As part of the university-wide strategic planning process, Case School of Engineering is focusing on enhancing the school’s strengths while seeking interdepartmental collaborations, as well as forming new partnerships with the community and industry.

Case Alumnus begins a new series of feature articles beginning with this issue. Each series will highlight one of those core disciplines as outlined in Dean Tien’s message to alumni (see opposite page). Our stories will showcase “energy, technology and health, advanced materials, and entrepreneurial-thinking in education” and the CSE-based institutions related to each.

In the coming issues, we’ll take an in-depth look at, among others, the Great Lakes Institute of Energy & Innovation, the Center for Layered Polymeric Systems (CLiPS), the Center for Cardiovascular Biomaterials, the Case Advanced Power Institute, the Center for Computational Genomics and Systems Biology, the National Center for Space Exploration Research, and the Yeager Center for Electrochemical Sciences.

Advancing the Cause

The Swagelok Center for Surface Analysis of Materials, located on the ground floor of the Glennan Building at Case Western Reserve University, is part of the Department of Materials Science and Engineering. SCSAM is a multi-user analytical facility providing instrumentation for microstructural characterization of materials as well as surface and near-surface chemical analysis.

Case Alumnus toured the facility with Frank Ernst, Leonard Case Jr. Professor of Engineering, one of two co-directors of the center. Arthur H. Heuer, Kyocera Professor of Ceramics at the Case School of Engineering, is also co-director. SCSAM is integrated in the recently-founded Case Center for Surface Engineering, presently financially supported by the Wright Projects Program through Ohio’s Third Frontier Initiative. This initiative supports the development of new technology leading to new jobs and new markets in the state.

FEI Tecnai F30: SCSAM’s most sophisticated instrument, this energy-filtering field-emission gun high-resolution analytical scanning transmission electron microscope allows for high-resolution imaging. The instrument is equipped with a state-of-the-art X-ray energy-dispersive spectroscopy (XEDS) system.

Zeiss LIBRA 200FE Field-Emission Gun Energy-Filtering Transmission Electron Microscope: As part of a Wright Project entitled “Case Center for Surface Engineering,” SCSAM plans to install this new instrument in March 2009.
Frank Ernst efficiently makes his way to each instrument throughout the center, telling his visitors the name and purpose for each of the highly-technical and specialized machines used to study the surface structure of a broad range of materials. It is clear by his beaming face that he is proud of each and every piece of sophisticated equipment in the secured ground-floor room that houses the Swagelok Center for Surface Analysis of Materials.

The newest SCSAM equipment comes courtesy of state-sponsored funding acquired by the Case Center for Surface Engineering. What is truly exciting about these acquisitions from the University’s perspective is the cost share that equates to nearly twice the state funds. The new instruments will be an essential part of an umbrella research program, supported by the operating funds of the Wright Project.

“Some of the operating funds will support projects of common interest that will provide intense interaction between our graduate students and companies using these new instruments,” said Dr. Ernst, director of the project. The Wright Project will enable Ohio industries to develop new technology, establish new markets, and create jobs. The instruments will be used for analyzing engineered surfaces, Dr. Ernst further explained, which means studying the microscopic structure of surfaces ranging from ceramics to polymers to semiconductors to metals. The companies then use that information to improve the surface properties.

Currently there are 15 companies working with these instruments through SCSAM, many that employ alumni from Case. But, Dr. Ernst noted, it is far from a closed club. The center is constantly looking for more companies to join the program, which they can do as part of the cost-sharing opportunity for the project.
“In order to be a member of our advisory committee, the companies need to commit by providing cash to the project. What that buys is scientific support with this instrumentation and decades of expertise in these techniques,” he said.

The search to bring in new investors to join in the effort is ongoing. Dr. Ernst believes that Case alumni can be a major factor in attracting such relationships, and he highly values the already-strong alumni relationships as a basis for present and future successful partnership between local industry and the University.

“The people who actually use the instruments at our center, including the alumni, know what we have to offer and how unique the center is. They played a key role in our efforts to obtain funds for the Wright Project by convincing their management to provide the required cost-sharing,” Dr. Ernst explained.

“We actually came up with a cost sharing of 2 to 1, which exceeded the 1 to 1 for every dollar Ohio has given us. Out of the more than 60 proposals received by the state, ours came in at number one,” he said. “That has everything to do with those alumni relationships.”

The Story Behind the Endowed Chair

Arthur H. Heuer
Kyocera Professor of Ceramics at the Case School of Engineering
Department of Materials Science and Engineering

Arthur Heuer’s reputation as a leading researcher in the field of materials science is directly tied to the success of Case’s Swagelok Center for Surface Analysis of Materials. As co-director of the center, he has helped secure millions of dollars in funding in addition to obtaining other research funding for the Case School of Engineering.

Case Alumnus recently spoke to Dr. Heuer, currently on sabbatical leave in London.

How did you come to be named to the Kyocera chair?

The story goes back to roughly 1980 time frame when I was approached by a patent lawyer who worked with Kyocera, a global leader in ceramics technology. The company was looking for some technical help in two different patent disputes. The only guy that could do what the company needed was me—using the instruments that would eventually be part of the center.

I helped on both cases, and Kyocera top executives were very pleased. In 1983, I was working the day after Thanksgiving and received a call from the senior partner on this case. He asked if I had an endowed Chair, and then asked if I would like one. About a year later I received a letter asking if I could please meet the legendary founder of Kyocera at their U.S. main office in San Diego at 9 a.m. on a Monday morning. I proceeded to try to get someone at Case to join me but the only person I could get was my department chair. It seemed everyone else thought this was such an unlikely event, they couldn’t be bothered to go or they were too busy. We did go there and sometime later the Chair developed. I have been Kyocera professor ever since.

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The Swagelok Center for Surface Analysis of Materials

First established in 1974 as a center for electron microscopy, the facility now known as the Swagelok Center for Surface Analysis of Materials was renamed in December 2006 after receiving a substantial grant for remodeling and additional resources from Fred A. Lennon, founder of Swagelok Company.

The Fred A. Lennon Charitable Trust, formed after Lennon’s death, is dedicated to education, health care and economic development in Northeast Ohio. Swagelok Company, located in Solon, Ohio, is a longtime Case School of Engineering corporate partner.

In 1986, Case received a large Multidisciplinary Research Program of the University Research Initiative (MURI) grant from the Defense Advanced Research Projects Agency (DARPA). This, along with additional major funding from the state, the National Science Foundation and corporate partners, helped establish the Center for Surface Analysis of Materials. Further grants from DOE, NSF, the State of Ohio and DARPA allowed for continual upgrades and expansion.

Please turn to pages 12-13 for more Swagelok-related coverage.

Photo caption, top of opposite page:
Dr. Ernst demonstrates the new PHI VersaProbe Scanning XPS Microprobe, a multi-technique surface analysis instrument. It can produce a focused, highly monochromatic X-ray beam that can be scanned over the specimen surface.