

Hocking WheelScan 5

Automatic Wheel Inspection System



Simplicity

Why Inspect Wheels

Aircraft wheels are subject to high level cyclic fatigue, particularly during landing. To ensure the safety of passengers and the aircraft it is important that the wheels are maintained to the highest standard.

Eddy Current wheel inspection is widely accepted throughout the world as a rapid and reliable means of maintaining the integrity of aircraft wheels.

The WheelScan Inspection

- The wheel is first lifted on a lift ram to a preset height, spun up to the required speed and centred.
- The probe is then scanned over a test block with a reference notch and the probe moves to the scan start.
- The wheel is scanned at the required scan helix and speed and the signals from the probe recorded.
- Thermal chart recording or paperless recording allow archival recording of test results for quality assurance purposes.
- The probe returns to scan the test block again.
- The probe then returns to the defect and investigates the flaw to allow recorded flaws to be analyzed manually for process control purposes.

Easy Setup

Set-up is made easy by the storage of test parameters. When a new wheel is encountered a "teach and learn" system, in conjunction with the rotary control, allows the stop and start heights to be determined intuitively.

Tough

With an all steel welded frame the WheelScan 5 is tough yet compact. The 250 kg (550 lbs) wheel lift capacity is in excess of the stripped weight of all commonly used wheels. The welded steel frame means that there are never frame bolts to be tightened and checked, for minimum maintenance and maximum strength. Positioning the unit is made simple by virtue of its compact dimensions, as well as the option of locking castors for maximum convenience.

Easy to use

The roller table facilitates positioning of a wheel and easy incorporation into a conveyor system. For a new wheel, only three positions need to be taught to the system using the "teach and learn" function and then saved for future recall. The operator interface couples the precision and flexibility of a digital control system with a rotary control for parameter setting and push buttons for commonly used functions. For maximum simplicity an operator can simply scan a barcode off a chart and instantly the unit is set-up and ready to go.

Rapid Testing

The unit covers the wheel with inspection speeds up to 2 ms^{-1} (78 inches/second). All inspections are specified with a constant surface speed rather than fixed RPM, allowing the eddy current filters to give the best possible performance irrespective of the amount of wheel taper. The operator can set up a wide range of helix settings, to arrive at the quickest inspection for the required surface coverage. In addition the stepper motor drives take the probe rapidly to the start of the inspection at up to 150 mms^{-1} (6 inches/second) so as to minimise inspection cycle time.

Easy Maintenance

Full diagnostics are available to the operator. The suite of operations include motion control and test from the HMI (shown below) to full PC evaluation from a remote location.

The modular design, all components with plugs and sockets, enables rapid fault identification.

Reliable

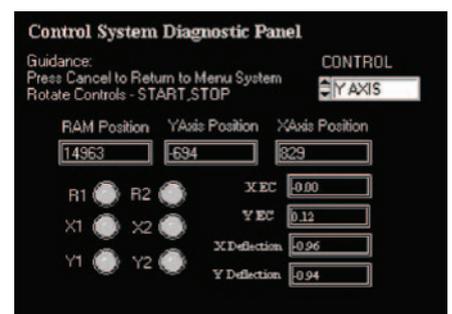
Uses standard motion control system components for longevity. The unit has a modular construction for easy replacement of components. The ball-screw driven actuators have a standard life rating in excess of 10,000 km of travel, equivalent to approximately 10 million wheel inspection cycles!



Simple Human to Machine Interface with intuitive layout



HMI Diagnostic Panel

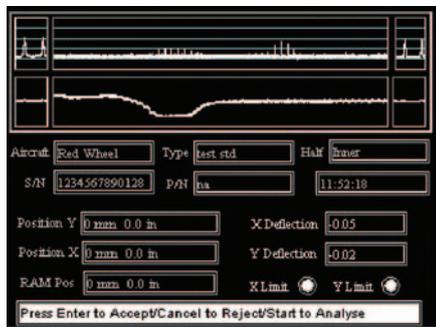


Control System Diagnostic Panel

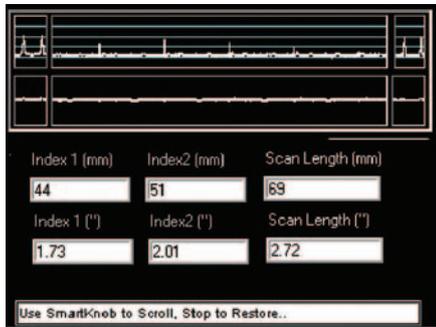
Reliability

Accurate

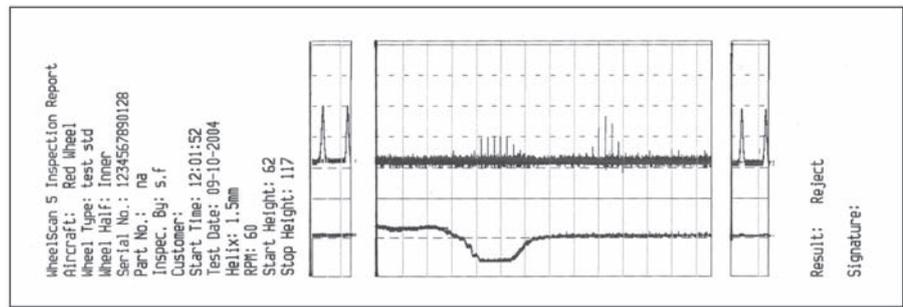
With encoders on all axis, repeat positioning of scan parameters is guaranteed. The AutoTrak Plus, two-dimensional bi-directional contour following system, ensures that the probe travel path covers 100 % of the surface. The wheel may be tested flange up, flange down, fully assembled flange to flange and can handle complex profiles (e.g. racing car wheels).



a)



b)



c)

- a) -HMI display of scan
- b) -HMI zoomed display of scan
- c) - Results of the test as printed out on the thermal printer
- d) -Offline data analysis

Minimising User Errors

The WheelScan 5 provides a variety of methods for entering and retrieving data. The aim of the unit is to allow the experienced operator total flexibility when setting up precision inspections. The ability to “walk” the equipment through the tests and take settings from the on-board encoders ensures that measurements are absolutely precise for each type of wheel. Once the data has been set up it can be stored digitally for easy recall in the future. The recall can even be automated so that the total test can be recalled with the single scan of a bar code, and input errors such as the operator ID and Job References can also be input by bar code. This removes the need for manual data re-keying, the most frequent cause of data error in comparable systems. Also, a key switch with user/supervisor mode enables the operator to be prohibited from making adjustments.

WhIRS - Wheel Inspection Reporting System

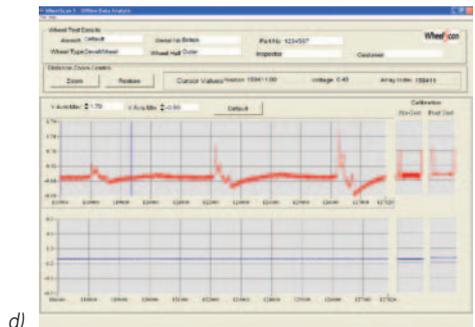
The WheelScan 5 has different levels of reporting to allow you to fulfil all your inspection requirements. Real Time charts are built on the EL display, allowing an easy and convenient method of checking the test. An instant thermal strip chart can provide an in-unit report for each inspection, whilst the Offline Data Analysis that can be provided on a linked PC can print a full colour report complete with all inspection parameters. This can be printed from a laptop situated right next to the unit, or from a PC situated on another continent!

Versatile Inspection

The requirements of Aircraft Wheel Inspection are constantly being improved and becoming more varied. Non-standard wheels and different styles of inspection are being investigated. WheelScan 5 is prepared for all these developments.

Very small wheels are a major problem for similar wheel inspection rigs because of the inability to clamp, and may require tailor made hardware. The SLIC can easily cope with this. New wheels may demand internal inspections. Again the unique SLIC Clamping system has allowed the development of an arm to facilitate this.

As the effect of heat damage on wheels becomes more clearly understood the provision of a conductivity measurement system with the unit allows evaluation of this. A dynamic bolt-hole scanner can also provide valuable information about any conditions that might exist in and around these potential stress raisers.



d)

Specifications:

Safe Inspections

Any inspection must be safe for the operator and for the component being inspected. The WheelScan 5 uses the unique SLIC device (Secure Lift, Inertial Centring) to lift and centre the wheel. This ensures that the component cannot be 'clamped-up' eccentrically, a risk at high RPM.

The unit is also designed so that all control interfaces are located on the front of the unit, which removes the requirement to lean over the inspection area.

Furthermore, the equipment is not vulnerable to damage by wheels being positioned for inspection as all instrumentation is safely below roller height.

Probe

Absolute probe system. Probes are as standard 6 or 9.5 mm diameter with a choice of frequencies from 100 k, 200 k (standard), 500 k and 1.5 MHz. Other diameters and frequencies are available on request.

Component Size

Scan Height	415 mm (16.3 inches)
Diameter Range	0-865 mm (35.5 inches)
Max Weight	250 kg (114 lbs)

Lift Ram Stroke

250 mm (9.8 inches)

Operator Interface

IP 67 protection.

Electro-luminescent display

(320*240 pixel), rotary control for parameter setting. Push buttons for commonly used functions. Emergency Stop.

Eddy Current Functionality

Uses well proven Phasec 2d Eddy Current unit. In addition to the very accurate WheelScan 5 test, this provides the option of Conductivity, Rotary Bolt hole inspection and Dual Frequency modes, amongst others.

Probe Motion Speed

The probe X/Y motion will travel at up to 150 mms⁻¹ (6"/second) for the motion to and from the wheel.

Wheel handling

Roller table and 215 mm (8.5") stroke lift ram with position encoder locates SLIC adaptor on hub.

SLIC

The Secure Lift Inertial Centring (SLIC) adaptor is an automatic centring can that grips securely on the wheel hub. 70 to 230 mm (2¾ - 9") hub internal diameters accepted. Note smaller wheels may be gripped on the rim.

Inspection Speeds

Surface inspection speed is 2 ms⁻¹ (78 inches/second) maximum (limited to 120 rpm). Scan helix may be set in 0.1 mm (4 mil) steps from 0 to 25 mm (1 inch).

Scan Direction

Bottom to top or top to bottom

AutoTrak Plus

Ensures the probe maintains a constant pressure normal to the wheel surface whilst scanning parallel to the surface at the required helix.

Data Recording

57 mm wide thermal chart (optional) or paper less recording and review system.

Data Storage

Unlimited capacity for test parameter storage. Storage of data recorded during test (paper less recording).

Options

Electrical conductivity. Rotary probe.

Outputs

Standard RS 232 via 5 way Lemo

PC Connectivity

Ethernet 10/100

Maintenance

The unit has a modular construction for easy exchange of parts. Major wear parts are sealed units for maximum longevity. XY mechanism has expected life in excess of 10,000 kilometres (Built in prompts for routine maintenance.)

Weight

250 kg (550 lbs) or heavier dependant on accessories.

Frame

Welded steel tube

Dimensions

914 x 870 x 800 mm (36 x 34 x 31½ inches)

Power

90 to 264 VAC, 47 - 63 Hz, 350 watts

Important note. This product is covered by one or more patents.