

NEPP ETW
GFSC
June 12, 2023



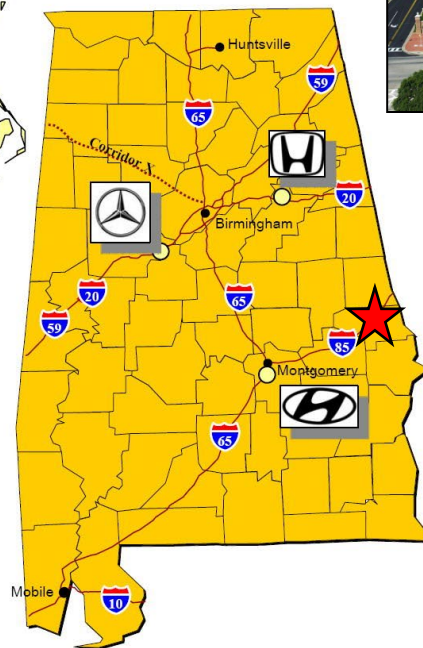
AUBURN UNIVERSITY ELECTRONIC PARTS AND PACKAGING

Research and Education

George Flowers, Sa'd Hamasha, Jeff Suhling
Departments of Mechanical Engineering and
Industrial & Systems Engineering
Auburn University
Auburn, AL 36849

AUBURN UNIVERSITY

Introduction



Auburn University

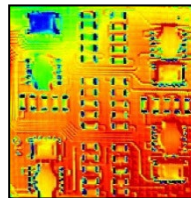
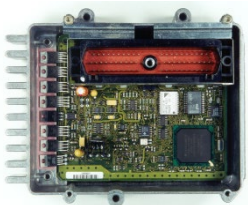
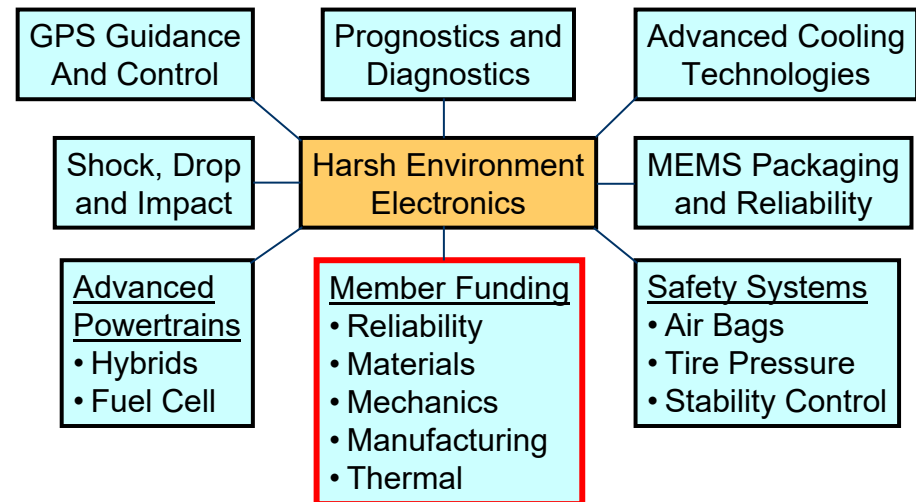


EP&P RESEARCH

Auburn University



- CAVE3: Center for Advanced Vehicle & Extreme Environment Electronics
- National Science Foundation Industry/University Cooperative Research Center (I/UCRC)
- 1998-Present (25 Years!)
- Objective: Research and Development (in Collaboration with Industry) on Electronic Packaging in Harsh Environments
- Demographics:
 - 20 Member Companies/Agencies
 - 20 Faculty
 - 40 Graduate Students
 - 10 Laboratories



ME

Department of Mechanical Engineering



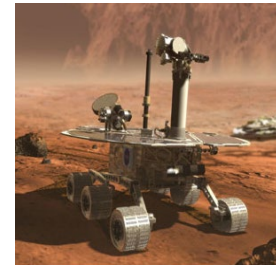
AUBURN
UNIVERSITY

EP&P RESEARCH

Auburn University



Automotive - Aerospace - Military - Computing - Portable - Other



Harsh Environments: Extreme High/Low Temperatures, Large Temperature Changes, Vibration/Drop/Shock, Corrosion/Radiation/Pressure/etc.

AUBURN FACULTY

Personnel Working on EP&P



Faculty and Specialty Areas

- ? Jeffrey C. Suhling - Stress Analysis, Reliability, and Mechanics
- ? George Flowers - Connectors, Dynamics, Vibrations, Tin Whiskers
- ? Sa'd Hamasha – Reliability, Manufacturing, Mechanics
- ? John L. Evans - Electronics Manufacturing and Economics
- ? Pradeep Lall - Quality and Reliability, Mechanics, Dynamics
- ? Sushil Bhavnani - Heat Transfer, Electronics Cooling, Boiling
- ? Mehmet Arik - Electronics Cooling, Thermal Management
- ? David Bevly - Dynamics, Controls, GPS
- ? Michael Bozack - Surface Science, Tin Whiskers
- ? Ben Choe - Fuel Cells, Hybrid Vehicles, Powertrains
- ? Robert Dean - MEMS, Sensors, Die Packaging
- ? Jeff Fergus - Materials Science, Sensors, Electrochemistry
- ? Daniel Harris - Heat Transfer, Heat Pipes
- ? Richard C. Jaeger - IC Fabrication and Test, Sensors
- ? Robert Jackson - Connectors, Tribology, Design
- ? Lewis Payton - Metallurgy, Manufacturing, Materials
- ? Alice Smith - Manufacturing and Reliability
- ? Jeff Smith - Design, Analysis, & Control of Manufacturing Systems
- ? Jorge Valenzuela - Stochastic Modeling and Optimization

- ? Graduate Students: 40

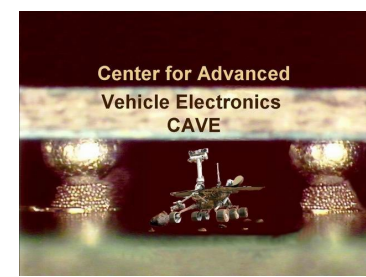
Departments

Electrical Engineering
Industrial Engineering
Materials Engineering
Mechanical Engineering
Physics



AUBURN FACILITIES

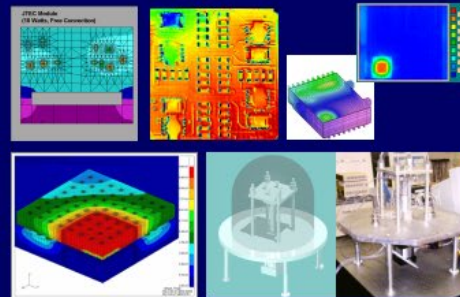
Departmental/Faculty Research Labs



SMT Assembly



Thermal / Heat Transfer



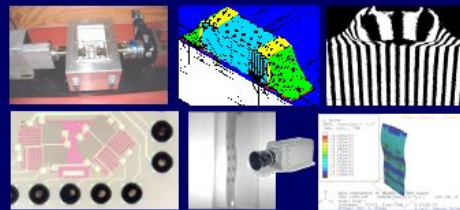
Environmental Testing



Advanced Packaging



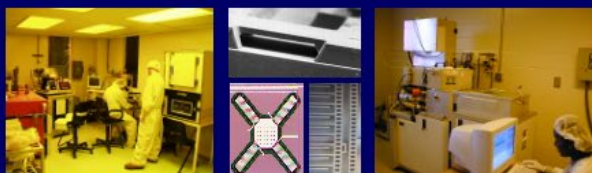
Mechanical / Stress



Surface Science



Micro Fabrication (AMSTC)

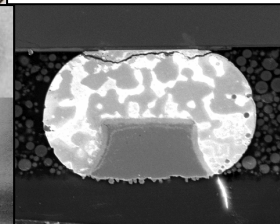
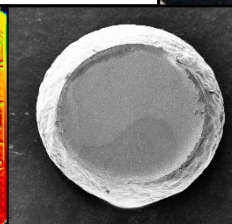
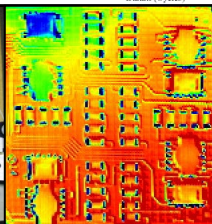
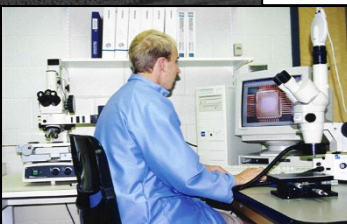
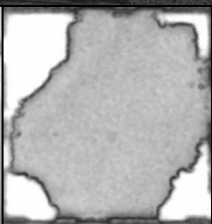
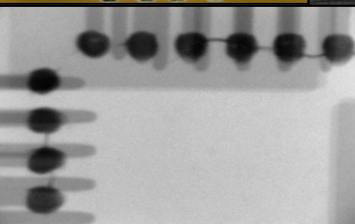
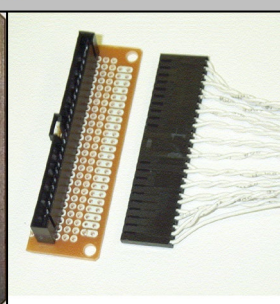
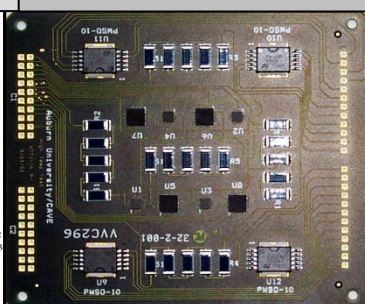
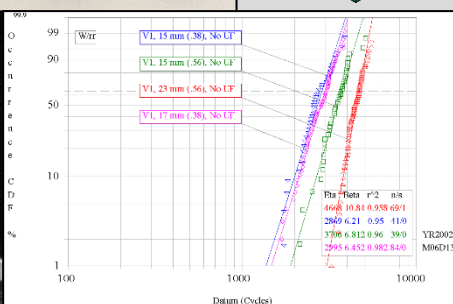
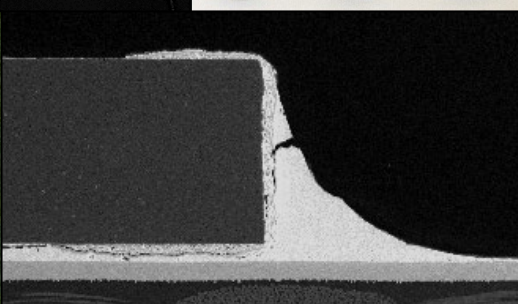
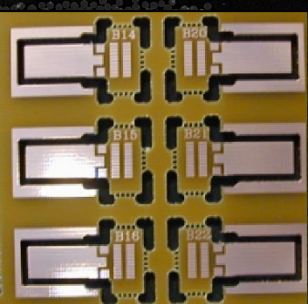
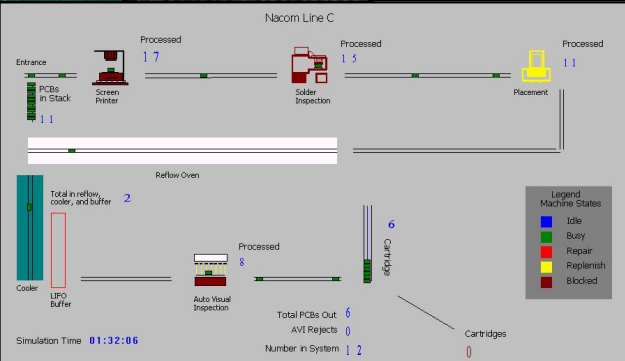
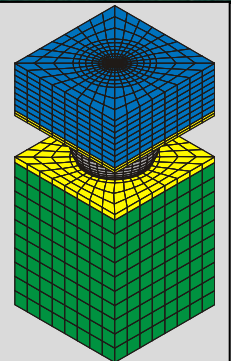
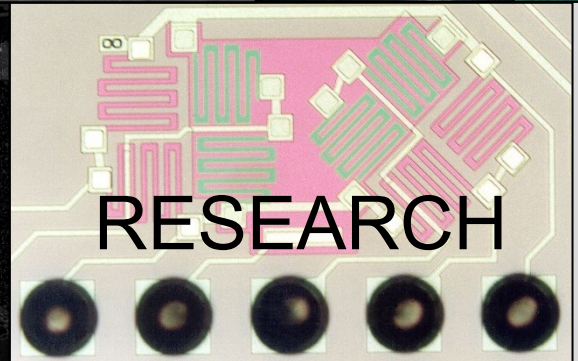
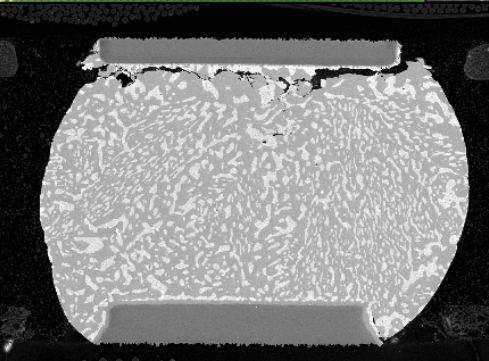
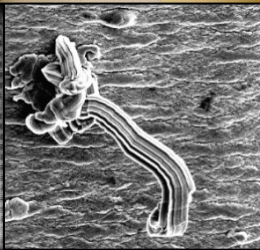
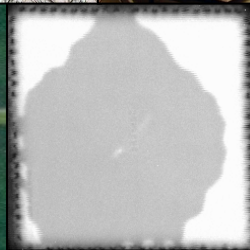
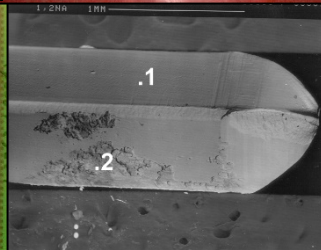
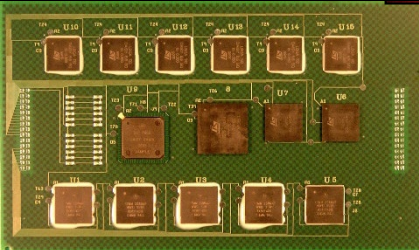
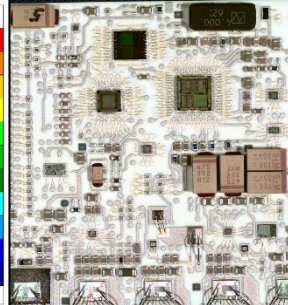
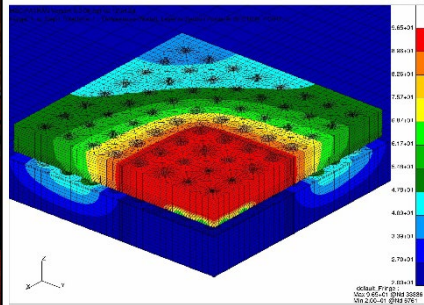
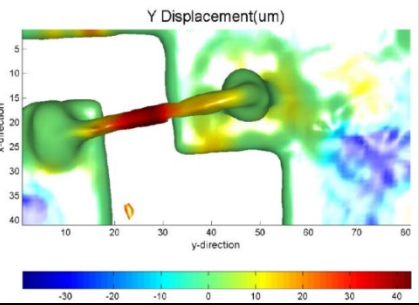


Vibration



Failure Analysis





AUBURN ENGINEERING

Degree and Certificate Programs



- Engineering (ME)
- Electrical & Computer Engineering (MS, PhD)
- Industrial & Systems Engineering (MS, PhD)
- Materials Engineering (MS, PhD)
- Mechanical Engineering (MS, PhD)

- Electronic Parts and Packaging (Certificate)

- Aerospace Engineering (MS, PhD)
- Biosystems Engineering (MS, PhD)
- Chemical Engineering (MS, PhD)
- Civil & Environmental Engineering (MS, PhD)
- Computer Science & Software Engineering (MS, PhD)
- Wireless Engineering (MS, PhD)



**2022
RANKINGS**

U.S. NEWS and WORLD REPORT Best Online Graduate Engineering Programs

No.
17

**BEST online
graduate engineering
program**



- No. **5** BEST online civil and environmental
- 11** BEST online mechanical
- 11** BEST online programs for veterans
- 14** BEST online industrial and systems
- 17** BEST online engineering management
- 31** BEST online computer science and software engineering



AUBURN ENGINEERING

Example EP&P Related Courses



- Electronic Materials
- Mechanics of Electronic Packaging I & II
- Electronics Manufacturing I & II
- Manufacturing Systems
- Electronics Reliability
- Electronics Thermal Management
- MEMS and MEMS Packaging
- Silicon Device Fabrication
- Microelectronic Devices
- Semiconductor Sensors
- Semiconductor Physics
- Vehicle Electronics
- Unmanned Autonomous Systems