ASSEMBLY, RELIABILITY & THERMAL MANAGEMENT

Plated-Through-Hole / Press-Pin Reliability in High-Speed Connectors

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OBJECTIVE:

To develop a fully 3D-numerical model of a PTH and a gas-tight press-fit pin used in high-speed connectors. The research aims to:

*** Model the behavior of the assembly to understand the behavior at the PTH/Press-Pin interface.**
*** Minimize current destructive characterization methods by offering design guidelines.**
*** Offer insight into the effect of parameters neglected so far, such as plating non-uniformity.**
***Predict the fatigue life of the assembly based on selected damage metrics.**

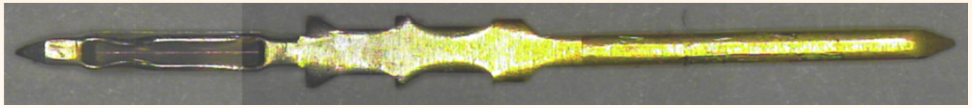
APPROACH:

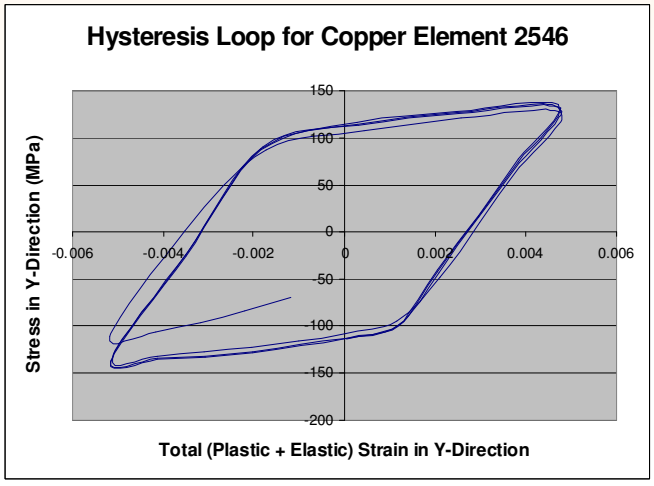
*** Create 3D models to simulate the Press Pin insertion process and subsequent thermal cycling.**
*** Model material non-linearities and use contact elements.**
*** Conduct experiments to validate the model, including insertion/extraction tests, temperature-life tests, Low Level Contact Resistance, and in-situ measurements during thermal cycling.**
*** Ductility-dependent low-cycle and strength-dependent high-cycle fatigue life prediction.**

ACCOMPLISHMENTS:

*** Models to determine post-insertion stresses and strains in PTH.**
*** Data gathered for insertion/extraction and temperature-life experiments.**
*** Press-Pin insertion simulation - Thermal cycling for fatigue life and reliability predictions**

Fatigue Life Calculations based on Coffin-Manson Formulation		
Plastic strain range **-L**ow **C**ycle **F**atigue	**PSR**	0.01
Total strain range - Low and **H**igh **C**ycle **F**atigue	**TSR**	0.010999306
Fatigue ductility coefficient	ε_f	0.15
Tensile strength (psi)	σ_{TS}	3.60E+04
Young's modulus (psi)	**E**	1.75E+07
Cycles to failure - LCF	N_f	201.12
Cycles to failure -HCF	N_f	300.33





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