Sonatest

DRYSCAN 410D

SPECIAL APPLICATION ULTRASONIC FLAW DETECTORS

Sonatest

HALF A CENTURY PIONEERING ULTRASONICS

- Low frequency testing from 150 kHz
- Inspection of attenuative materials & composites
- Tuned amplifier for dry coupling transducers
- High performance 450V pulser for attenuative materials
- 5 KHz PRF suitable for high speed scanning

THE DRYSCAN 410^{D}

Setting standards of performance and reliability

Description of Technique

The Dryscan 410^{D} or Shadow Technique is a proven method in the Non-Destructive testing of high technology materials used in the Aerospace and Aviation Industry, especially Hybrids, Composites and Honeycomb structures, which cannot be examined successfully by conventional NDT methods. This technique can be used in the through transmission mode i.e. with the signal passing directly through the test material from the transmitter to the receiver, and also when working with the transmitter and receiver transducers on the same side of the specimen.

The dry coupling technique offers a number of considerable advantages. For example when a wide spectrum of transmitted signals is used, many of the geometric considerations conventionally applied in ultrasonics can be ignored. Typically, the transmitter and receiver transducers need not be in alignment, they can be oriented at a right angle to each other. This characteristic, plus the fact that the transducer tip can be as small as 5mm diameter, enables testing to be achieved that cannot be dealt with by conventional means.

With the Dryscan technique, highly effective signal transmission can now be achieved by using a completely dry contact system. The ultrasonic energy is coupled between the transducers and the material under test by using special plastic pads on the transducers, eliminating the need for a coupling medium. Transducers can be held or they may be roller type for continuous pass scanning using various manual or automatic manipulation systems, which can be linked to C-Scan recording systems. The Dryscan 410^{D} concept is simple to apply and requires only a minimum of operator training. This technique results in no possible hazards of radiation, contamination or degradation of the test pieces.

Advantages of the System

The main advantages of the Shadow Technique is summarized below:

- No coupling medium is required to contact the transducers acoustically to the test material.
- Many of the geometric considerations applied to conventional ultrasonic detection methods can be ignored.
- The system is highly reliable for fault detection.
- The method can be used for many materials as a GO or NO-GO system - semi - or fully automatic.
- In many cases, materials surface preparation is not necessary.

How the technique is used

The Dryscan technique is typically used in through transmission (shadow technique), with a transducer either side of the part to be tested, although due to the low frequencies used testing can also be performed from a single side. The transmitted ultrasonic pulse is a short burst, wideband, signal with very little damping creating a characteristic signal envelope. The Dryscan 410^{D} has a unique tunable filter that is adjusted for the best signal response for the material under test. This fine tuning allows significantly increased sensitivity, whilst maintaining low noise, therefore enabling the testing of very attenuative materials. Once the system has been tuned to the material characteristics the typical waveform shape can easily be interpreted to identify defects and abnormalities.

Interpretation of the Results

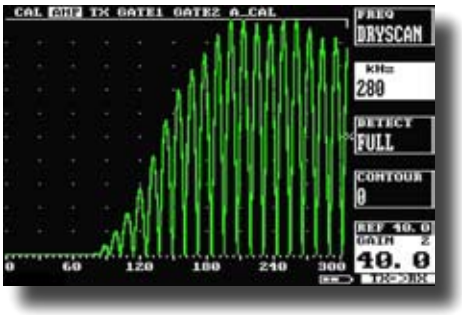
With the Dryscan type of transducer, the received signals produce a typical pattern.
The first group of signals in this pattern usually contains from 7 -10 cycles.

The condition of the material is decided from three factors:

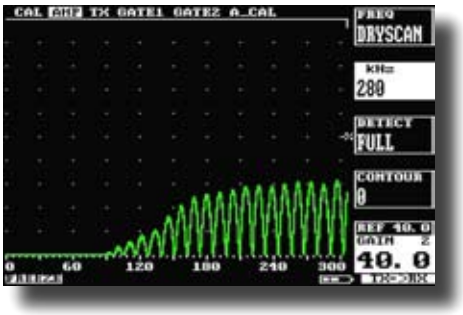
- The intensity of the received signal
- The displacement or the starting point of the first half circle of this wave on the Time Base.
- The shape of the displayed interference pattern.

As a general rule, the structure is considered to be good provided:

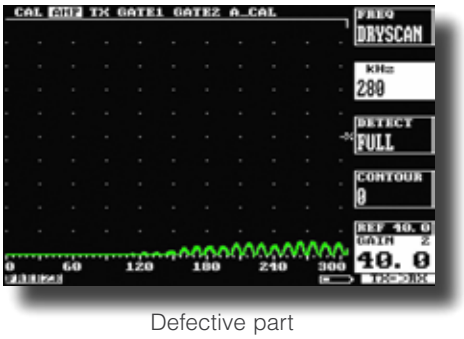
- The first group reaches full scale with a specified dB value.
- The waveform patterns look normal i.e. the first group contains between 7 and 10 cycles.
- There is no sudden change in intensity between adjacent cycles.



Good Measurement



Problem Area Detected



Defective part

Applications

Ideally suited to components having a geometrically complicated pattern, amongst many other materials:

Friction Material	Plastics/Rubber Composites	GRP/CFRP in many forms
EB Welding	Root Pass Weld (heavy Fabrication)	Conveyor Belts
Ceramics	Tyres (Automotive/Aircraft)	Wood Laminate
Trees (Centre Core Disease)	Carbon Products (lamination/cracking)	Bonding of dissimilar materials

Honeycomb sections in aluminium, stainless, paper etc

DRYSCAN 410D Specifications

Test Range	0 - 1mm (0.05in) up to 0 - 20000 mm (800 in.) at steel velocity. Variable in 1,2,5 sequence or continuously in 1mm (0.05in) increments.
Velocity	256 to 16000m/s continuously variable.
Probe Zero	0 to 999.999 µs, continuously variable.
Delay	Calibrated delay from 0 -20000mm in 0.05 mm steps at steel velocity (0-400in. in 0.002 in. steps).
Gain	0 to 110dB. Adjustable in 0.1, 0.5, 1, 2, 6, 10, 14 and 20dB steps. Direct access to gain control at all times.
Test Modes	Pulse echo and transmit/receive.
Pulser	100V - 450V square wave pulser. Pulse width from Spike to 2500ns duration - rise/fall times <10ns into 50 ohms at 200V: Width adjustable in 2% of nominal width, minimum 1ns maximum 40ns.
ActiveEdge ™	Unique active pulse control for enhanced near surface resolution and signal response.
P.R.F	Selectable 15 to 5000Hz in 5Hz steps.
Update Rate	60Hz (NTSC Mode); 50Hz (PAL Mode).
Rectification	Full wave, positive or negative halfwave and unrectified rf.
Frequency Range	7 narrow bands centred at 0.25Mhz, 0.5MHz, 1MHz, 2.25MHz, 5MHz, 10MHz and 15MHz. Broad band at 2 MHz to 22MHz (-6dB) and 1MHz to 35 MHz (-20dB). Special Dryscan mode allowing the resonant frequency of the receiver stage of the Dryscan 410 to be adjusted between 150kHz and 1.42MHz in 10 kHz steps.
System Linearity	Vertical = 1% Full Screen Height (FSH). Amplifier Accuracy ± 0.1dB. Horizontal ±0.4% Full Screen Width (FSW).
Units	Metric (mm), inch (in) or time (µs).
Display	Colour Transflective TFT: Display area 111.4 x 83.5 mm (4.39 x 3.29 in) 320 x 240 pixels. A-Scan Area 255 x 200 pixels (315 x 200 expanded), 8 colour options and variable brightness.
Gate Monitor	Two fully independent gates for echo monitoring and thickness measurement. Start and width adjustable over full range of unit, amplitude variable from 0 to 100% FSH. Bar presentation. Positive or negative triggering for each gate with audible and visual alarms.
Measurement Modes	
Mode 1	Signal Monitor
Mode 2	Depth and amplitude of first signal in gate.
Mode 3	Echo-to-Echo distance measurement. (single gate)
Resolution	To 0.01mm (0.001in) for distance measurement or 1% FSH for ampli -tude measurement. Large display of measurement at top of A-Scan display. Measurement mode selectable between peak and flank.
A-Scan Memory	Maximum of 800 waveforms can be printed or transferred to a PC using opitional SDMS software.
Panel Memory	100 stores for retaining calibrations.
DAC	DAC defined by up to 10 points and digitally drawn on screen. DAC curves meet requirements of EN 1714, JIS and ASME standards, selec able between -2, -6, -10, -12 and -14dB. Amplitude read out selectable between % DAC, % FSH or relative dB.
Auto-Cal	Provides automatic calibration from two echoes.
Clock	Sets time and date.
Reference Waveform	This menu displays a waveform from one of the A-log stores as a reference or fingerprint display in a colour different from the active display highlighting differences from the reference.
Notes	Alphanumeric labelling for panel and A-log allows the user to enter Notes for storage with panel settings and A-scans.
Display Freeze	For capturing the current A-scan image.
Active Peak Memory	Envelope waveform for echodynamic pattern determination, with simultaneous live A-scan display.
Keylock	Prevents accidental alteration of parameters.
Help Key	For instant operator guidance on using the Dryscan.
Language Support	Supports multiple languages. User selectable between English, German, Spanish, French, Dutch. Others available on request.
Waveform Smoothing	Gives a smooth signal envelope, simulating analogue equipment.
Outputs	Full bi-directional serial interface to transfer parameters, thick ness readings and waveform memories. Composite video, PAL or NTSC compatibility. Analogue proportional outputs programmable to distance or amplitude of signal in the gate. Transmitter sync output.
Front USB	For connection to printers, keyboards and PC.
Printers	Supports Hp Deskjet, Epson.
Power	Lithium Ion battery pack 14.4V, 5.0 ampere hours, gives up to 16 hours duration from a fully charged pack. Indication of low battery status. Recharge time 3-4 hrs. Mains pack option.
Charger	100 - 240 VAC, 50-60 Hz.
Transducer Sockets	BNC or LEMO (factory option)
Environmental	Case sealed to IP67
Temperature	Operating -10°C to +55°C (14 to 131°F). -20°C to +70°C. (-4 to 158°F) survivable. Storage: -40° to +75°C. (-40 to = 167°F)
Size	255 x 145 x 145mm (10.0 x 5.7 x 5.7 in)
Weight	2.5kg (5.5lbs) with Li-Ion cells.
Standard Kit Includes	Dryscan 410D Li-ion Battery & Battery Charger Fabric Carry Bag Calibration Certificate Instruction Manual (EN12668)

CE BSI REGISTERED
Certificate No: Q5036

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