



Northern Lights Chapter # 370

The Northern Lights

January 2008

For the latest information visit
<http://chapters.sme.org/c370/>

If you would like to be added to our monthly newsletter visit:
<http://maillists.bijouenhancements.com/lists/>

SME Northern Lights Chapter 370 proudly presents

Fundamental Studies and Industrial Applications of Plasma-sprayed Coatings

Presented by André G. McDonald, Ph.D., P.Eng
(Department of Mechanical Engineering - University of Alberta)

Plasma-spraying is a process in which a high-temperature ionized gas jet is used to melt and accelerate micron-sized metal, ceramic, or alloy particles to build protective coatings on industrial machine components. Fundamental studies have focused on the fragmentation of the high-speed (~200 m/s) molten particles, which results in reduced mechanical strength of the final coating. High-speed particles (~40 µm diameter) were plasma-sprayed onto glass and metal held at either room temperature or at 400°C. Photographs of the splats, during spreading, were captured by using a fast CCD camera. A rapid two-color pyrometer was used to collect thermal radiation from the particles during flight and spreading to follow the evolution of their temperature. Particles that impacted the surface at room temperature disintegrated, leaving a small central solidified core on the substrate. On a surface held at 400°C, there was no fragmentation and a circular, disk-like splat remained. It was found that particles on heated surfaces had cooling rates that were significantly larger than those on non-heated surfaces, suggesting that splat-substrate contact was improved. Mathematical models were developed to show that the splat-surface contact area was significantly lower on non-heated surfaces, while the thermal contact resistance was more than an order of magnitude larger than on heated surfaces. It was concluded that the reduced splat-surface contact and increased thermal contact resistance was due primarily to vaporized adsorbates at the splat-substrate interface.

From these fundamental studies, the research program will be ready to conduct other studies with greater industrial applicability. Government of Alberta funding has been secured to study the application of nanostructured ceramics to combat wear, erosion, and corrosion in equipment in the oil sands and forestry sectors. Other projects will involve the novel fabrication of thermocouples by cold-gas dynamic spraying for application in forest fires, as well as the fabrication of solid oxide fuel cells by combined thermal spraying processes. Fundamental engineering research will still be an important component of the research program. The presentation will detail plans to develop advanced heat transfer models and experiments to estimate the temperature distribution in substrates during thermal spray deposition and the thermal diffusivity of thermal-sprayed coatings.

WHERE TO GO!

University Faculty Club
11435 Saskatchewan Drive

Wednesday, January 9, 2007

Social Hour: 5:30 to 6:30 pm
Dinner: 6:30 to 7:30 pm
Presentation: 7:30 pm

COST: \$20 members
\$25 guests
\$10 student members
\$15 student guests

Member pricing is always extended to members of other technical societies such as ASM, AWS, CWA, NACE, CSME, ASME, etc.

Please RSVP by 4:00pm **Monday, January 7, 2007.**

RSVP Online for our event at

<http://maillists.bijouenhancements.com/sme/>

PLEASE DO NOT "REPLY" TO THIS NEWSLETTER

The SME Northern Lights Chapter normally holds technical meetings on the second Wednesday of each month except for the month of July and August.

REMEMBER...

Students and student members that attend the SME dinner meeting have a chance to win a FREE dinner drawn at the end of the meeting.

Northern Lights Chapter Executive 2007



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Thank you...

for reading the Northern Lights. If you are interested in presenting at an SME dinner, please contact Dave Budney, drbudney@shaw.ca.

SME Northern Lights Chapter 370

Is proud to present . . .

FUNDAMENTALS OF LEAN and WORLD CLASS MANUFACTURING

**Presented by:
Gary Loblick, P.Eng., MBA**

On February 22, 2008

Companies that have implemented Lean programs have achieved:

- **50% reduction in WIP**
- **75% reduction in labor time for product assembly**
- **Improved on-time delivery by 80%**
- **Reduced average throughput time per order by 65%**
- **Reduced order lead time from 8 weeks to 1 week**
- **Reduced overall labor-hours per unit by 30%**
- **Reduced machine set-up times by 60% to 88%**

SEE UPCOMING NOTIFICATION AND THE SME NORTHERN LIGHTS WEBSITE FOR MORE INFORMATION INCLUDING REGISTRATION DETAILS

<http://chapters.sme.org/c370/seminars/>

Remember to keep SME information current

- We do not wish any of our members or friends to miss a newsletter. Please make sure to inform the newsletter editor of any changes to your email or employment address.
- If you have any newsworthy stories or information, we would be pleased to include it in our newsletter, subject to editorial approval.

If you know of anyone who would like to receive this newsletter, please send them to <http://maillists.bijouenhancements.com/lists/>. The best part about it - it's FREE!!