Auto research could bring jobs



Photographs by GEORGE GARDNER / Staff

Researchers at Clemson University's ICAR campus in Greenville conduct tests on an engine, a focus of the government's new regulations on fuel efficiency and emissions.

U.S. centers for automotive research

1. **Clemson University**
International Center for Automotive Research
Greenville
2. **Ohio State University**
The Center for Automotive Research
Columbus, Ohio
3. **University of Michigan**
The Automotive Research Center
Ann Arbor, Mich.
4. **Wayne State University**
The Center for Automotive Research
Detroit, Mich.
5. **University of Wisconsin**
Engine Research Center
Madison, Wisc.
6. **University of California**
Vehicle Dynamics and Control Lab
Berkeley, Calif.

SUZIE RIDDLE / Staff



Dr. Tom Kurfess, BMW chair in manufacturing at ICAR, said research spending could increase as manufacturers push to build vehicles that meet the stricter standards.

ICAR partners

FOUNDING PARTNERS

- AT&T
- BMW
- Michelin
- Sun Microsystems
- Timken

CAMPUS PARTNERS

- BMW ITRC
- CADFEM GmbH
- EnginSoft
- INTEC US
- Ozen Engineering
- SAE International
- Timken

ICAR hopes to lead way on fuel efficiency challenge

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Tougher U.S. regulations to govern fuel efficiency and tailpipe emissions could be the starting fuel for a Manhattan Project on energy and a major boost for Clemson's International Center for Automotive Research, with more funding and more jobs as a result.

The surge in research could also make the Upstate home to a more robust automotive research cluster and a magnet for start-up companies trying to make money out of new technologies, said Ryan Lockwood, project engineer with the International Society of Automotive Engineers. That would create more jobs in the region and spur the local economy, he said.

Although research

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would begin with vehicle transportation to meet the government-imposed deadline, Dr. Imtiaz Haque, director of ICAR, said he expects it could spread to other forms of energy.

"We need it for every area of our lives," he said. "It is going to require a Manhattan Project on energy."

Such a research effort, jump-started by the need to improve vehicle efficiency, could create a change in the way the country thinks and lives, he said.

"The United States has been struggling for a long time to determine what is new and what is innovative in the auto industry," Haque said. "Innovation didn't look like it would pay off. But you can't maintain the status quo and play in the world market."

President Obama's new directive "gives legitimacy to the manufacturers to do innovation," Hague said. "I feel it has breathed new life into engineering and science in this country," something needed as the number of young people going into the two fields has plummeted over the years.

It's not that unusual for a government directive requiring new technology to result in a more rapid pace of technology evolution, said Bruce Yandle, dean emeritus of Clemson's College of Business and Behavioral Science. The emphasis on a particular outcome could mean that technology – some of which might already be an idea – could arrive earlier.

Lockwood agreed.

"As far as imposing a deadline, it forces opportunity," he said, adding that a lot of research already is underway. "You have people starting to look outside the box."

The increased emphasis on automotive research could offer exciting opportunities for small and medium-sized companies, Lockwood said. There is likely to be more collaboration than usual in the industry, as the need to move quickly is paramount, and much of the new technology could be driven by suppliers rather than the carmakers.

"I believe in putting out these grand challenges," said Chris Przirembel, Clemson vice president for research and economic development. "This kind of challenge is great and will attract young people."

Another exciting aspect of this challenge, he said, is the ripple effect.

"As you focus on a particular technology, the ripple effect can be used in different fields," he said. "That is the beauty of focusing on a general technology."

Dr. Tom Kurfess, holder of the BMW chair in manufacturing at ICAR, said the Obama directive for higher fuel efficiency and lower emissions is "very exciting. Personally, I think it's achievable. It won't be easy. It's a challenge. It's an opportunity to make an impact."

Kurfess said he expects that research dollars flowing to ICAR and other research centers could increase as manufacturers move toward vehicles meeting the standards.

"The systems approach is going to be the dominant approach," and that is the focus of ICAR, Kurfess said. "We don't want to just look at one thing. We want to look at the whole. We can. We do that here."

Clemson's ICAR is an advanced technology research campus specializing in automotive engineering research where academia, industry and government collaborate on research projects. The center, with AT&T, BMW, Michelin, Sun Microsystems and Timken as founding partners, has more than $200 million in commitments that directly fuel the knowledge base critical to the automotive industry.

ICAR and other researchers aren't starting from zero as they attempt to meet the president's deadline, Kurfess said.

"A lot has been done to improve fuel efficiency," he said.

A study by researchers at the University of Michigan Transportation Research Institute recently found that overall fuel efficiency for vehicles in the United States was 14 miles per gallon in 1923 – and 17 miles per gallon in 2006.

Haque said much of the research and technology developed to improve fuel efficiency has been put on the shelf over the years when manufacturers decided innovation wasn't worth the expense.

"I don't think we need rocket science to reach" the 35.5 miles per gallon set by the government, said Paul Venhovens, the BMW professor of systems integration. To reach the goal, manufacturers need to create cars with an average efficiency of 42 miles a gallon and light trucks that reach 26 miles a gallon.

"There are light trucks that already reach that," he said, as well as hybrid cars that get more than 42 miles a gallon. Also, about half the vehicles sold in Europe are diesel-powered. BMW's 5 Series, using a two-liter, four-cylinder diesel engine, gets the equivalent fuel efficiency of 46 miles a gallon.

Lockwood said he doesn't think the change toward more fuel-efficient vehicles will stop at that guidepost.

"I think this is just the first step," he said, adding that as fuel becomes more expensive, efficiency becomes more important.

The easy fixes for fuel efficiency have been done, Kurfess said.

"Now we're getting more into harder issues. They are more difficult and more costly," he said.

One issue could be the weight of materials used in manufacturing a car, he said. Reducing weight is one obvious way to improve fuel efficiency, but advanced materials may be more expensive.

For example, titanium is one material that could be used more in cars as it is in planes. However, building perhaps one plane a day is a very different manufacturing process from building 500 cars a day as BMW Manufacturing does, he said.

Some fear that if cars become smaller, they will become less safe. However, Venhovens said that small cars can be just as safe as large cars. They must reach the same crash standards. Occupants of small cars are obviously at a disadvantage if they collide with a larger vehicle. Occupants of larger vehicles are at a disadvantage if they collide with a stationary object, such as a tree.

Przirembel said he expects the move in the United States to be toward lighter cars rather than smaller cars.

"There has not been a history of the American population thinking small for long," he said.

That could be a plus for ICAR. A professor at the facility is studying lightweight engineering – which could lead to new materials and could encourage a total redesign of vehicles, Venhovens said.

The move toward fuel-efficient cars in this country is likely to "become very big," he said, and will be a source of research for ICAR and similar programs.