and high transmission optics result in high sensitivity. This continues to be true when the system is fitted with a moderately powerful laser thanks to low noise detectors and electronics. The Quartet also yields a stable, demodulated signal even when processing a highly speckled beam. This means that it can perform measurements on any kind of surface, including rough, porous, rusted and mirror-like.

Rapid Inspection

Streamlined electronic processing allows the Quartet to perform single shot measurements on fast-moving objects, at speeds up to meters per second (with rectified demodulation).

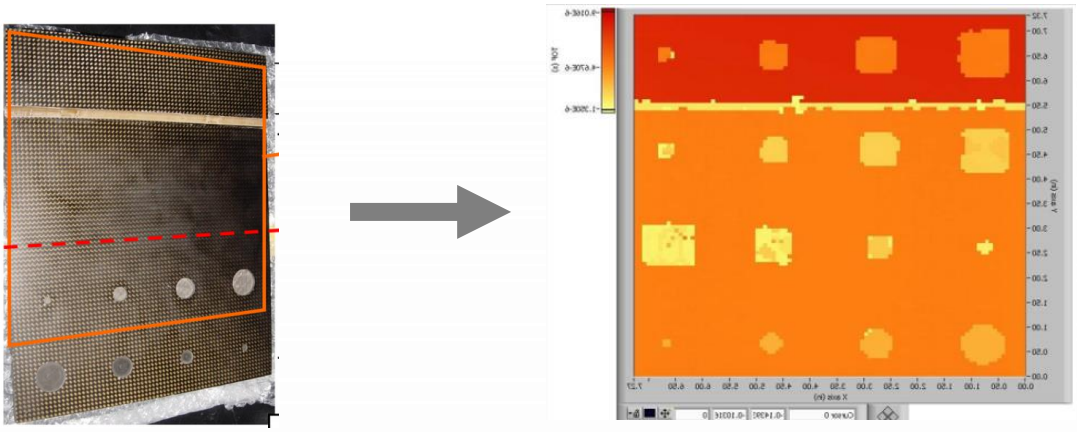
Not Wavelength Dependent

The Quartet can be fitted with a range of internal laser wavelengths ranging from visible to infrared.

Proven Applications Include:

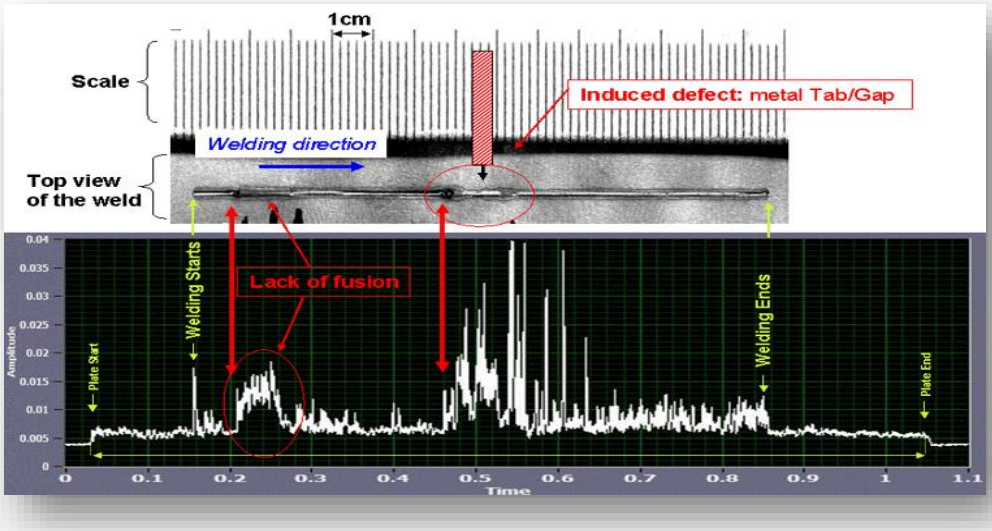
Detection of Disbonds on Composite Materials

The Quartet can be fitted with an internal chopper which reduces the average power emitted on the target. This prevents damage to the sample and allows the Quartet to detect disbonds between composite materials layers.



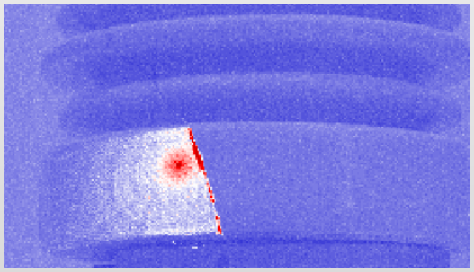
Ultrasonic Emission Monitoring During Laser Welding

In-process scanning of weld quality by continuous monitoring of the ultrasonic emission (UE) generated by the welding process during high-speed laser welding.



Rapid scans on complex shapes

Mirror scanning and a high-repetition rate laser allows for high-speed inspection of objects with a complex shapes, while visualization of ultrasonic wave propagation using specialized software makes identifying defect echoes simple and intuitive.



MCRQ Technology: The idea behind Multi-Channel Random Quadrature was to develop a laser-ultrasound technology with a robust, compact design and a large depth-of-field, capable of functioning effectively in a wide range of environments without loses in sensitivity, including on rough surfaces. With support from the National Science Foundation and NASA, we developed the Quartet. By collecting and processing a multitude of speckles, the Quartet is fully functional in environments which would otherwise be unsuitable for most other receivers and can perform measurements on all surface types.

NESD (Noise Equivalent Surface Displacement)	2. 10^{-6} nm/$Hz^{1/2}$
Detection Bandwidth Upper limit	Up to 80 MHz
Standard Detection Bandwidth Lower limit	1 MHz
Suitable CW Laser power	500mW to 3W internal laser Option: Internal chopper for reduced average power
Laser wavelength	532nm (Visible), 1064nm (IR) and 1550nm (IR)
Fiber	Multimode / Length to be specified when ordering
Spot diameter on sample	50µm to 1.5mm (depend on stand-off & wavelength)
Optical stand-off	From 70mm to a few meters
Diameter of collecting aperture	2" (50mm)
Analog Outputs	Calibrated output – 100mV/nm Direct output, Calibration level and DC level
Options	Beam Chopper / 2D scanning set-up including PC, software, digitalization card and X-Y translations
Electrical Requirements	110V / 220V - 50Hz / 60Hz
Demodulation Dimensions	185 x 320 x 370mm
Optical Head Dimensions	65 x 85 x 170 mm
Demodulation Weight	10kg
Optical Head Weight	0.75kg

Beam Chopper (Optional Upgrade): The beam chopper is an optional feature which allows the system to be used on materials with poor heat conductivity, such as plastics, CFRP and , carbon fiber materials without damaging the surface. A perforated disk synchronized with the generation laser “chops” the beam at a regular interval in order to prevent the sample from being exposed to continuous laser power. This feature does not affect the quality of the signal as it allows the laser to be used at full power, in contrast to alternative solutions such as using continuous but low laser power systems. Once installed, the chopper can be turned on and off to suit the application. This upgrade is compatible with new generation Quartets and is easily installed by replacing the top cover of the system.

Minimum Frequency	20Hz - for 1-slot wheel 80Hz – for 4-slot wheel
Maximum Frequency	100Hz - for 1-slot wheel 400Hz – for 4-slot wheel
Extinction ratio (average power reduction)	1/100 for 1-slot wheel (frequency independent) 1/25 for 4-slot wheel (frequency independent)
Measurement window	>50μS for 1-slot wheel @ 100Hz (or 4-slot wheel @ 400Hz)
Installation	Easy installation by simply replacing the QUARTET standard cover with the Integrated Chopper cover
Compatibility	Model: QUARTET V.4