

AS WELL AS BEING ABLE TO DRIVE 50 MILES IN ZERO-EMISSIONS MODE, THE 403BHP KARMA WILL ACCELERATE TO 100KM/H (62MPH) IN SIX SECONDS AND HAS A TOP SPEED OF 125MPH (200KM/H)



Instant Karma

BY PRIORITIZING DESIGN AND AN INNOVATIVE HYBRID POWERTRAIN, FISKER IS PROVIDING ITS DYNAMICISTS WITH A REAL CHALLENGE. INTERVIEW BY GRAHAM HEEPS



Don't expect Fisker Automotive's products to become known as benchmarks for ride comfort. "It's part of the DNA of the Fisker brand that exterior design is very nicely proportioned," explains the newcomer OEM's director of engineering, Thomas Fritz. "For example, we have 22in wheels on the car. [Company founder] Henrik Fisker is a car design guru, and big tires speak a lot for the language of the car. We will not be competing with anyone doing mass-market vehicles so we would accept certain comfort limits - 22in tires may not give a super-comfortable ride..."

But whether or not the forthcoming Fisker Karma will ride brilliantly is perhaps beside the point. The four-door, US\$87,900 (E78,780 + VAT) luxury plug-in hybrid sports sedan is scheduled to enter production in late 2009 following a sub-two-year development program. In an era when car companies and their suppliers are regularly being sold, downsized, or closed altogether, a successful start-up is an all-too-rare good news story. Fisker Automotive is confident that it has not only the vision and the financial backing, but also the engineering resources and know-how to bring such an ambitious car to market.

USA-based Fisker's setup is a far cry from the low-volume start-up sports car companies that come and go with predictable regularity, particularly in Europe. To begin with, the company does not plan to be a particularly low-volume OEM: a swift ramp-up to 15,000 cars a year, possibly as soon as 2011, is the goal after the first production Karma coupé leaves the line at Valmet Automotive in Finland, which will also continue to build Porsche Boxsters and Caymans until 2012.

In order to get this and subsequent cars into production - a convertible, the Karma S, is scheduled for launch in 2011 - Fisker has hired

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Thomas Fritz, director of engineering, Fisker Automotive

a number of experienced ex-OEM engineers, including Fritz, who, like Fisker himself, has stints at BMW and in Ford’s now-defunct Premier Automotive Group on his resumé.

Although headquartered in Irvine, California, Fisker has established its Engineering and Development Center in Pontiac, Michigan, to be the focus of test and development activity. “In California we do a lot of the design and powertrain work, but Detroit has everything for car development and production, which is why we set up our engineering center here,” Fritz explains. “Michigan is also a more central working location for us: it’s three hours to California, and seven to our production facility in Finland, with a good time overlap.”

The 3,200m² facility brings together up to 200 engineers and designers from Fisker and its supplier base, which includes Michelin, Hydro, and Magna (another of Fritz’s former employers). For a small, if growing, start-up OEM, the expertise of its supplier base is crucial: “We have a critical mass of core Fisker Automotive team members, but have also engaged a lot of critical suppliers that we’ve known for a long time. Our network has been very important for us in getting the right skill set of suppliers, whether it be the engine or other parts and systems.

“Our own team is growing day by day, and it’s important that those people also have good skill sets and leadership qualities,” he adds. “They must also have a passion for cars and must understand cars – they must be car guys – because we work almost 24/7. There’s still lots to do.”

This is, after all, still a start-up company with an ambitious new

SPECIFICATIONS	
Fisker Karma	
Dimensions: 4,987mm (L) x 1,984mm (W) x 1,330mm (H)	
Wheelbase: 3,160mm	
Track: 1,689mm (F), 1,720mm (R)	
Chassis: lightweight extruded aluminum spaceframe, supplied by Hydro	
Powertrain: dual-150kW rear electric motors; rear wheel drive; lithium-ion battery pack located longitudinally along the centerline below the floorpan; front/mid-mounted 265bhp ICE/Generator combination. Total system power 403bhp	
Brakes: Electrohydraulic brake boost unit with integral chassis control functions. ABS/TCS/ESC standard. Electrically regenerative brake combined with friction braking. Electrically actuated parking brake	
Steering: Electrohydraulic power-assisted rack-and-pinion with programmable servo assistance. Ratio 14:1; 2.7 turns lock-to-lock	
Tires: Michelin Pilot Sport PS2 with optimized rolling resistance. 245/35 R22 (F), 265/35 R22 (R)	
Top speed: Stealth Mode (battery only) 95mph (153km/h); Sport Mode (ICE & battery) 125mph (200km/h)	
Acceleration: 0-62mph (100km/h) in six seconds	
Range: Stealth Mode 50 miles (80km); Sport Mode 300+ miles (483km)	

product that demands large amounts of careful integration and calibration work, particularly in the fields of powertrain and electronics. In the Karma, the Quantum Q Drive electric driveline puts two electric motors and a differential on the rear axle, so even without the large wheels there’s a job to be done at the back of the car in terms of rolling refinement.

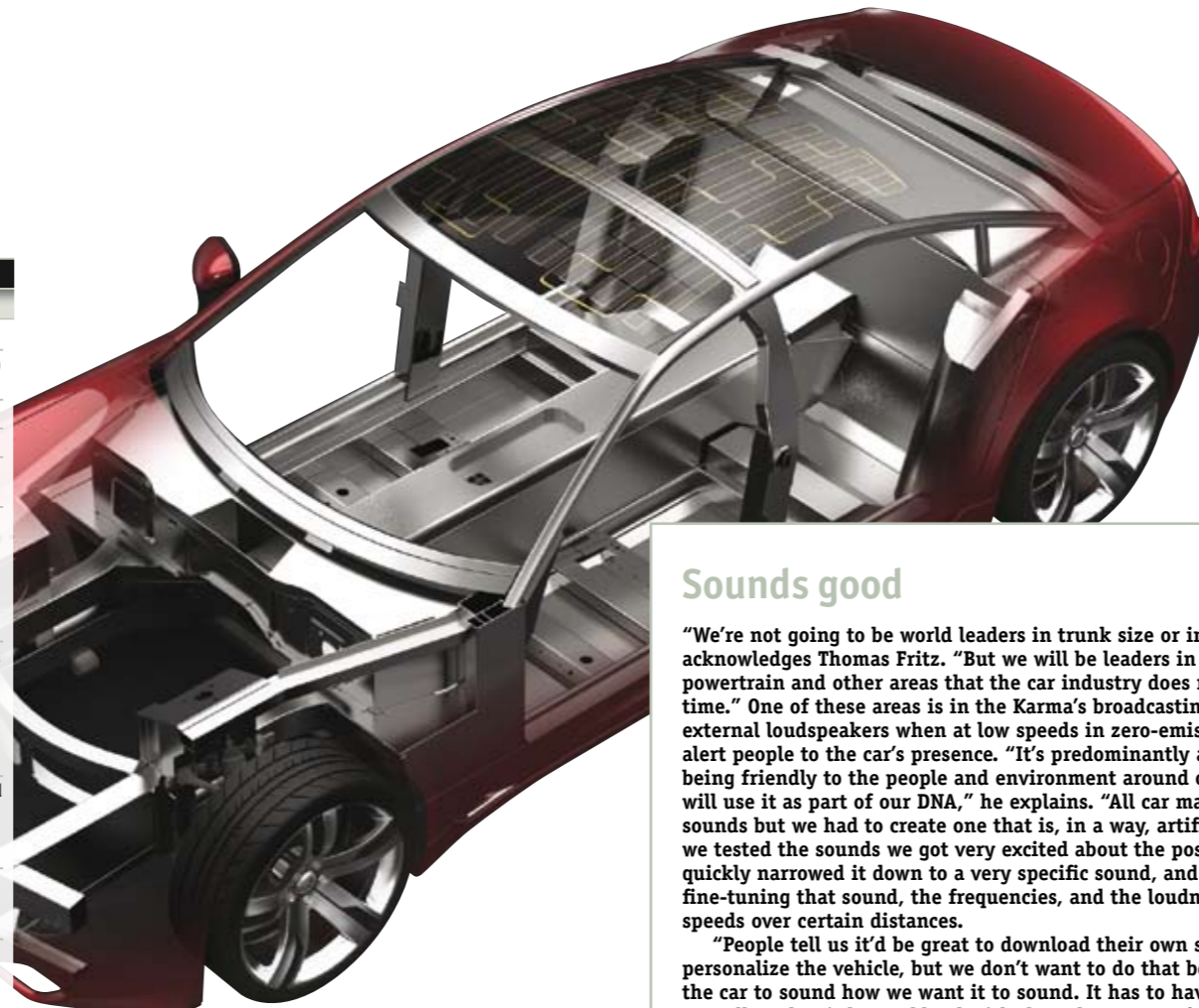
Fisker’s solution is an aluminum subframe soft-bolted to the

spaceframe with a multilink suspension setup. “The architecture of the subframe is more or less like a transaxle vehicle,” says Fritz.

Up front, the turbocharged GM Ecotec engine coupled with a generator is isolated on the subframe, which is then hard-bolted to the main structure. The suspension solution is SLA double-wishbone.

“There are some components we carry over from [engine supplier] GM, but the core of the suspension is bespoke and laid out for the weight, the driving dynamics targets, and for the tire sizes,” he assures. “We have everything in an ADAMS model and are using the virtual tools to get the suspension right. We have already tuned it on a couple of prototype cars, we’ve tested it and done road load data acquisition, but we’re still working on it, of course. We’ll use a production-build car to do the final tuning.” It’s thought that some or all of Fisker’s future dynamics work could be outsourced.

At least the stiffness of the Karma’s aluminum spaceframe should make tuning the car a little easier. It’s made by Hydro in Denmark, with whom Fritz and Fisker worked on the



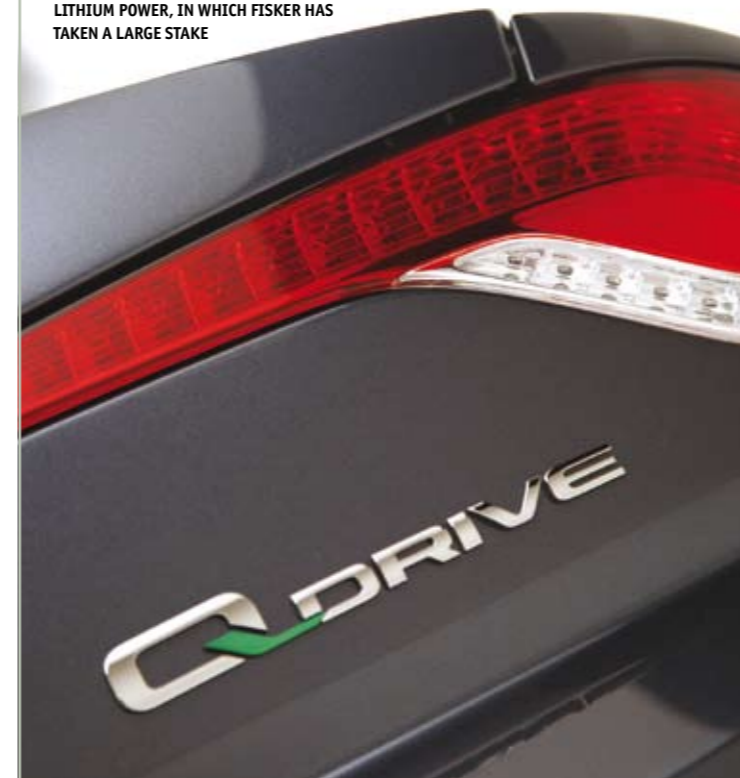
FISKER KARMA COMES WITH A FUNCTIONAL SOLAR ROOF AS STANDARD. MORE THAN 1,300 OF THE VEHICLES HAVE ALREADY BEEN PRE-SOLD

Sounds good

“We’re not going to be world leaders in trunk size or interior space,” acknowledges Thomas Fritz. “But we will be leaders in design, powertrain and other areas that the car industry does not at this time.” One of these areas is in the Karma’s broadcasting of sound from external loudspeakers when at low speeds in zero-emissions mode, to alert people to the car’s presence. “It’s predominantly a safety feature, being friendly to the people and environment around our car, but we will use it as part of our DNA,” he explains. “All car makers have their sounds but we had to create one that is, in a way, artificial. When we tested the sounds we got very excited about the possibilities. We quickly narrowed it down to a very specific sound, and we’re currently fine-tuning that sound, the frequencies, and the loudness at certain speeds over certain distances.

“People tell us it’d be great to download their own sounds to personalize the vehicle, but we don’t want to do that because we want the car to sound how we want it to sound. It has to have its own DNA. As well as that it has to blend with the exhaust note from the gasoline engine, because the two will be emitted simultaneously at times.”

FISKER’S POWERTRAIN MARRIES A 2-LITER TURBOCHARGED GM ECOTEC ENGINE WITH A Q DRIVE PLUG-IN HYBRID ELECTRIC DRIVE SYSTEM FROM QUANTUM TECHNOLOGIES AND A LITHIUM-ION BATTERY FROM ADVANCED LITHIUM POWER, IN WHICH FISKER HAS TAKEN A LARGE STAKE



THE TRUNK WILL FIT SEVERAL PIECES OF LUGGAGE OR TWO BAGS OF GOLF CLUBS. ON THE INSIDE, THE KARMA WILL BE THE FIRST CAR TO FEATURE A HAPTIC TOUCH-SCREEN INTERFACE AND AN ANIMAL-FREE INTERIOR



TWO BMW PROJECTS WITH LINKS TO THE FISKER CARS. BOTH THE ROLLS-ROYCE PHANTOM (LEFT) AND BMW Z8 (BELOW LEFT) USED ALUMINUM SPACEFRAMES FROM HYDRO. THOMAS FRITZ SPENT THREE YEARS AT ROLLS, WHILE HENRIK FISKER DESIGNED Z8

BMW Z8 and Rolls-Royce Phantom. “Even with the wide track and long wheelbase, this spaceframe will be super, super stiff – the benchmark for cars of this type – and will also crash well,” Fritz promises. “We’ve over-achieved on the torsional stiffness targets and are too stiff in some areas, so now we have to pull out some weight, do some gauging, make some changes – the normal engineering process.”

Fritz has also set tough targets for the electrohydraulic steering. “We expect very good steering feel. Bernhard Koehler [COO], Henrik Fisker, myself, and a couple of other people in our company come from BMW, which is very good at doing steering, so that’s how we want it.”

As well as leveraging the knowledge and facilities of its suppliers, Fisker has supplemented the extensive use of CAE in house with time on third-party physical test rigs and proving grounds.

The company is tight-lipped about exactly which facilities are being used, although it has been to at least one European location as well as to proving grounds in California, Michigan, and Arizona. 