

TSIS

Turbine Shaft Inspection System



TSIS multi diameter inspection head (MDH)

For rotor bore inspections in steam turbine shafts, the TSIS system combines both ultrasonic and eddy current techniques simultaneously for volumetric and surface inspections.

TSIS comprises a lightweight inspection head (MDH) which, operates in conjunction with the Phoenix PRISM drive system. Together they provide a reliable, powerful and cost-effective tool offering full automation that is easily deployed.

Benefits

- Easy to use and rapidly deployed
- Lightweight and compact
- Superior signal to noise performance via ultrasonic pre-amplification located in the head
- Versatile: Applicable to rotors with bores from 60mm to 350mm diameter and up to 14m long
- Fast: Simultaneous ultrasonic and eddy current scanning potentially reduces scanning time by 50%
- Compatible: Can be used with industry standard data acquisition systems

In use for over 20 years, the TSIS models have a proven track record for reliability and highly accurate flaw detection and operate on bores of varying diameters and lengths.

Construction and Use: The delivery system - PRISM is clamped directly to one end of the steam turbine shaft and axial movement is transmitted to the head via a series of feed rods.

MDH - Multi Diameter Head: The inspection head stator locates positively in the bore of the shaft by means of a spring-loaded mechanism that allows it to negotiate changes in the bore diameter caused by 'chambering'. The stator contains the rotary drive mechanism, slip rings and bearing housing for the rotor. The rotor module consists of two carrier arms holding probe arrays. The arms pivot on the barrel of the rotor which can rotate continuously in either direction. The arms are designed to hold the probes in contact with the bore surface to ensure good ultrasonic coupling.

Multi Element Ultrasonic Transducers: Two arrays are used, each fitted with up to four elements. A typical configuration uses four single element ultrasonic probes, two twin ultrasonic probe and an eddy current array probe. When in position, the head is designed such that each array is loaded against the bore surface but does not support the weight of the head to ensure the arrays are evenly loaded. The probe arrays are designed to be easily replaced.

The PRISM Drive: Consists of an aluminium modular frame with a linear belt driven carriage which holds the manipulation bars and umbilical for the MDH head. PRISM comes as standard in a flange mounting format but is also available floor mounted. PRISM can be broken down into sections to keep the size of the system as small as possible for transportation.



TSIS MDH bore inspection

Specification

Multi Diameter Head (MDH)

- Simultaneous ultrasonic and eddy current scanning with up to 8 ultrasonic and 7 eddy current elements
- Ultrasonic pre-amplification at the head
- Helical scanning within the head offers improved accuracy and inspection times and no twisting of the umbilical
- Rotary speed up to 10rpm
- Applicable to bores from 85 to 305mm including chambered bores. (Contact Phoenix to discuss options for other bore sizes)

PRISM Drive

- Accuracy of +/-0.5mm
- Axial speed up to 75mm/s
- Suitable for bores up to 14m long scanned in 1m sections
- Flange or floor mounted
- Flat pack construction for transportation

Ultrasonic Multi-Element Transducers

Two arrays are used, each fitted with up to four standard elements

Options and Accessories

- Adapters for calibration blocks and shafts - 1 set
- Linear drive support tripod
- Workbench/Lift table and adjustment frame

Kit

- TSIS MDH Advanced 85mm to 305mm (with changeable parts)
- TSIS MDH umbilical (20m)
- TSIS Manipulation bar (1.0m long per metre of shaft length)
- TSIS Support bush (one per manipulation bar)
- TSIS-MDH-ADV adapter cables for calibration
- PRISM - 2 linear drive with head support for inspection from the start of the bore
- Pair of probe arrays - UT array, maximum 4 elements and UT and ECT array (No. of pairs dependent on bore diameters)
- TSIS - MDH expanding support for inspection of chambered bores (bores with varying diameters)
- Set of TSIS & PRISM Transport crates
- Couplant Pump
- Set of operating and maintenance manuals

System Spares Package

Minimum Spares package to include one off each of the following:

- UT Pre amplifier
- TSIS-MDH actuator
- TSIS-MDH slip ring set
- TSIS-MDH tilt sensor
- TSIS-MDH nose switch
- TSIS-MDH couplant seal
- PRISM linear actuator
- PRISM drive belt



Scan

