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Residual Stress Analysis . . .

Providing Insight into Component Failures

Residual stress exists in the majority of metallic and ceramic components. Knowing the amount, type and location of stress present in a component is important in improving the quality and reliability of the part.

Oftentimes, failure modes such as fatigue failure and stress corrosion cracking may be due to residual stresses inherent in the materials, design, or processes employed in production. Component failures can now be reduced through production monitoring utilizing the -_ --" Model 1600 Series Stress Analysis System.

One of the recent applications of the TEC stress analysis system is in the automotive industry. A leaf spring manufacturer was battling against premature spring failures due to fatigue cracks. The manufacturing process initially used was to fabricate and heat treat the leaf spring, shot peen and then 'bump" to the final arc desired.

Residual stress analysis, utilizing the TEC system, indicated that the area with tooling marks formed during the bumping process was in tensile stress while the other shot peened areas were in high compressive stress. The production process being used was lowering the fatigue life of the component. E TEC suggested changing the process sequence to shot peening after bumping. The fatigue **liter** of the springs has been increased with no increase in production costs.

_ Stilt another application of the TEC Stress Analysis System is in the aerospace industry. ',:.:" recently completed a major program funded by NAVAIR (Naval Air Systems Command) to demonstrate the value of the nondestructive x-ray analysis technique as a toot for improving the effectiveness of aircraft maintenance and rework operations.

In one application, landing gears experiencing fatigue, stress corrosion cracking, and hydrogen embrittlement were tested. It was noted that the desirable high surface residual compressive stresses in the high strength steel of the landing gears can degrade during its lifetime. Low compressive or tensile stresses in critical areas are often precursors to landing gear failures. Residual stress analysis is currently being used to evaluate whether landing gears can be reused, as is, or whether they must be reworked or removed from service.

These examples are but two of many applications where the TEC Model 1600 Series Residual Stress Analysis Systems have helped users improve quality and reliability of their products.

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Circle Bingo No. 14

Ervin Industries, Ann Arbor, Michigan , has announced availability of the Ervin Test Machine. The machine was developed to provide laboratories with a method to evaluate the value and quality of metal abrasives. This information can then assist the buyer and plant personnel in making the right abrasive selection to insure the lowest possible cost and highest efficiency in production use.

The machine is available for loan or purchase. For more information, Circle Bingo No. 15