

Optimization for the Repair of Worn Aircraft Engine Components

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Significance

The application is the automated repair of high value aircraft engine components. Components have been in service and have much variability. Repairs must be to high standards and fast. Parameter optimization must be efficient to minimize the number of tests on real components.

Novelty

Heuristic expert rules guide a coarse search to locate the near-optimal-parameters based on qualitative visual assessment. Once in the correct region, design of experiment techniques are applied to model and optimize the welding parameters. A range of quantifiable factors were established using the following materials characterization techniques:

- ◆ Laser Profilometer
- ◆ Residual Stress
- ◆ X-ray Inspection
- ◆ Metallographic Examination
- ◆ Microhardness

What the Poster will Show

- Examples of parameter space representation showing location of tests and search path
- Images of parameter dependent welding flaws.
- DOE structure and response surface modelling results
- Images and graphs from the weld characterization

Important Points

- Rigorous statistical methods are needed to cope with interdependency of factors.
- Expertise is incorporated in the optimization process.

Economic Impact

Automated repair processes reduce time-off-the-wing for very high value engines.

More consistent quality control and automated procedures give a more competitive edge.