

# A miracle made in Germany

German aerospace technicians have had an idea: A clean car engine which gazzles almost everything. Warren Buffett already believes in it. *By Bettina Weiguny*

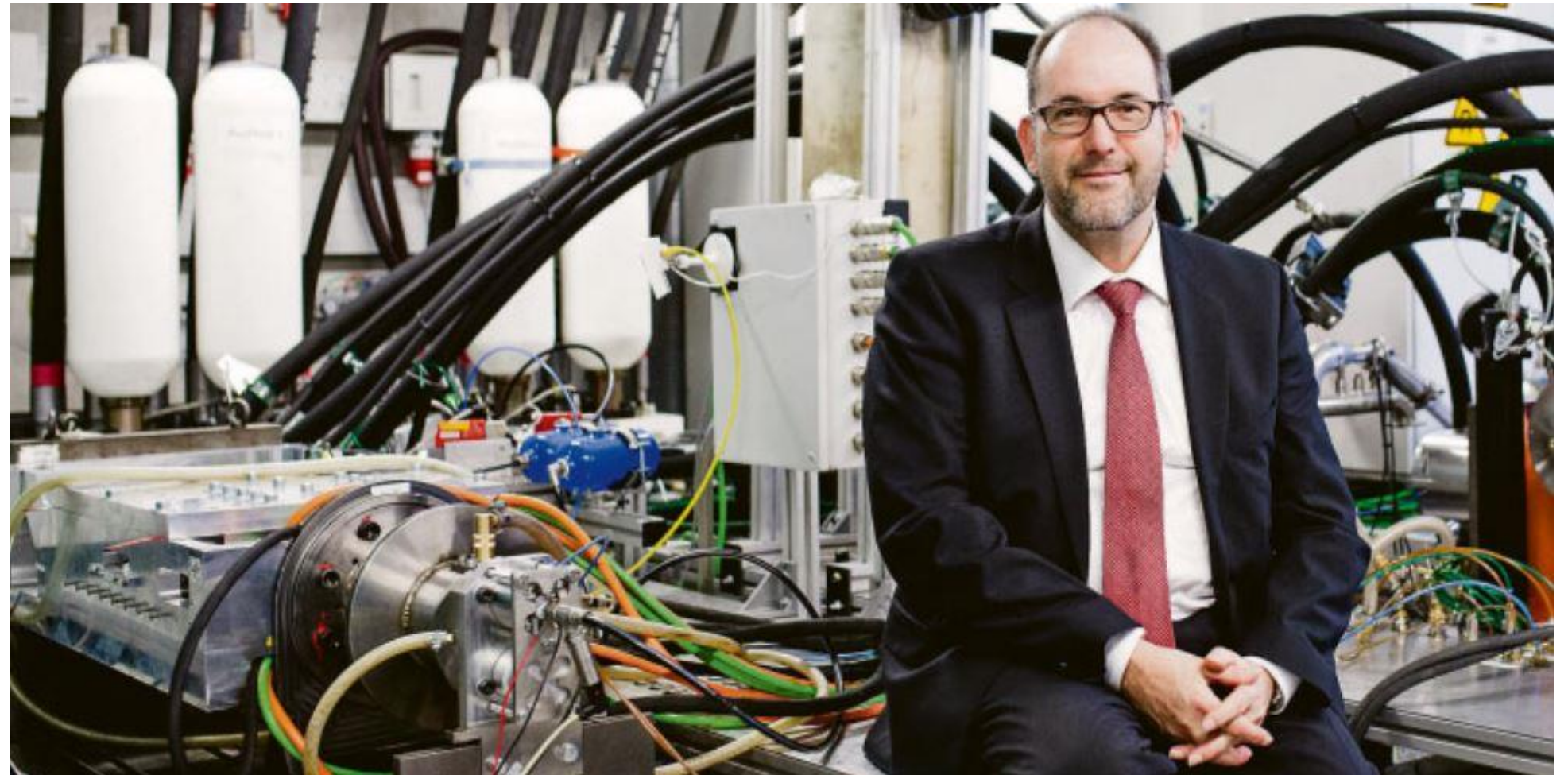
The miracle engine is waiting behind a heavy steel door in the basement of the German Aerospace Center (DLR), which you can only enter using an electronic access card. Florian Kock is one of the rare people who owns one of these access cards. The engineer welcomes today's guests, the investors from China, into a small windowless labor. They travelled the long way from Hongkong to Stuttgart to get an introduction on the innovative drive system of the electric car, which is getting tested in here.

For multiple years Kock has been working on a free-piston linear generator with a team of engineers in Stuttgart-Vaihingen. The engine with the monstrous name could be able to change the automobile market if everything is happening as planned. Developer Kock is confident about it as well as investor Manfred Groeger, who started the startup SWEngin two years ago when the DLR was outsourcing the research project. "Electromobility is the subject of the future" says Manfred Groeger, a professor for economics in Munich, who teaches MBA students at the University of Wurzburg if he isn't busy as a "Business Angel" or investor.

The engine fits perfectly into the current time. Chancellor Merkel wants to see one million electric cars driving on german streets in 2020. But the clients are hesitating, so the government is

planing a purchase premium for electric cars. As a whole, fine dust alert in the cities, too high nitric oxid values and the VW-scandal constitute advantages for the electric car development. Sooner or later, Groeger expects all mayors to ban the cars with a combustion engine from the inner-cities. Stuttgart, Frankfurt and Munich already raise fine dust alert regularly. In Stuttgart the permissible limits already have been exceeded five times this year. By now the government thinks about introducing a "blue badge" for euro 6 emission standards, which could be launched this year. Especially older diesel engine models would have to stay away from the cities.

This is quite optimal for the young Swabian engine company with head-quarter in Munich. Their engine is "cleaner and more efficient, lighter, smaller and cheaper than everything you can get on the market", says Manfred Groeger. Furthermore this engine, in it's XL version, could even run ships, turbines or power plants. "This engine is the missing component making the energy revolution affordable". The visitors from China are convinced that this technology from Stuttgart is very promising. They will invest a two digit million amount in SWEngin and thereby secure themselves 30 % shares of the start-up. Very considerable investors stand behind the Chinese consortium, for example one of the largest automobile



The professor and his motor: Manfred Groeger presents the „Free Piston Linear Generator“ (FPLG), a motor, as small as a briefcase.

Photo: Etienne Lehnen

builder and battery specialists from China with the funny name "Build your Dreams" (BYD) as well as the investor legend Warren Buffett.

Hence, in Stuttgart, they are dreaming about the great success. Isn't it time for an innovative invention by German engineers, 130 years after the invention of cars? The inventors are working on achieving success by themselves instead of letting major companies from foreign countries take away the success from them, similar to what happened to the inventors of the MP3 player, which was invented by the Fraunhofer Institution, but was monetized by the IT giant Apple. Therefore Groeger travels through Germany looking for investors.

So what is the specialty about this genius engine? The free-piston linear generator works like a hybrid car, similar

to the "Range Extender" version of BMW's "i3" electric car. Meaning that the car starts as an electric car and the engine takes over if the battery is empty, which unfortunately happens way too fast with electric cars nowadays. The free-piston linear generator drives emission-free within the city, at long distances (reaching 500 miles) the software switches to fuel. Unlike other engines, the free-piston linear generator guzzles various mixtures. "The automotive manufactures", according to Groeger, "could build it into every car model they produce". It is usable wherever the car needs diesel, petrol, hydrogen, rape oil, ethanol or other biofuels. Moreover the engine is not using a crankshaft, which decreases the production costs vastly. The Chinese were deeply impressed by the small size of the engine. The model standing in the DLR basement isn't much

bigger than a usual briefcase. A car won't need a big engine bonnet anymore. "You could easily hide the engine in the underbody of the car", raves the professor. There is enough space, even if you need two or three free-piston linear generators to gain more performance power, especially for faster car models. Since the diesel scandal alarmed the branch, the miracle engine from Stuttgart earns more attention. The developer of the free-piston linear generator ensures, that the manipulation of the emission values would not have been necessary with this engine. The engine works at low temperatures, so the harmful nitric oxides wouldn't emerge.

Recently, scouts of a DAX concern have visited the company; others have announced themselves to visit soon. Many townships apply to become the production place for the engine. The only

problem with the engine is, that it isn't on the market yet. Only the prototype should be ready at the end of this year. It could take some years until the start of the series production.

Nevertheless the Swabians are world leaders with the development of this technology. Research teams of Volvo and Toyota are also testing free-piston engines, but technologically they are not nearly as far as the Stuttgarter company. "You observe each other in this branch permanently" says engineer Kock.

Actually the idea of a free-piston linear generator is half a century old. But the technology was not successful because of it's lack of research in the 60s. Only the electrical engineering wasn't far enough. Kock's team had to develop the necessary software by themselves. "The engine contains at least as much IT as German art of engineering", says Kock.