

## Stress Alert

The National Park Service (NSP) of the U.S. Department of the Interior has been involved in a project to restore French sculptor **Frederic Auguste Bartholdi's Statue of Liberty**. The recently completed project returned the Statue (engineered by Alexander Gustave Eiffel), located in New York City harbor, to a safer and more appropriate condition as America's symbolic 'First Lady'. Part of the restoration effort involved replacing elements that are incorporated into the Statue. But, to accurately match the replacement copper with the old, the existing copper had to be analyzed and a quantitative breakdown of its elemental composition given to the French metallurgists working on the restoration. With only a tiny, 2.5-cm square sample (not much bigger than an average man's fingertip), the Materials Characterization Division (MCD) of MTL's (Materials Technology Laboratory) Organic Materials Laboratory went to work. Emission spectroscopy and X-ray examination were performed on the sample. Emission spectroscopy means exposing the sample to extremely high temperatures and vaporizing it. This emits a characteristic light which is a direct measure of the specific element and amount of element in the unknown, or sample. These light measurements, or spectroscopic 'fingerprints', are used to identify the elements that make up the sample. Ten elements were found, in concentrations ranging from the 99-percent copper to minute amounts of lead, arsenic, silver and gold. The surface of the sample was also examined, using X-ray procedures. Lead was found, perhaps derived from the templates used in shaping the copper, and titanium, apparently from a paint pigment. The surface was also found to contain an appreciable amount of iron, with speculation that this was pollution from a nearby ironwork. This analysis has been instrumental in matching the materials used in the restoration effort to the original materials used in the construction of the Statue. It is important to match the new and old to avoid the corrosion problem which would arise from using dissimilar metals.

A new approach, being offered by **Battelle**, enables firms to enter into a phased program in coatings technology development and commercialization. In the first phase, researchers demonstrate

the technical feasibility of the concept. The second phase involves limited pilot-plant manufacturing of products at Battelle, along with the opportunity for a client to obtain licensing rights to the technology as applied to the client's product. The final phase provides several options for mutual involvement by the client and Battelle in the firm's long-term production operations. These relate to equipment, layout, training, test marketing, and manufacturing ventures. The new approach is being offered by the Electronic Materials and Advanced Coatings Section at Battelle's Columbus Division.

Technical damage research has been carried out by **Allianz Versicherungs-AG** for more than 50 years and this has made an active contribution to restraining the sometimes threatening increase in the losses incurred in the most varied technological fields. The results of the research are equally applicable to the design, material selection, manufacture and operation of machines and installations. The insurer gives an informative survey of the activities of his research facilities in a sixteen-page reprint. The German version (ordering ref. TI-D6-189) has already been available for some time

and an English edition (ordering ref. TI-E6-189) has now been published. For more information contact Allianz Versicherungs-AG, Vertrieb-Redaktion/ TI, Postfach 44 01 24, D-8000 Munchen 44.

**Temescal, a Berkeley, CA, based manufacturer of thin-film deposition equipment, has formed a strategic partnership with SFI**, a leader in the development of sputtering deposition systems, located in Santa Barbara, CA. Keith Hampe, President of Temescal, and Michael McGarr, Vice-President of SFI, anticipate a mutually beneficial association, providing growth opportunities for both companies. The terms of the agreement give Temescal access to results of SFI research and development for 10 years. In return, SFI gains the use of Temescal's large manufacturing, sales and service capabilities. This strategy provides Temescal with an additional source of new products to continue its expansion as a major supplier to the semiconductor industry, and SFI with the financial resources to continue to develop 'leading-edge' deposition equipment. For further information contact Zoe Zuber or Rachel Kimball, Temescal, 2850 Seventh Street, Berkeley, CA 94710; (415) 841-5720.

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## Conferences/Exhibits

**November 2-5, 1986. 1986 SEM FALL CONFERENCE ON EXPERIMENTAL MECHANICS AND TABLE-TOP EXHIBIT: 'Optical Methods and Composites.'** Keystone Resort, Keystone, CO. Contact SEM, 7 School Street, Bethel, CT 06801; (203) 790-6373.

**November 10-13, 1986. Icaleo 86 Fifth International Congress on Applications of Lasers and Electro-Optics.** Sheraton National Hotel, Arlington, VA. Contact Jack Dyer, Laser Institute of America, 5151 Monroe Street, Toledo, OH 43623; (419) 882-8706.

**November 30-December 5, 1986.** International Symposium on Pressure and Temperature Measurement, part of ASME Winter Annual Meeting. San Francisco, CA. Contact J.H. Kim, Electric Power Research Institute, 3412 Hillview Avenue, P.O. Box 10412, Palo Alto, CA 94303; (415) 855-2671.

**February 17-18, 1987.** Second International Conference on Stress Analysis by Thermoelastic Techniques. London, England. Contact David Oliver, Ometron, Inc., 380 Herndon Parkway, Suite 300, Herndon, VA 22070; (703) 435-9799.

**March 1987.** 4th Annual Hostile Environments and High Temperature Measurements Conference, Hartford, CT. Contact SEM, 7 School Street, Bethel, CT 06801; (203) 790-6373.