# Heat Switch for Fuel Filler Flaps

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The fuel filler flap will be released by a single wire instead of a small servo motor in future. Credit: Fraunhofer IWU

Just in time – the car coasts into the gas station on its last drop of fuel. In order to fill the tank, the driver first has to release the fuel filler flap, usually by pushing a button inside the vehicle. The actual releasing is performed by a small servo motor, several cogwheels and various springs, more than ten separate parts in all.

This mechanism could be greatly simplified in future: A single wire will be sufficient to open the release mechanism for the fuel filler flap. The special feature of this part is that it is made of shape-memory material. If such a material is first deformed and subsequently heated, exposed to a magnetic field or held up to the light, it resumes its original shape. In

the case of the filler cap lock, the components contract due to a rise in the temperature.

"We pass a current through the wire, and it heats up. The heat causes it to remember its original shape, so it contracts and opens the filler cap," explains Dr. Gunther Naumann, team leader at the Fraunhofer Institute for Machine Tools and Forming Technology IWU in Dresden, under whose leadership the new system was developed.

"Our release system has several advantages. It is on average 80 percent less expensive than conventional systems. We can also save about 90 percent of the weight, as the special wire only weighs five grams," says Naumann. The release system also saves space: While the housing of the usual servo motor takes up a space of 6 x 4 x 3 centimeters, the wire can be integrated in the existing tie rod. In other words, it needs no extra space at all.

A prototype of the system has already been built. And the wire, a nickel-titanium alloy, can be purchased by the meter, ready-made – it has already been "trained" to contract when heated. "Even if you opened the filler cap twice a day for ten years, the system would not wear out," says Naumann.

Source: Fraunhofer-Gesellschaft