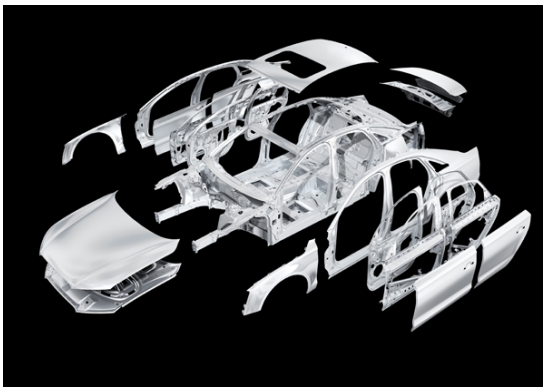
SUCCESS STORY 94

AUTOMOTIVE STRUCTURAL METAL BONDING



Q **How did an automotive manufacturer optimize uniform heating of the car body shell during the Ecoat cure process, to prevent the failure of structural adhesives?**

A

Situation and background

Historically in the car construction industry, spot welding has provided the most efficient means of fixing metal seams with a metal to metal bond. Structural adhesives are used in order to increase stiffness of the car body or improve crash performance. Adhesives and sealants are applied to the seam and are cured as the car body passes through the Ecoat oven. During the oven cycle, differential heating of inner and outer metal structures or mixtures of materials (aluminum and steel) on the car body may create metal warping. The distortion/warping can lead to adhesive failure, because the cured polymer layers are very sensitive to tensile stress at the high temperatures in the e-coat oven.

The winning solution

- Trials with the Datapaq Oven Tracker XL2 System during prototype build testing allowed identification of locations on the car body at risk of metal distortion due to differential heating effects.
- Temperature data was used with mechanical simulation models to predict the degree of distortion for various seams identified to be at risk of adhesive failure.
- Invaluable temperature profile data was collected, which is essential to help with oven set-up and optimization for both coatings and adhesives during the prototype validation phase.

Savings made

- Quicker optimization and validation of paint and adhesive cure process during new car body style launch, allowing earlier production start-up
- Informed selection of appropriate adhesive sealant chemistries to suit a range of different seal characteristics on the car and eliminated risk of seal failure
- Improved mechanical design quality from combining accurate temperature data with thermal distortion simulation models

KEY FACTS

Customer's End Product
Automotive body shell

Max temperature reached
140 to 200°C/184 to 392°F

Duration of Process
30 to 60 minutes

PRODUCT AND BENEFITS

Datapaq® Oven Tracker® XL2

Thermal Barrier TB0090/TB0083

MicroMag magnetic thermocouples

Insight™ Professional software

- Rapid temperature profiling of the car body with up to 16 measurement points
- Temperature difference analysis allowing accurate analysis of differential heating effects
- BakeChart analysis to accurately quantify cure of adhesives and sealants

DATAPAQ®
Fluke Process Instruments

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