



Ken Ragsdell's Design Optimization Laboratory excites American industry and places University students at the vanguard of design research.

making good
ideas better

KEN RAGSDELL has a commanding presence—he looks like a drill sergeant and speaks like a senator. But his ideas are his biggest drawing card. Last year they drew \$325,000 from companies big and small across the country.

For Ragsdell, a mechanical engineer, an idea is something you start with and then make better and better. In engineering jargon, that's called design optimization.

In 1976, his idea was to create a design optimization laboratory. Today the DOL operates from its base at Mizzou's College of Engineering with

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financial backing from such corporate giants as Whirlpool, IBM, Xerox, Honeywell and General Motors.

SITUATED in the rear corridors of the Engineering Complex, the lab is a magnet to faculty and students who want to do world-class research in the field of computer-aided design and manufacturing. Besides serving as a teaching tool, DOL produces innovative computer software for companies that belong to its Software Users Group. In 1984 its software, sold at a fraction of market prices, generated \$90,000.

But DOL is not merely a producer of quality research and quality software. A visionary like Ragsdell never thinks in such narrow terms. DOL has a mission: to push the United States to the front of the pack in all sectors of mechanical and machine manufacturing.

"This country is doing a good job of designing razor blades and nuclear power plants," Ragsdell says, "but in between we're getting beat. Japan and Germany and some other countries are really killing us with our own technology." Our problem is not with labor, he says, but with management, specifically the management of design.

According to Ragsdell, most Americans don't realize that the standard of living they currently enjoy simply won't be available to their children if American industry continues with business as usual.

"I hear people say that the United States will move into an information age and we won't be a manufacturing country," Ragsdell says. "I pray not. Because if we do, we doom ourselves to second-class status. We must do whatever is necessary to continue to be the leading manufacturing country in the world."

The laboratory's subscribing members seem to agree.

The subscribers group consists of companies that have a keen interest in fundamental engineering research, to the point that they're willing to contribute a minimum of \$25,000 a year, no strings attached.

"WE KNOW we need to get the computer more and more into the design process," says Gale Cutler, Whirlpool's

vice president of university relations.

Through newsletters and conferences, the lab communicates steadily with its subscribers and software buyers. "Too often, industries are interested in doing one thing and universities are interested in doing another thing," says lab manager Mark Iannuzzi. "What we're trying to do is bridge the gap."

The lab starts with a structural design and then strives to improve it through computer-assisted design/computer-assisted manufacturing (CAD/CAM).

The possible applications of CAD/CAM are virtually limitless. In recent months, doctors at the Hospital for Special Surgery in New York have created precision artificial knee and hip joints with CAD/CAM, while at the same time the Frito-Lay's Co. has used it to design a crunchier potato chip.

At DOL, current projects include making copy machines, automobiles, typewriters and air conditioners lighter and more efficient and helicopters, ships, airplanes and buildings more durable in severe environments.

LEADING THE WAY are senior research investigator Dr. Brian M.E. de Silva, a world-renowned expert on structural optimization; Dr. Eric Sandgren, the lab's associate director; and Iannuzzi.

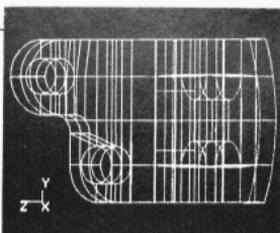
De Silva and Iannuzzi are two of five researchers who came to Mizzou last summer when DOL was moved from its former base in Tucson, Ariz.

Ragsdell, who grew up in Missouri, left the University of Arizona in June to become chairman of Mizzou's mechanical and aerospace engineering department. In the process, he was reunited with Sandgren, whom he had taught at Purdue University.

"He was my first doctoral student and, without question, the most brilliant student I've had the opportunity to work with."

Last spring, Sandgren was named a 1984 Presidential Young Investigator, a national award that could mean more than \$100,000 in research funding each of the next five years.

With CAD/CAM techniques, Sandgren attacks structural problems in General Motors automobiles that



would've been unmanageable 10 years ago. In the past, automobile engineers couldn't conveniently analyze the outcome of minor structural changes, Sandgren explains. The result was that cars were big and heavy.

Today, with the help of computers, engineers can quickly investigate what happens to the car's overall design when certain parts of the body are made lighter.

"Cars like the Chevrolet Blazer would've gone out of existence because of the costs associated with their operation," Ragsdell says. "Now we can make them lighter, but they're still safe because of increased strength associated with the design of an even lighter structure."

In Ragsdell's mind, computers touch the very essence of our lives. He says the real beauty of these machines lies in the revolutionary impact they have on the way people think about design. Computers open up the possibility that engineers will really only do what they're best designed to do: think, create. The machine will take care of all the drudgery, all the unpleasantness of making drawings, assembling materials and playing the what-if games.

"THIS RELEASES you from a burden," Ragsdell explains. "You don't worry at night about, 'Well, you know, I gotta make sure this is right.' Oh hell, it doesn't matter, just let it fly, just do it. Then, literally, your psyche takes on wings and you consider things you never would have thought of before."

"As educators," says Ragsdell, "we attempt to open the minds of students and prepare them for the world they will see when they graduate and beyond. We must be visionaries, some say soothsayers. It's a compelling assignment."

—Jim Kelty