John Bauguess

John Boosinger of the UO's Technical Science Administration uses a diamond-tipped drill to custom modify research equipment.

Fabricating Science

In a little-known corner of the University, technicians and students hand-make the tools of research.

Deep in the basement of Pacific Hall, alchemists are at work. The ingenious staff at the UO's scientific instrument shop may not be changing base metals into gold, but they are by all reports using their extraordinary creative powers to transmute ordinary, inexpensive materials into sophisticated scientific research equipment.

"I've had work done at this shop that started out with a sketch on a napkin," says Dana Johnston, professor of geological sciences. "The staff thrives on bringing a rough concept to completion as a well-designed and expertly built device, at as affordable a price as is possible."

The machine shop, along with an electronics shop in a nearby building, is part of the Technical Science Administration, which provides low-cost technological services and expertise to the scientific community of the College of Arts and Sciences (and to the rest of the University at a somewhat higher rate). A sudent shop shares the space.

Kris Johnson, M.S. '96, is the shop's senior instrument technician. With undergraduate degrees in chemistry and math, a master's degree in physics, and a degree from the Lane Community College machine shop, he is uniquely qualified to help researchers bring their ideas to fruition. One of Johnson's recent projects, for physics professor Russ Donnelly, was to create a syringe device that expels a small volume of water from a tube, producing a traveling vortex ring in water. The intent is to figure out how to control the swirling ring. "The vortex of fluid dynamics is not understood," Johnson says. "It's an extremely complicated mathematical problem." Extremely complicated, and extremely important to Donnelly's ongoing research.

The shop's resident guru, Dave Senkovich, officially retired about five years ago after a twenty-five-year stint as manager of the University's chemistry stores and teaching labs, but he continues to work half-time in the machine shop because he thrives on the creative challenge. "People come in and they have an idea of how they want to do something," he says. "Everyone working in the shop has different strengths. We start talking, and we figure out how to approach it. We are treated as members of the research group."

Senkovich was instrumental in helping Dana Johnston create equipment that uses computer-controlled pressure vessels to simulate the physical and chemical environment of magma rising. "Dave got interested in my goal, and he designed an entirely new and much better way to generate and control the pressure than is used in other labs," Johnston says. "He and Kris also suggested countless ways that they could make things for much lower cost than I could buy them commercially, enabling my grant funds to build a more extensive experimental setup."

The student shop offers a one-credit class in which undergrads learn to use the tools, but its main denizens are graduate students conducting scientific research. The students come in the door with a simple drawing or sometimes just an idea, says John Boosinger '03, student shop supervisor. "We discuss all the possibilities—from the plywood version to the stainless-steel and gold version." His first task is to teach the student researcher how to use the lathes, milling machines, drill presses, and other tools. "We don't give them busywork," he says. "We just start with the simplest parts of their projects. In a machine shop, if you follow instructions and watch the numbers, you'll end up with a nice product. The stuff they produce is top-notch." Use of the shop—with expert assistance—is just $10 per hour for student researchers.

> ***"I've had work done at this shop that started out with a sketch on a napkin,"***

Dana Johnston says he is not aware of any other university that gives student researchers the opportunity to build the gizmo of their dreams. "It shows students that their scientific endeavors aren't limited to experiments they can perform only with the equipment they can buy from a scientific supply house. Instead, they learn that there is no such limitation—if it doesn't exist for sale, they can build it!"

Johnston raves about the spirit of intellectual curiosity, integrity, and cooperation that pervades both shops. "Everyone has so much fun, be they the shop staff, faculty customers, or graduate student apprentice machinists," he says. "It's a unique and wonderful place where a different kind of learning goes on."

Boosinger's eyes light up as he gives voice to the intellectual excitement that infuses this basement workshop full of decades-old tools. "We have so much fun," he says. "I would work here for nothing."

—ROSEMARY CAMOZZI '96

DECISION SCIENCE

AND THE WINNER IS . . .

For a UO researcher, predicting Oscar winners is as easy as

$$\Pr(Y=j\,|\,\boldsymbol{x}_i)=\frac{\exp(\beta^T\boldsymbol{x}_{ij})}{\sum_{h\in C_i}\exp(\beta^T\boldsymbol{x}_{ih})}$$

IAIN PARDOE IS LOOKING FOR A HOLLYwood ending. Not, mind you, a Hitchcock-style ending with twists, turns, and a hold-your-breath shock finale.

Like some Hollywood endings, Pardoe's does involve a formula. But instead of a secret, dark-shadows-in-the-alleyway-license-to-kill formula, it's one that Pardoe himself has devised as part of his research and teaching as an assistant professor in decision sciences at the UO's Charles H. Lundquist College of Business. It's a formula for the Oscars. More precisely, it's a formula that enables Pardoe to predict with a great degree of accuracy who will win best actor, best actress, and best director, as well as best picture at the Academy Awards.