



AUTOMATED IMMERSION ULTRASONIC TESTING SYSTEM FOR BEARING INSPECTION

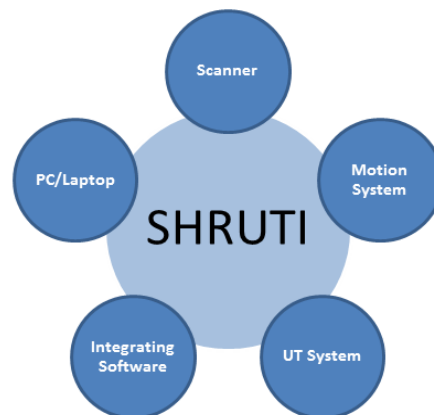


Tapered roller bearings are designed to withstand both axial loads and radial loads. The tapered bearing comprises the tapered inner ring (cone) and outer ring (cup) raceway with rollers between them. To withstand high loads on the cup and cone raceway it should be ensured that the raceway does not have any defects including rust or cracks.

Ultrasonic immersion scanning is a recognized NDT method for defect detection and tracking in mechanical components. In bearing inspection, it is used to detect defects in raceways of cup and cone sections, which are subjected to continuous loads. Ultrasonic testing can provide

information on the defect about its location and size.

The test is carried out using the pulse-echo method using two transducer setups. Defects in the raceway will cause a drop in the energy level (amplitude) of the raceway echo.



The system is an indigenously developed customizable,

automated, multi-axis robotic scanner. The system used for the inspection is **SHRUTI**[®], Scanning High-Resolution Ultrasonic Inspection System. SHRUTI along with AcqUT facilitates easy inspection of bearings. To achieve high demand in production two scanning system is used.

The two machines are fed using a six-axis robot and two incoming conveyors. The robot is capable of fetching samples to the scanner and then placing the sample back to the outfeed conveyor at high speed thus reducing the cycle time. It has a load capacity of 165kg and a maximum reach of 2metres.

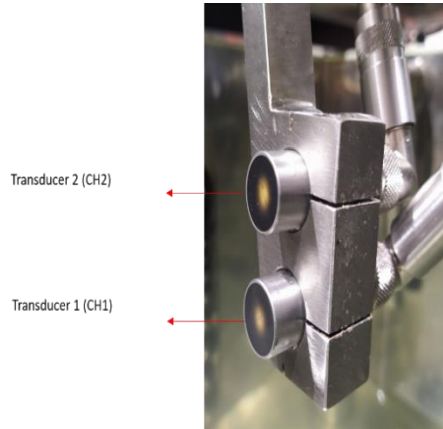


After calibrating the system an automatic inspection software, that controls the robot, conveyor, and UT machine is used to run the system in production mode. Each infeed conveyor is dedicated to a UT machine while the outfeed conveyors are common.



The sample is washed in pre tank

All the rejected samples will be placed in one of the outfeed conveyors while all the accepted samples will be placed on the other outfeed conveyor. After each scan, Automatic inspection software will generate an alarm and a tower lamp indication for rejected samples and the sample will be placed in a “rejected conveyor”. All the accepted samples on the other hand will be placed on the “accepted conveyor”.



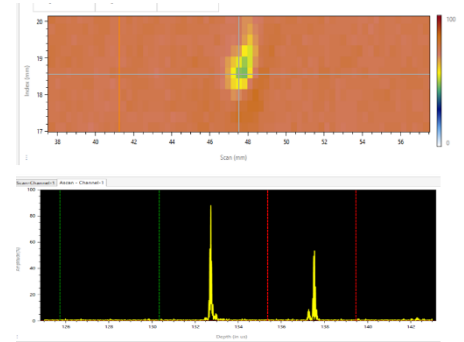
Transducer probes

Furthermore, the automatic inspection software will give the count of the total number of samples scanned and the number of rejected and accepted samples of each UT machine.

In addition to reducing the cycle time, the system can also handle two different samples in each UT machine.



Sample on the infeed conveyor



Scanned tracking image of Bearing Inspector Result

Cycle time for a single raceway cone sample is just 90 seconds, this includes fetching to the scanning machine and placing it back in the outgoing conveyor.



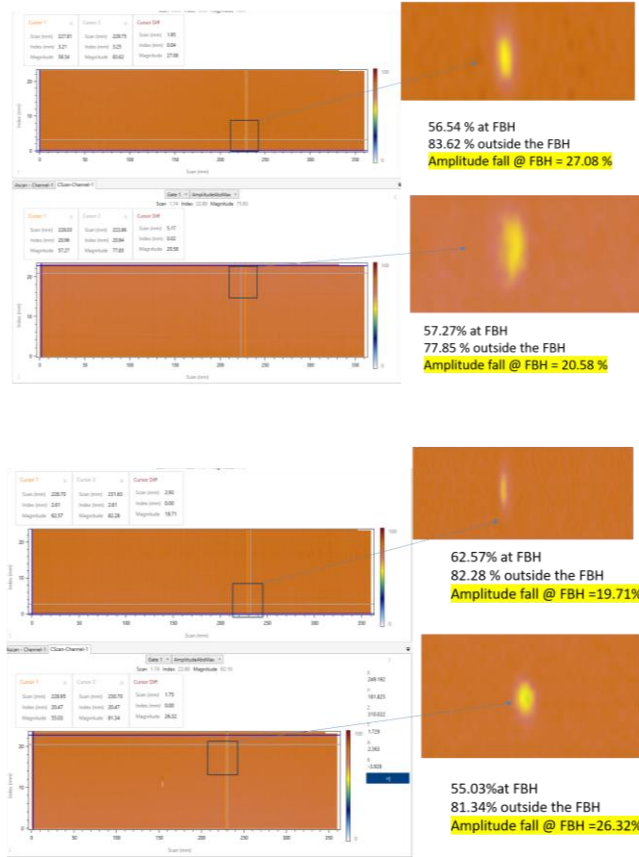
Inspected Samples on the Accept conveyor

All the electrical connections are rugged and properly routed following industrial standards offering very durable and reliable running. The system employs rugged servo motors for motion requirements and had industrial standard safety interlocks.

Automatic Immersion Ultrasonic Testing System for Bearing Inspection- Application Note

A Dhvani Research
Application Note

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Calibration result – Cup- Top and Bottom race – Zoomed image

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