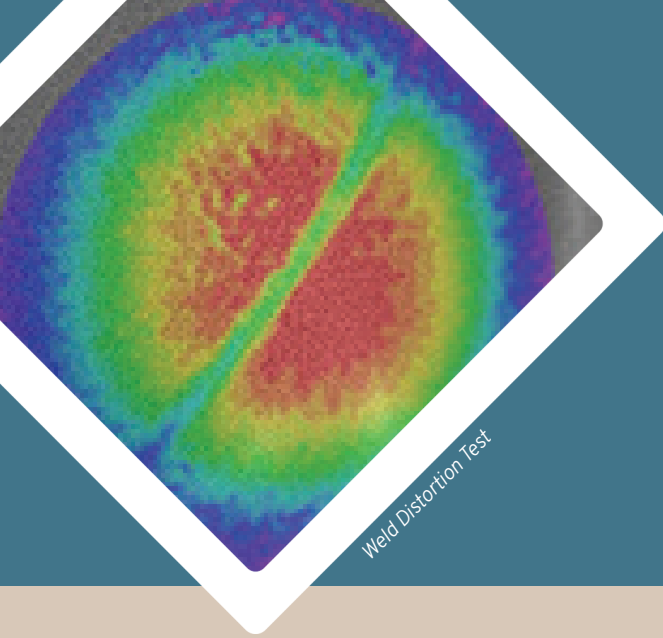


Digital Image Correlation for Full-Field Displacement and Strain Measurements



The Problem

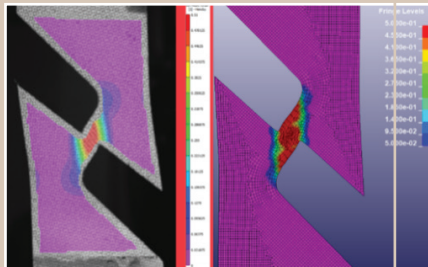
Structures with complicated shapes or high material deformations often are difficult to design, and demonstrating that their failure modes can be prevented is a challenge. The actual deformation of the structure under loading can create temporary localization of deformation that may be missed by localized measurements and not observed on final parts after testing.

The Process

Digital Image Correlation (DIC) is a non-contact optical system that measures deformation and strains on a given material or structure. DIC relies on a randomized speckled pattern applied to the surface to which uses cameras to monitor and record deformation and strain during loading. DIC can be used to replace sensors such as strain gauges and can provide both higher accuracy and greater surface coverage. DIC allows users to fully understand static and dynamic behaviors in either 2D or 3D.

The Benefits

- **Improve material qualification** – Many material qualification tests (e.g., tensile, hole expansion, bending, bulge, shear, and fatigue testing) are helped by knowing the pattern of deformation and provide results with higher accuracy.
- **Enhance simulation results** – DIC can obtain the data needed to both qualify assessment methods like finite element analysis (FEA) and access more localized data to address limitations in those methods.
- **Inform design decisions** – Localization of deformation can be observed all over the surface to confirm the efficacy of both the material and design configuration.
- **Broad application** – DIC can be applied to a wide variety of materials, surfaces, and products across industries including automotive, aerospace, defense, and medical technology.



DIC vs. FEA Correlation

The EWI Advantage

EWI has the capabilities to combine DIC with specialized testing, such as bulge tests or hole expansion tests. We can also compare results from DIC to finite element analysis (FEA) of the structure to better define material behavior during deformation. Our specialists have both the expertise and the resources to determine the formability of new materials for sheet metal forming and forging processes, and to provide recommendations for materials, lubricants, coatings, and process parameters.

If you have issues with localized damage on important structures, EWI can help. Call us today.

For more information on DIC, contact Laura Zoller, Applications Engineer, at lzoller@ewi.org or 614.688.5283.

EWI
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