

## Scope

To accurately test wheel hubs for correct hardness and at the same time verify that the internal diameter has the correct spline pattern.

## Application

Wheel hubs are a safety critical component and must be 100% inspected. Correct hardening is vital to safety, longevity and performance.

## The Challenge

With advancing eddy current technology heat treat verification is usually a relatively straightforward test. However, in this case the customer also wanted to verify that the broaching process had created the correct spline pattern on the interior diameter.

Confirmation of the spline pattern would require a separate test at different frequencies from the heat treat verification but the tests had to be virtually simultaneous to meet cycle time.

## The Solution/Setup

To effectively solve this challenge a special probe would be required. It would need to be able to operate efficiently at the frequencies determined suitable for the heat treat verification test and also at



the second set of frequencies required for the confirmation of the spline pattern.

The application specialist designed a self reference differential driver pick-up probe that could operate within the frequencies needed for both hardness and spline detection. A stainless steel entry plate and center shaft was incorporated in the design for long wear and to help center the part.

## Test Results

Excellent test results were obtained with a high degree of differentiation.

## Implementation

Using the eight selectable frequencies in the InSite HT2, two configuration, or test, files were created. The first was optimized for heat treatment verification and the second, using a higher set of frequencies, was optimized for confirmation of the spline pattern.

The equipment was integrated into the customer's production line so that 100% in-line inspection could take place. A PLC controlled the InSite HT2, and used the configuration switching facility in the unit to switch back and forth between the heat treat test and the spline test. On board I/O in the tester was fed back to the PLC to separate good and bad parts according to a series of standards created by the customer. Each of the standards was color coded (see photograph) so that periodic challenge tests could take place by the introduction of the various samples.

In this type of situation where a variety of possible fault conditions can exist, the full capability of the InSite can be witnessed. With eight frequencies, multiple tests and configuration switching through a PLC it is possible to easily create tests and sequences of tests to reliably differentiate between a variety of conditions. Shortly after the InSites were installed, the Uson Application Engineer went on site to assist with validating the equipment and training operators on its use and capabilities.



## Benefits

Custom probe design dramatically improves the repeatability and reliability of eddy current testing. Coupled with the capabilities of the InSite tester, attention to the design of the probes produced a far superior test for the customer. Follow up with installation assistance and training ensured that the personnel operating the equipment understood how it functions and the importance of an accurate probe to part interface.

## Uson L.P.

Component Testing Solutions  
8226 Bracken Place SE, Suite 100  
Snoqualmie, WA 98065, U.S.A.  
Tel +1-425-974-2905  
Fax +1-425-974-2897  
www.uson.com