optonor
OPTICAL TESTING & METROLOGY

SNT 410

ACOUSTIC DERIVATIVE DETECTION - ADD

The SNT 410 provides a unique method to detect material anomalies and defects. The target object is excited over a range of frequencies, and nanometer scale surface and structural waves are measured from long distances. The excitation waves interfere with surface or subsurface defects, and the resulting signals are detected and mapped by the SNT 410. The SNT 410 enables fast, reliable and accurate defect mapping of complex materials, and large areas can be examined quickly in both quiet and noisy environments.

New features from the latest holographic technologies are incorporated in the optical configuration of the SNT 410, resulting in high resolution inspection results. The SNT 410 is a highly versatile and user-friendly tool for quality control and non-destructive product testing.

APPLICATIONS

- Non-destructive Testing (NDT):
    - Delamination
    - Lack of bonding
    - Impact damages
    - Matrix and fiber cracking
    - Liquid and gas inclusions
- Quality Control
- Product Testing and Qualification
- Condition Monitoring
- Research and Development

- Material applications
    - Fibre-reinforced plastics
    - Wrapped composite repairs
    - Ceramic and metallic composites
    - Sandwich/honeycomb structures
    - Metal structures
    - Face sheets, core bond lines and splice joints
- Industry applications
    - Aerospace
    - Ship and Maritime
    - Automotive
    - Oil and Gas / Energy
    - Rail

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HIGH RESOLUTION INSPECTION UNDER DEMANDING CONDITIONS

Optonor developed the SNT 410 for fast and efficient testing of large composite structures. The object surface is illuminated by an expanded laser beam and the object is imaged by a zoom lens onto a CMOS sensor array. The SNT 410 measures the spatial derivative of the dynamic surface deflections, as the deflection of each point on the surface is measured relative to a neighboring point. The distance between the SNT 410 optical head and the target surface can be up to 5 meters, or even further depending on surroundings, wind and thermal conditions.
The SNT 410 uses a signal generator for object excitation. The excitation results in structural vibrations or surface waves that propagate across the object field, revealing surface or subsurface defects. Vibration amplitude contour maps can be displayed in real-time or as numerical recordings.

VIBRATION ANALYSIS

The ADD system provides various modes for component analysis. The real-time mode of operation is used for both static deflec- tion measurements as well as dynamic measurements. The SNT 410 provides numerical data in terms of vibration amplitude and phase maps. Animated graphics present results at nanometer scale resolution.

OBJECT GEOMETRY

The non-contact principle used in the SNT 410 system eliminates many limitations inherent in other inspection methods. The system is not dependent on surface coupling or rear side access as other inspection technologies are. Curvatures, corners, overlaps and complex geometries are inspected in the same manner as planar surfaces. Various surface conditions (blasted, painted, smooth or coarse) can be measured using the SNT 410.

OBJECT EXCITATION

The Optonor ADD technique is compatible with various methods of object excitation. The primary method for the SNT 410 is vibration by piezo-electric transducers or electromagnetic shakers. This method enables high resolution inspection results, and provides a flexible and highly operational solution. The SNT 410 system can also be used with tradi- tional vacuum and thermal loading.

DEFECT DETECTION

For simple and informative interpretation and evaluation, Optonor has developed Defect Detection Scan in the SNT 410 system. This algorithm performs a frequency scan to detect discontinuities in vibration pattern and modes. The frequency range is modified according to the inspected material. By use of advanced filtering routines, the system detects and displays defects and discontinuities as bright spots or areas. Interpretation of complex vibration patterns is not necessary, and results are presented in real-time.

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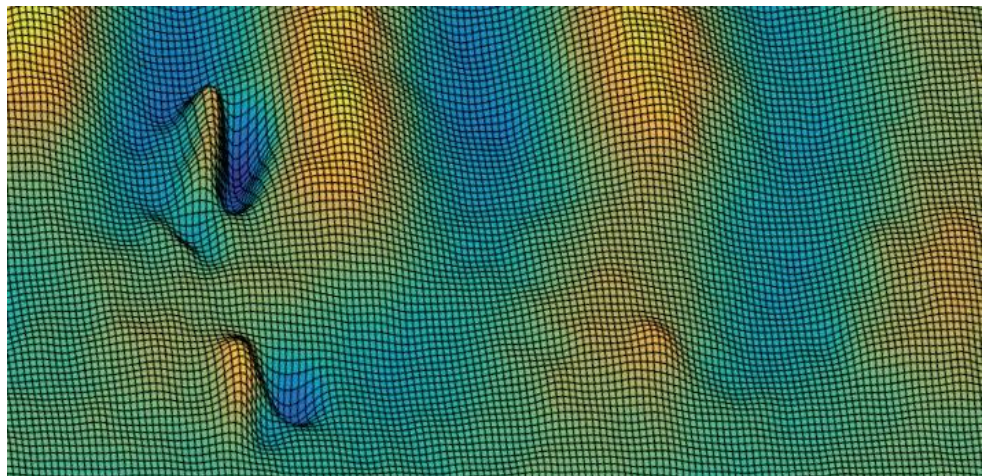
SNT 410
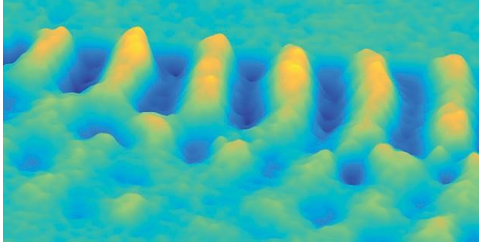
RELIABLE TECHNOLOGY

Optonor AS has delivered full-field laser systems for more than 20 years. The systems are based on modern interferometric technologies which are used in a large range of applications within the aerospace, automotive, audio and electronic industries. In addition to commercial customers, many research and educational environments and organizations use Optonor's systems.

USERFRIENDLY OPERATION

The SNT 410 system is a turn-key instrument where the operator or technician can perform advanced testing in a short time. Optonor can provide installation and operator training, or the customer can set things up themselves. The operator can easily perform recordings for documentation and analysis. The patented technology provides confidence in the measurement quality and the reported results.
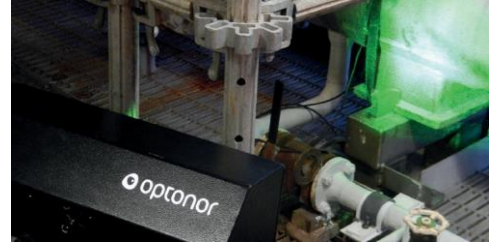
FIELD PROVEN

The underlying algorithms and filtering techniques have been improved over time to produce a very robust measurement system. Inspections can be done in challenging conditions offshore and onshore. The compact and flexible set-up kit is applicable to many types of inspection sites such as workshops, process plants, hangars and shipyards.
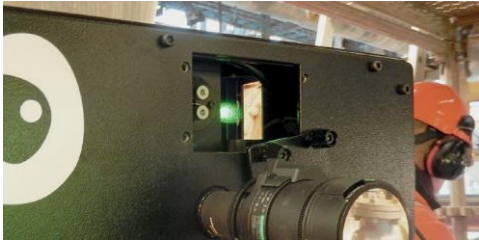
HSE FAVORABLE

The vibration-based excitation solution requires no bulky equipment or complicated installation. Quick and easy mobilization and set up make the system applicable to many applications and various environments. Experience has shown that the expanded laser source is not detected by fire-detectors in process plants.

COMPLIANCE

The SNT 410 is in full compliance with relevant standards and specifications including (but not limited to):

- HOIS GP1, "HOIS Good Practice Guide on In-Service inspection of Offshore Composite Components"
- DNV-RP-G103, "Non-Intrusive Inspection"
- DIN 54180-1/2, "Non-Destructive Testing– General Principles/Equipment"

FEATURES & BENEFITS

- Fast, accurate and efficient
- High resolution
- Robust technology for challenging environments
- Full-field measurements of large and small areas
- User-friendly hardware and software

"Inspections can be done in challenging conditions offshore and onshore"

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OPTICAL SPECIFICATIONS

Laser type / class	Nd:YAG / class 2 *
Laser wavelenght	532 nm
Camera res. / sensor type	1936(h) x 1216(v) / CMOS
*	Laser- and Optical configuration can be customized to client / application.

SYSTEM SPECIFICATIONS

Spatial defect resolution	< 1/100 of image area size
Max object size	2 x 2 m
Min object size	0.1 x 0.1 m
Vibration amplitude range	68 nm – peak to peak **
Freequency range	0 – 50 kHz
**	Spatial derivative of amplitude

DATA OUTPUT

Data exports	Defect Detection Scans Vibration amplitude and phase data Static deflection data Object image
Graphical displays	3D plots, line plots, contour plots, Image displays
System Computer OS	Microsoft Windows 10