



Deliver 100% Quality Powder Metal Components Using Eddy Current Hardness Inspection

Scope

Many manufacturers of powder metal components are moving toward 100% product hardness testing of critical automotive components. Eddy current testing offers rapid and accurate testing that reduces both warranty and scrap costs. One major manufacturer has successfully incorporated eddy current testing in-line for a complete hardness inspection solution.

Application

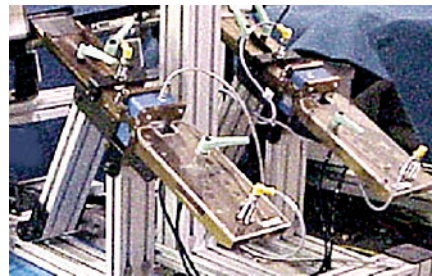
The customer required an in-line solution to provide test results as accurate as those from Rockwell hardness testers when inspecting powder metal fuel pump gear components (rings & stars).

Traditional static indentation testing, such as Rockwell and Vickers hardness tests, is time consuming and damages the part to some degree. Additionally, system capabilities had to accommodate the hardness inspection of two lanes simultaneously, including 15 star sizes, 10 ring sizes and three lobe geometries for each size. Testing had to be accomplished with just two coil sizes and deliver accurate, repeatable test results.

Solution

A compact system was installed directly downstream of the furnace and consists of a MIZ®-27CT instrument, two ECT encircling hardness coils (one for stars, one for rings) and two sorting stations (one per lane).

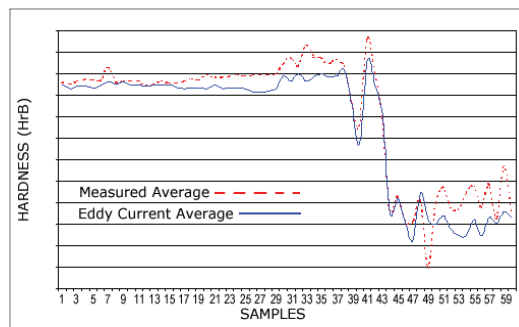
This provided a fast (up to 60 parts/min) solution that results in 100% hardness testing and sorting.



More Consistent Testing with Eddy Current

Two tests were conducted to develop a correlation between a measured Rockwell hardness (HrB) and the eddy current hardness values. First, 38 sets of 10 samples (380 samples) were tested with eddy current. Next, all 380 samples were sent through a normal Rockwell hardness tester. The eddy current hardness values and actual Rockwell hardness readings are compared in the graph. Twenty-two suspect and failure specimens were tested as well.

From this initial test the correlation



between Rockwell hardness and eddy current hardness was very good, showing only about 1~3 HrB points varia-

tion. Eddy current readings (solid blue line) tended to show a more consistent value when compared to the Rockwell readings. This was readily shown with the results from a sample production test. During this test, nearly 35,000 samples were tested with eddy current. Random samples were taken and had Rockwell hardness checks completed to verify the results. The Rockwell hardness readings were only accurate to ± 1.0 HrB. ECT provided more consistent results than Rockwell hardness testing.

Accurate Results Insure 100% Inspection

The test results show that the eddy current system meets or exceeds the accuracy of the normal Rockwell hardness tester. And not only does ECT inspect more of the component's surface area to compute a more accurate result, but repeats itself more consistently than Rockwell hardness testers while keeping up with the customer's production rate.

To 100% inspect and insure that all parts are above the specifications, I believe there is no other way to provide zero defect products than to use an eddy current test system.

— Project Engineer