

# Deep-fried fuel: Student converts diesel car to run on vegetable oil

*Part of a series profiling undergraduate researchers provided by University of Pittsburgh Office of the Provost.*

**By Niki Kapsambelis**

Cruising up Forbes Avenue in a Mercedes is usually enough to buy an undergraduate a little cachet. Of course, if the car is 22 years old, sporting patches of rust and smells faintly of Chinese food, the street cred does tend to drop—unless you're Pat Lambert.

That's because Lambert, a sophomore pre-med student from Washington, Pa., drives his 1984 Mercedes sedan for free after converting its diesel engine to run on vegetable oil.

"It has a lot of character, a patina," says Lambert of the car, which he describes as a "big, old, bulletproof diesel Mercedes ... a neat old vehicle that you used to see in the movies as a foreign diplomat's car."

Lambert first became interested in converting the car just prior to his freshman year at Pitt, when he inherited the sedan from a friend. He began making repairs in his family's home garage and stumbled across some online message boards that talked about using vegetable oil in diesel engines.

"I thought, 'This has got to be some kind of joke,'" Lambert admits.

However, the more he read about it, the more he began to think of vegetable oil fuel as a realistic possibility. And when he discovered that diesel fuel would cost up to \$3 per gallon, he resolved to find a cheaper way to drive.

"When I found out it was good for the environment and free gas, that was the clincher," he says.

Once he started taking classes, Lambert talked to his chemistry professor, Eugene Wagner, about the idea. Wagner, a self-described "gearhead," took a keen interest and helped Lambert locate potential funding sources for the project within the University.

The young student impressed Wagner with his drive and ambition.

"General chemistry classes are pretty large—200 to 250 people. You don't get to know all the students. But there are always students who stand out. Pat was one of those types of individuals," says Wagner. "It takes a certain amount of intensity and character (to write a research grant). To get to that level as a freshman, and to be able to think and express himself and have that kind of motivation outside the classroom, is very unusual."

Acting as the de facto principal investigator on the Vegetable Oil Project (VOP),

Lambert received a combined total of \$4,300 in funding from the Honors College and the Office of Experiential Learning at the School of Arts and Sciences.

"What was intriguing about VOP was it looked like a first-class engineering design problem, which is the sort of thing we ought to be fostering for undergraduate students," says G. Alec Stewart, dean of the Honors College, who read Lambert's proposal. "It seemed to me that it was worth the investment."

The summer following Lambert's freshman year, he completed the conversion in his family's garage, aided by his father, a mechanic, and using information about the parts and diesel automobiles that he researched on the Internet.

"Six weeks later, he drove it up and parked it in front of the Cathedral," recalls Stewart, who accepted Lambert's offer of a ride.

The conversion involved the installation of a 24-gallon fuel tank in the car's trunk, as well as a fuel pump, two coolant-powered heat exchangers, one electric heat exchanger and an onboard oil filtration unit. Although the first diesel engine demonstration in 1898 used peanut oil, one of the challenges of making vegetable oil work is to heat it enough to reduce viscosity. Lambert explained that the engine will get hot regardless of outside air temperature, but it may take a few minutes once the car is running.

A switch inside the car allows the engine to run on diesel fuel until it is warm enough to switch to vegetable oil, which takes about five minutes on a typical January day in Pittsburgh. The mileage—about 30 miles per gallon—is essentially equivalent whether the car is using diesel or vegetable oil, and the sedan's performance is also identical.

Lambert gets the oil from Chinese food restaurants that dump it into drums when they empty their deep fryers. Because restaurants have to pay to have that waste hauled away, they are more than happy to allow Lambert to take it for free. Before it can be poured into the tank, it must be filtered, and Lambert acknowledges that there is a faint fried-food smell emitted by the exhaust. But otherwise, the system has so far been foolproof.

"I'm sure that I could take it cross-country right now," says Lambert. "People seem to

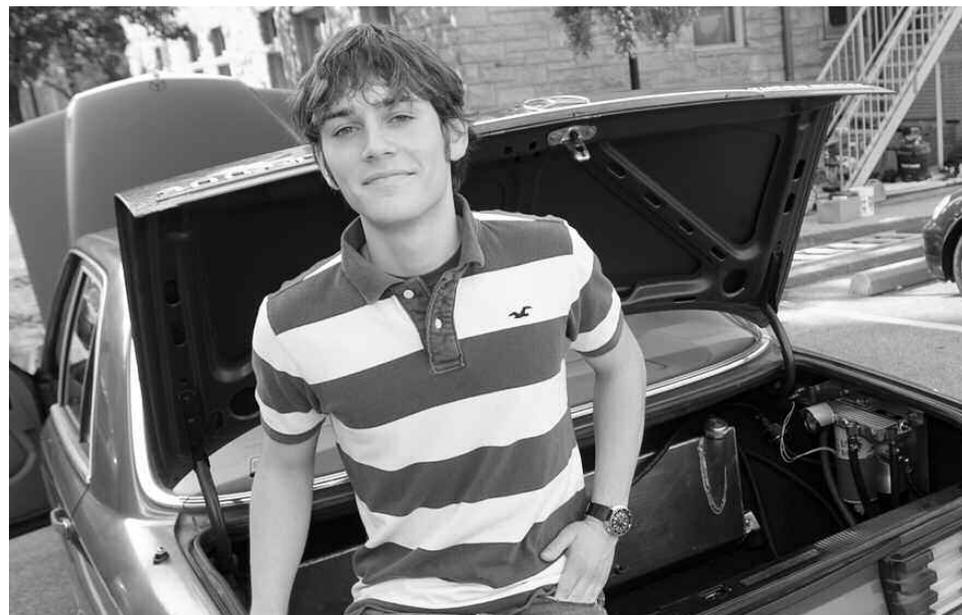


Photo by Joe Kapelewski/CIDDE

**Pat Lambert with his undergraduate research project, a 1984 Mercedes that is powered by vegetable oil.**

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