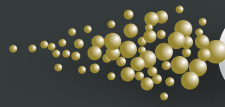




Center
for Innovative
Sintered Products



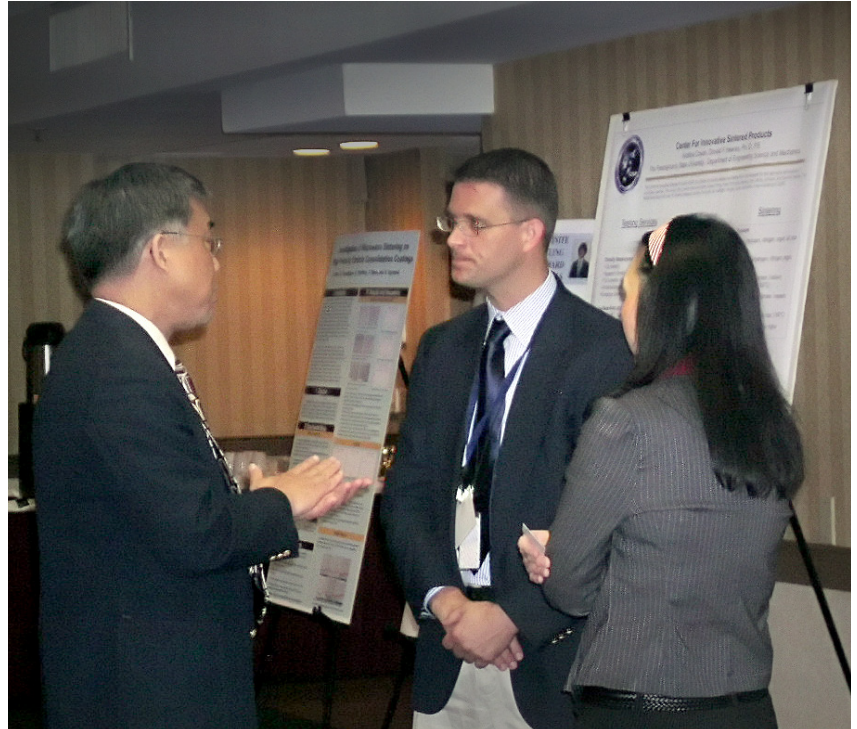
CISP

Penn State
118 Research West
University Park, PA 16802-6809

Phone: 814-865-2121 • Fax: 814-863-8211 • E-mail: CISP@psu.edu • Web: <http://www.cisp.psu.edu>

2009 Industry Member Meeting

Days Inn Penn State
State College, PA
April 15 - 16



Training on New FCT Systems GmbH SPS machine

*Come learn
about our new
initiative on
Refractory and
Hardmetals*

PENNSSTATE



Keynote Speaker



Dr. Albert E. Segall

Professor of Engineering Science and Mechanics

PROBABILISTIC FRACTURE ASSESSMENTS OF THE RESPONSE OF CERAMIC CANNON BARRELS INCLUDING THE INFLUENCE OF ALTERNATE RIFLING GEOMETRIES

A.E. Segall and R. Carter

Given their resistance to wear, thermal shock, and thermochemical degradation, ceramics make sense for gun barrel applications. However, their brittle nature and the severe stresses caused by intense pressure and temperature transients must be factored into the design process. Given these concerns, a 3-D finite-element model was used to simulate the severe and localized thermal/pressure transients and the resulting stresses experienced by a rifled ceramic-barrel with a steel outer-liner; the focus of the simulations was on the ceramic materials response, as well as the influence of non-traditional rifling geometries on the thermoelastic and pressure-stresses generated during a single firing event. Results indicated that the unique rifling geometries and refractory ceramic had a significant influence on the maximum circumferential (hoop) stresses and temperatures when compared with more traditional rifling configurations. As with earlier studies, it was also found that increasing fillet radii could lower the stresses and failure probabilities over time.

Biography:

Albert E. Segall is a professor of engineering science and mechanics. His research interests have mainly focused on the thermo-structural behaviors and reliability of materials. This research includes the development of probabilistic fracture and brittle-design methodologies and their application to the understanding of thermal shock-behaviors of ceramics, the underlying thermal transients via direct and inverse approaches, and laser machining. Dr. Segall is also interested in the study of wear, friction, coatings, and the development of realistic tribo-test methods to assess wear-couples under industrially relevant conditions. Additional research interests include the study of creep and fatigue behaviors of stainless steel PM alloys. As an avid science fiction fan, Dr. Segall is also working on innovative ways to integrate this genre as seen in movies and books with engineering education.

Industry Spotlight

Horiba Instruments, Inc.



Horiba Instruments is a worldwide leader in analytical instrumentation. Analytical instruments offered by the scientific divisions range from particle size analysis to optical spectroscopy. The Partica LA-950 is the most advanced particle size analyzer of

its kind in the world with a dynamic range of 0.01-3000 μ m.

Evening Speaker



Michael Appleby

Mikro Systems, Inc.

TOMO LITHOGRAPHIC MOLDING (TOMO™)

MIKRO has developed a high-volume manufacturing process for producing complex, net-shape, micro-to-meter scale structures from advanced materials.

This process is a synthesis of lithographic micromachining, precision stack lamination, and replication processes.

The production cycle begins by transforming a 3D digital model into a series of lithographic masks, each representing a cross-sectional slice of the desired 3D solid. Each mask is used to lithographically machine an exact replica from metal foil or polymeric film. Next, the foils and/or films ("toma") are stack-laminated to create a durable, ultra-high precision master tool. This is typically a non-recurring operation. Low-cost, production tooling of the same dimensional accuracy can be derived from the master. These second and subsequent generation tools can be a negative or positive copy of the master tool.

Multiple generations of replicas can be derived from the master tool at low unit cost. Finally, application-specific material is used to produce a high-fidelity, monolithic part. TOMO™ combines the precision of lithographic machining with the economy of a net-shape replication process.

Biography:

Michael Appleby, co-found, president & ceo of Mikro Systems, Inc., Charlottesville, VA. Appleby has more than 25 years of experience in commercial product development with specific emphasis in the field of photolithography and photochemical machining. He is a co-inventor on more than ten U.S. patents and has co-authored publications with leading researchers in the fields of medical imaging and astrophysics. Before founding Mikro Systems, Appleby was director of new product development at Thermo Electron/Tecomet.

Industry Spotlight

Global Tungsten and Powders (GTP)

GTP used to be part of the lighting manufacturer Osram for many years and was recently acquired by the Plansee Group to increase the company's competitiveness and raw materials supply base for tungsten products, and expand its refractory metals activities in North America. GTP's expertise in processing tungsten ore concentrate and recycling of hard materials scrap has enabled the company to become the leading supplier of tungsten powders in North America. Its product range additionally includes molybdenum powders and semi-finished products, as well as other powders that are relevant to the Plansee Group's markets. GTP's main customers are from the aerospace, automotive, coating, electronics, energy and lighting industries.

GTP has production sites in Towanda, PA, and Bruntál, Czech Republic, and employs 1,050 people. In the last fiscal year, it recorded sales of approximately 280 million euros. To meet the group's increasing requirements for tungsten powders, the Plansee Group plans to expand the Towanda site.

CISP Industry Member Meeting

April 15-16, 2009

Wednesday, April 15, 2009

- 12:30 **Registration / light lunch**
- 1:30 **Welcome / introductions and Status of CISP**—*Donald Heaney*
- 1:40 State of the Engineering Science and Mechanics Department—*Judith Todd*
- 1:50 Microwave Sintering of WC/Co and Refractory Metals—*Dinesh Agrawal*
- 2:25 Hot Pressing Capabilities and Activities at PSU—*Tim Eden*
- 2:45 Vacuum Sintering of Metals—*Donald Heaney*
- 3:05 Probabilistic Fracture Assessments of the Response of Ceramic Cannon Barrels Including the Influence of Alternate Rifling Geometries—*Al Segall*
- 3:35 **Break**
- 4:05 Contemporary Hardmetals—*Ivi Smid*
- 4:25 Spark Plasma Sintering Technology and Applications—*Jogender Singh*
- 4:55 **Industry Spotlight:** Particle Characterization of Powder Metals—*Keith Swain, Horiba*
- 5:25 **Social**
- 6:00 **Dinner**
- 7:00 Tomo Lithographic Molding (TOMO™)—*Mike Appleby*
- 7:45 **Closing / plan for tomorrow**—*Donald Heaney*

Thursday, April 16, 2009

- 8:00 **Continental Breakfast**
- 8:30 **Welcome**—*Don Heaney*
- 8:35 Financial update
- 8:45 Materials Testing at CISP—*Kristina Cowan*
- 8:55 Cold Sprayed Aluminum Coatings for Magnesium Aircraft Components—*Brian DeForce*
- 9:15 Powder-Based Stainless Steel Microcomponents Fabricated by Utilizing Lithographic Featured Tooling—*Craig Shaffer*
- 9:35 Effect of Sintering Temperature on Feature Resolution—*Kevin Geist*
- 9:45 2008 International Research Experience for Students in Innovative Sintered Materials at University Carlos III de Madrid (Spain) with Penn State and Mississippi State—*Dan Cunningham*
- 10:05 **Break**
- 10:30 **Industry Spotlight:** Global Tungsten and Powders (GTP)—*Thomas Wolfe*
- 10:50 Industry – University Partnerships, Case Studies—*Tanna Pugh*
- 11:10 PSU's Refractory and Hard Metals Initiative—*Donald Heaney*
- 11:35 **Lunch**
- 12:30 Industry Council Meeting
- 2:00 **Meeting adjourned**

Registration Form

Register me for the CISP Industry Member Meeting, April 15–16, 2009, Days Inn Penn State, 240 S. Pugh St., State College, PA. Registrations will be accepted by e-mail, mail or fax through Friday, April 10, 2009.

Name _____

Company _____

Address _____

City _____ State/Province _____ Country _____

Telephone _____ Fax Number _____ E-mail _____

- My company is a member of CISP
- My company is not a member of CISP, but I would like to attend this meeting (\$300⁰⁰ registration fee)

- I will attend: April 15, 2009 Lunch Dinner
- I may attend: April 16, 2009 Cont. Breakfast Lunch

Mail checks payable to The Pennsylvania State University



Fax or mail completed registration form by April 10, 2009 to:

Donald Heaney—Director
 Center for Innovative Sintered Products Fax: 814-863-8211
 118 Research West Phone: 814-865-2121 (inquires)
 University Park, PA 16802 E-mail: CISP@psu.edu

ACCOMMODATIONS are available at the Days Inn Penn State—*please make reservations immediately*
Days Inn Penn State - 240 S. Pugh St., Phone: 814-238-8454, Fax: 814-234-3377, E-mail: sales@centrehotel.com
 \$78⁰⁰ per room (reference CGCFIS when making reservations)

Map & Directions



Need help? Call 814-865-2121

Center for Innovative Sintered Products
 118 Research West, University Park, PA 16802-6809
 Office: 814-865-2121 Fax: 814-863-8211
 E-mail: CISP@psu.edu www.cisp.psu.edu

