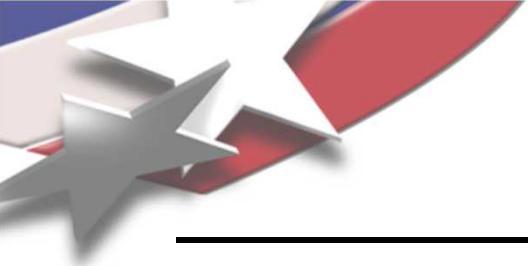


# Agency Update

## Sandia National Laboratories New Mexico

**IMOG Joining Subgroup  
Savannah River National Lab  
December 6-7, 2005**

**Jerry (with a “J”) Knorovsky  
Joining & Coating Department**



# Joining at SNL/NM

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- **Materials and Process Sciences Center (1800)**
  - 1813 Joining & Coating Dept (mgr: Mike Hosking)
  - 1825 Materials Reliability (mgr: Jeff Braithwaite)
- **Manufacturing Science and Technology Center (2400)**
  - 2430 Manufacturing Processing (includes "the Weld Shop", Fred Hooper, Jo Bridge)
  - 2450 Manufacturing Process Science and Technology
- **Other Centers**
  - **Microsystems Science Technology & Components (1700)**
  - **Intelligent Systems & Robotics Center (6630)**
  - **Neutron Generator Production Center (2700)**
    - Gary Pressly, Pierrette Gorman, Dan Appel, Dan Garcia
  - **Energy Components and Metrology (2500)**
    - Includes battery (Lou Malizia, Tony Romero), explosive components groups
  - Remote facilities tend to have "maintenance" welders



# Joining/Coating Personnel Changes

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- Mike Cieslak became Director of MESA Program Office (12900)
- Duane Dimos succeeded as Director of Matls & Proc Sci. Ctr (1800)
- Mark Smith was promoted to Sr. Mgr. (went to 2450)
- Rich Neiser was promoted to Dept. Mgr. (went to systems group)
- Mike Hosking was promoted to 1813 Dept. Mgr.
- Doug Hinkley came back from Iraq for ~4mo, was recalled for another 6mo tour (@ Pentagon this time, back early next year?)
- Srinath Viswanathan took faculty position at U of Ala. Tuscaloosa
- John Stephens is on indefinite medical leave (but telecommutes)
- John Bernal received BSME, transferred to NG group
- David Cook left to return to Ford
- Don Susan transferred into 1813 (soldering/brazing)
- Matt Perricone joined 1813 (new PhD metallurgist from Lehigh U)
- Dave Melgaard joined 1813 (from now-defunct Melt Lab)
- Rod Williamson joined 1813 (ditto)



## **Joining & Coating 1813\*, Mike Hosking,\* Mgr. Materials Reliability 1825\*, Jeff Braithwaite, Mgr.**

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### **Welding staff members:**

**Charlie Robino\***

**Jerry Knorovsky**

**Matt Perricone**

**Doug Hinkley (LTE, on leave)**

**Jerome Norris (LTE)**

### **Brazing/Soldering staff members:**

**Paul Vianco (1825)**

**Don Susan (1825)**

**Matt Perricone (1813)**

### **Technologists:**

**Danny MacCallum**

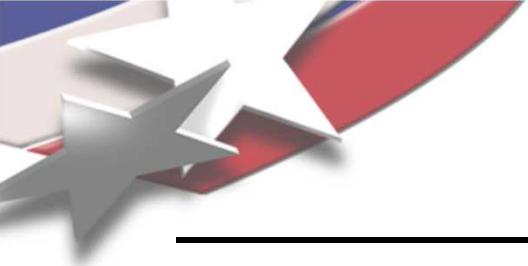
**Mark Reece**

**Peter Duran**

**Jerry Rejent (1825)**

**Mark Grazier (1825)**

**\*Charlie was a 2005 co-recipient of the AWS Warren F. Savage Award.**



# Joining & Coating Dept.

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## Coating staff members:

**Aaron Hall**

**Deidre Hirschfeld (faculty sabbatical)**

**Rod Williamson**

## Technologists/Contractors:

**John Cates**

**James McCloskey**

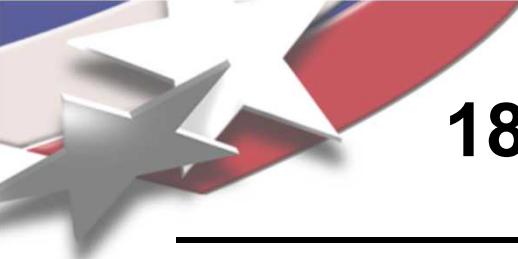
**David Urrea**

**David Beatty (contractor)**

**Andrew Mayer (contractor)**

**Tim Roemer (contractor)**

**John Perovich (student intern)**

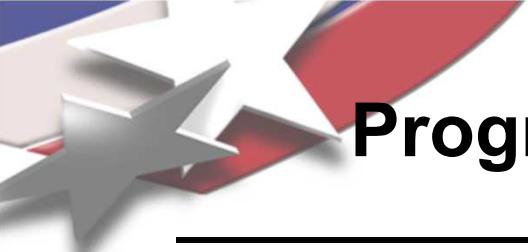


# 1813 Equipment Acquisitions:

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**Put into service recently or funded for immediate acquisition:**

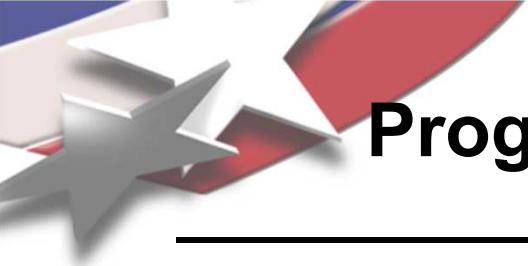
- **Potomac Photonics MicroPackaging Laser System Operating (F gas for excimer laser major concern, finally legal with all safety features installed & working)**
- **Analysis department's 1990-vintage JEOL SEM, now used as micro-E beam welder (replaced 1980-vintage ISI SEM)**
- **Spiricon CCD-based beam analyser with Navitar zoom lens for exceptionally small spot size determinations for visible and near IR wavelengths**
- **Photron APX/RS color high speed video (500K fps!) and fiber-delivered 20W Cu vapor laser for illumination.**
- **In process of replacing Anorad motion controller for existing Rofin-Sinar 1600W cw Nd:YAG laser (with Aerotech system)**



# Programs: Welding/Matls Research

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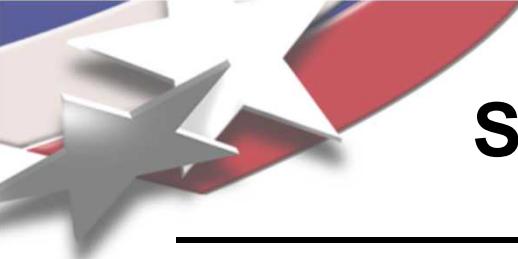
- C6 (Validation & Verification of ASC codes) Studies:
  - Laser welding fluid flow, shape, porosity for model validation (JN, CVR)
  - Laser weld mechanical properties using speckle correlation techniques to examine strain localization and overall weldment response (CVR)
  - Laser weld distortion measured via simple beam test and related analysis, used to validate ASC LW distortion models (CVR)
  - Diffusion bonding in support of advanced NG concepts. (CVR)
- C2 (Research Foundations) Study:
  - Laser Welding (CVR, others)
- DOE Environmental Management
  - Ni-Cr-Mo-Gd Alloy developed by SNL and INEL recently received an ASME Code Case approval. Present activities are aimed at commercialization for both DOE and non-DOE spent fuel canisters (~1800 tons req'd) and providing procedures and data to support a Code Case approving the welded alloy.
- LDRD
  - Armor development (GAK, J. Glass 1825, others)



# Programs: Welding Manufacturing

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- Neutron Tube/Neutron Generator support
  - Pulsed laser beam characterization (JN)
  - Modeling of NT girth and header welds (GP, JN, GAK, Allen Roach)
- PDP
  - Porosity formation in laser welds, joint with H FM&T (CVR, JN, AR) and C6
  - Gap bridging of laser welds (JN, AR, GAK)
  - Laser-based Ultrasonic NDE technique for welds, brazes, g-to-m seals (GAK)
  - Welding Al components in the ELNG (PG, JN, GAK, MP)
- W76-1, W80-2,3 LEP welding support (all)
  - PPI and QE lots for stronglinks/fireset/AF&F are ongoing or imminent; many last minute issues needing immediate resolution are being worked
  - Temperature optimization for Laser welding of glass- or ceramic-to-metal headers (cw vs modulated waveform)
  - Materials (weldable SS spec)
  - Misc. Design and QA issues
  - Specification writing
  - Micromachining technology maturation program: Static Interfaces (GAK)
  - Laser forming Launch Accel. Neyoro-G contacts (GAK & J Palmer 2455, 'Sharpening the Saw')
  - MC4698 Thermal battery lead/terminal fatigue cracking (GAK)



# Soldering/Brazing Programs

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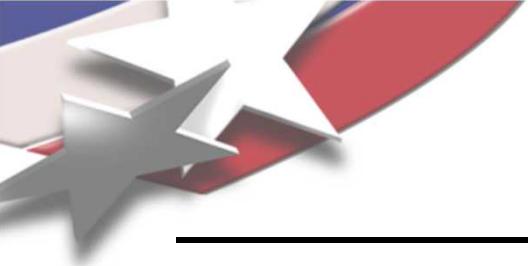
- **Don Susan has joined Paul Vianco in SNL's Solder Center.**
- **Effect of Au contamination on aging of solder microstructures and mechanical properties (C2 Research Foundation support)**
- **Ceramic/metal brazing support (Neutron Generators)**
- **Thick film brazing support (W80 CDU).**
- **Don Susan (1825), Jim Van den Avyle (1822), Sandy Monroe (1825), Matt Perricone (1813) and Rob Sorensen (1823) have teamed to investigate glass-to-metal seal processing for Lightning Arrestor Connectors. The team is studying the effects of composition and processing on the pre-oxidation behavior and glass adhesion of austenitic alloys (other than 304L). Supported by C2 RF, LACs and KCP-origin ADAPT funds.**
- **Soldered package evaluation (C8 Enhanced Surveillance)**



# Production Update:

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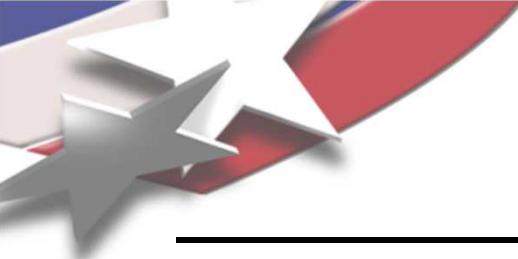
- **Neutron Generator Group**
  - Gary Pressly has been promoted to "Distinguished Member of Technical Staff"
  - Evan Dudley has joined the Weapons Intern program and his brazing work is now supported by Dan Appel and Daniel Garcia.
  - High power multiaxis general purpose laser welding systems are being replaced with smaller dedicated laser welders. They have proven more reliable, easier to maintain and use, more mobile and less mistake prone. Lean mfg principles are the drivers, and ROI is ~1.5 years.
- **Battery Group**
  - New development dryroom online (includes new Starweld spot weld laser and 90W Rofin-Sinar pulsed Nd:YAG)
  - Old development/production dryroom now converted to production only (also has spot weld laser and R-S 40W pulsed Nd:YAG being upgraded to 90W)
  - Successfully produced WR lot of MC3929 batteries
  - Preparing for WR lot of MC3948 batteries
  - Preparing for WR production of new MC4698 battery (at Eagle-Picher Technologies, Joplin, MO)



# Weld "Shops" Update

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- While the L-H EBW and Lumonics LBW systems are up and running, they are becoming unreliable.
- PTR quoted 250K\$ for an updated motion system for the L-H EB (does anyone have an EB welder they're about to excess with a good CNC?).
- SNL will need to decide if they want to keep the facility open when equipment replacements/upgrades become critical.



# Programs: Thermal Spray

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- Aaron Hall is now the PI of the Thermal Spray Research Lab
- TSRL's fully functional vacuum plasma spray facility was recently upgraded to allow vacuum as low as 1 Torr in the spray chamber.
- Active program investigating thin coatings (1-10 micron thick) produced by Very Low Pressure Plasma Sprayed process.
- TSRL is examining use of VLP-PS thin coatings of Ni as an EM shield for a component.