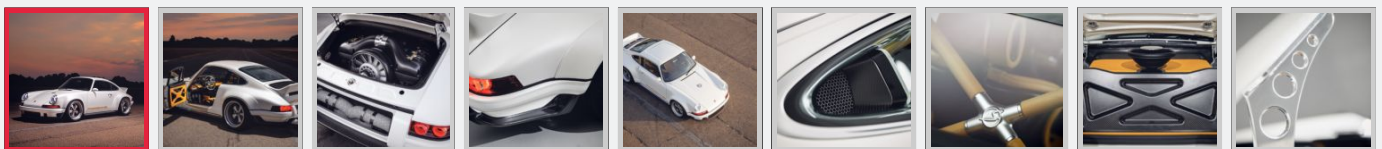


CAN WE HAVE A GO? PLEASE? —

# Working on this Singer 911 restoration “turns” Williams F1 engineers

The 500hp air-cooled 911 is 600 pounds lighter than when it left Porsche's factory.

ERIC TEGLER - 8/24/2018, 2:12 PM

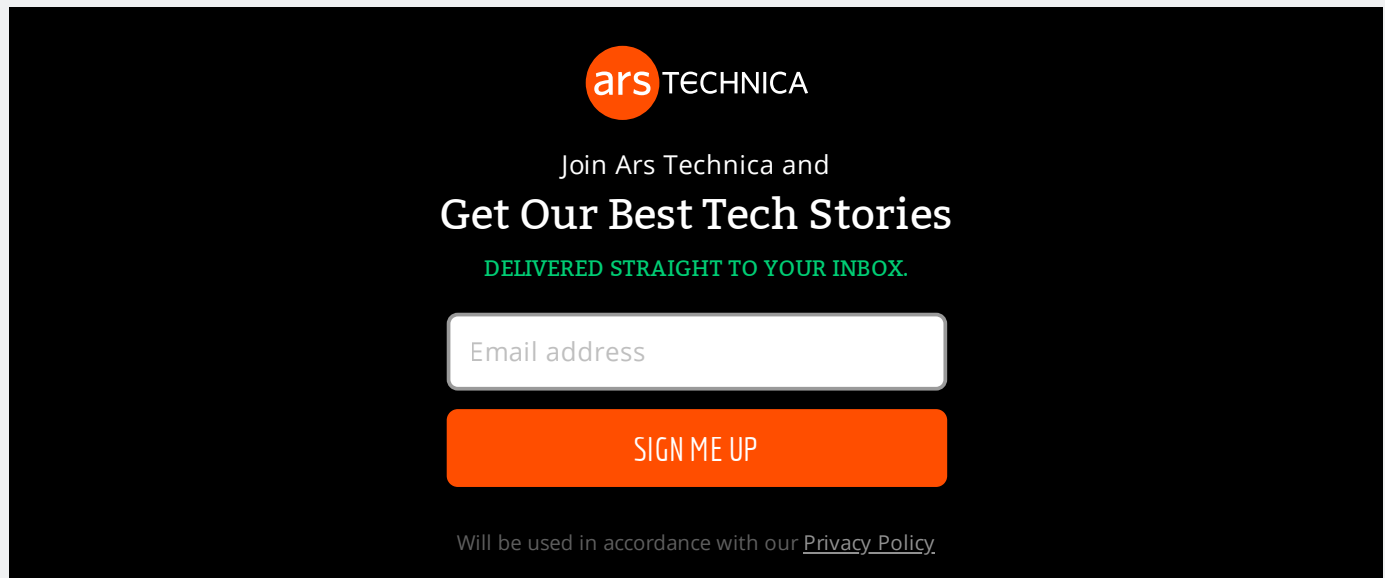


When Williams Advanced Engineering agreed to collaborate with Singer Vehicle Design on a Dynamics and Lightweighting Study (DLS) for a Singer client, it was expecting to wring the best dynamics and wrest the

most weight from a vintage Porsche 911. But that's not exactly what happened.

Based in Grove, Oxfordshire, England, Williams Advanced Engineering is a division of the group that includes the Williams Formula 1 race team. LA-based Singer restores and "reimagines" 1989 to 1994 Porsche 911s for its clients. The company has restored about 100 highly regarded and highly sought-after 911s so far.

This weekend, Singer is showing off its collaboration with Williams at the prestigious Pebble Beach Concours, displaying a 1990 Porsche 911 that it has restored with input from the study and a group of technical partners from Bosch to Michelin. The \$1.8 million car is perhaps the ultimate example of a Porsche 911 restored by Singer yet to emerge.



The image shows a newsletter sign-up form for Ars Technica. At the top center is the Ars Technica logo, which consists of the word "ars" in white lowercase letters inside an orange circle, followed by the word "TECHNICA" in white uppercase letters. Below the logo, the text "Join Ars Technica and" is centered in white. Underneath that is the main headline "Get Our Best Tech Stories" in a larger white font. Below the headline is the phrase "DELIVERED STRAIGHT TO YOUR INBOX." in a smaller, green, all-caps font. The next element is a white rectangular input field with rounded corners and a thin grey border, containing the placeholder text "Email address" in grey. Below the input field is a prominent orange rectangular button with rounded corners and white text that says "SIGN ME UP". At the bottom of the form, centered, is the text "Will be used in accordance with our [Privacy Policy](#)" in a small white font.

## Dynamic

Singer embarked on the project in February 2016. Its initial goals were inspired by a client who wanted the design and visceral elements that Singer restorations are known for, paired with sophisticated dynamics tweaks and weight savings.

Singer CEO Mazen Fawaz recognized that Williams, with its F1-honed analytical capabilities, would be an excellent partner for a dynamics and weight study. He also realized the irony of getting them to cooperate on the project. "Giving an F1 team this car is almost comical. By their accounts it was aerodynamically laughable when we started. There was some giggling, but we were able to use their magic in a number of areas."



[Enlarge](#)

Williams' magic starts with engine, aerodynamics, and materials improvements. The company adapted and developed a normally aspirated, air-cooled 4.0L Porsche flat-six engine with technical advice from legendary ex-Porsche engineer Hans Mezger. It incorporates lightweight throttle bodies with F1-inspired upper and lower injectors to enhance drivability and a unique, optimized oiling system to improve lubrication and cooling. It also uses magnesium extensively to reduce mass. Fawaz says he had long thought titanium to be the ultimate choice for lightweight strength, but Williams' materials expertise taught him otherwise.

"At Williams, they have a display with aluminum, titanium, and magnesium blocks. It's incredible how much heavier titanium is than magnesium. This is where the F1 influence came in." It shows in the change from a two-valve to four-valve cylinder head, with Williams specifying magnesium for the job. Materials are mixed throughout the car. The pedal box, for example, blends carbon, titanium, magnesium, and steel.

Aerodynamically, Williams reassessed every surface, applying computational fluid dynamics analysis. The engineers claim to have eliminated the 911's typical front axle lift/power-on understeer through redesign of front oil-cooler intake and venting, together with a new front splitter. They also optimized the iconic 911 "ducktail" rear spoiler, adding its downforce contribution to those of a roof-channel and roof/rear window spoiler and diffuser.

Side-window ram-air intakes and rear deck-lid venting maximize engine intake and cooling performance. The flat six (with 500hp/373kW at 9,000rpm) is moved forward in the car by 14mm. The ECU and other electronics move forward as well. The DLS Study suggested so many improvements that Williams just wanted to keep on going, Fawaz confides. "They wanted to fix it."

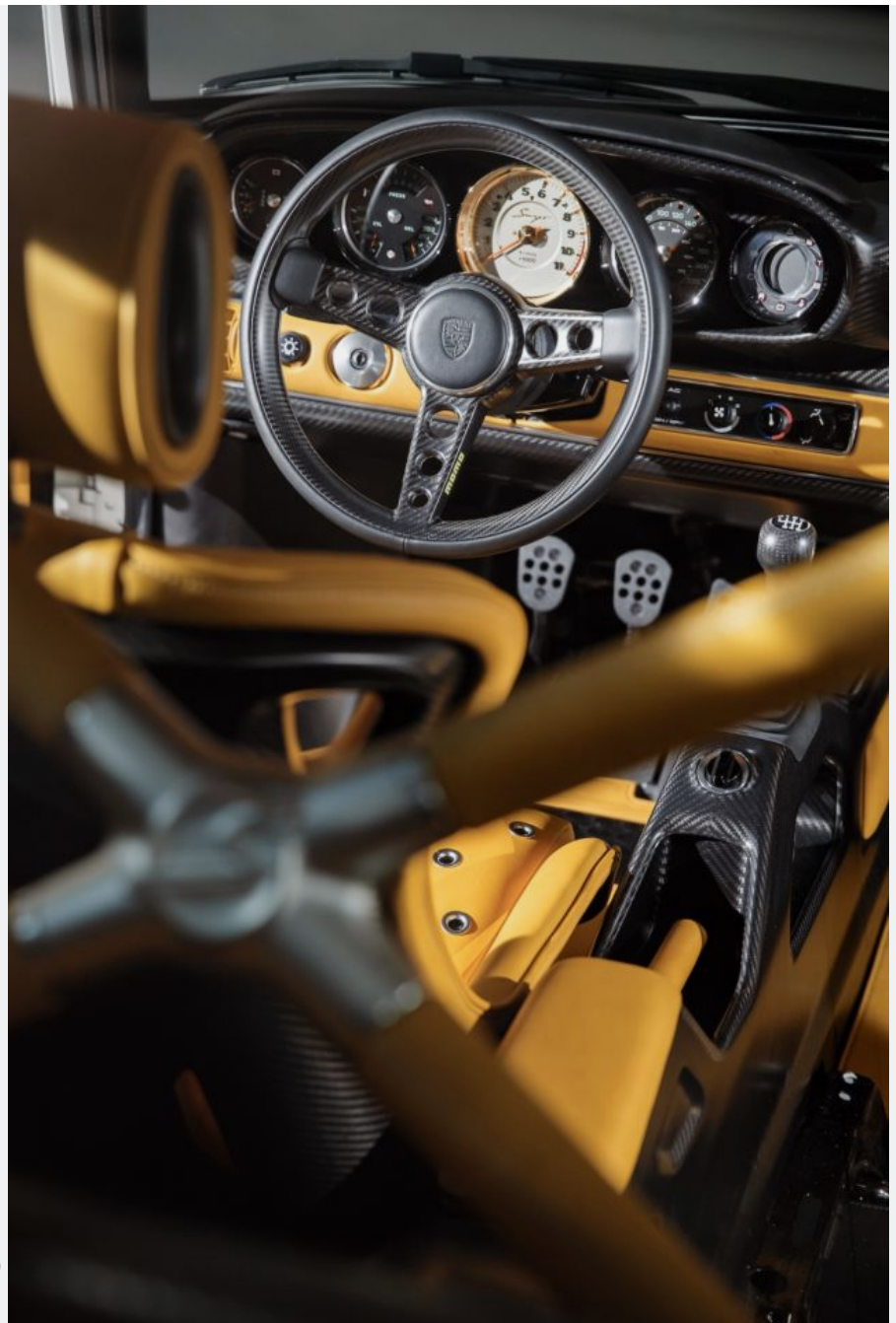
## A different kind of optimization

Singer staged a benchmarking driving event with Williams in the UK. They invited clients, enthusiast engineers, and friends including Chris Harris of the BBC's *Top Gear* to drive a new Porsche 911 GT3, an older GT3, and a standard Singer restoration.

"The guys we invited to drive and take notes loved our classic car," Fawaz remembers. "It was the least sophisticated and slowest of the group. The new GT3 is a surgical instrument; it's unbelievably capable, but you don't participate that much. In an old 911, even on the roads in Malibu, *you* make it happen. The Williams guys were like 'You want that?'"

That's exactly what Singer wanted: a reinvigorated 911 true to its analog roots. The company gave the six full-time and approximately 40 part-time Williams engineers working on the project clear definitions of results needed in terms of driving communication and feel rather than best performance numbers.

 Singer



[Enlarge](#)

Call it trading off the somewhat dehumanizing lap-time maximization of Formula 1 for emotionally motivated engineering. "It was asking guys who were born to optimize things, not to optimize but to hit our targets," Fawaz says. "I would argue that we 'turned them,'" he laughs.

That direction, combined with Williams' competency, yielded results beyond Singer's expectation, its CEO says. "It's the kind of expertise that gave us results we didn't even sign up for. This engine, for example, is unlike anything we, or our friends, have experienced. It's quite special."

## Light weight, heavy enthusiasm

A stock Porsche 911 (964 model in Porsche-speak) has a curb weight of approximately 3,050 pounds (1,383kg). Typical Singer Porsche 911 restorations with lush appointments range from about 2,800 to 3,000 pounds (1,270-1,360kg). The "Porsche 911 Reimagined by Singer, Dynamics and Lightweighting Study" car comes in at 2,359 pounds (1,073 kg). Losing 500 to 600 pounds wasn't easy, Mazen Fawaz says. "I weighed all the stuff that looked big and heavy. Nothing turned out to be super heavy."

The weight savings sprang from details mined by Williams, literally rounding mass off of parts and adding full carbon-fiber bodywork. The car's six-speed Hewland gearbox has a magnesium case rather than aluminum. Suspension anti-sway bars are hollowed out, and a lighter electric air conditioning pump is used along with special lightweight glass. "Williams assessed fasteners, brackets, hoses, sound deadening, even glue," Fawaz explains.



Singer

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One notable win came from lightweight brake rotors and calipers. Brembo developed a special brake caliper for the project simply because the company wanted to. "They didn't just use something off the shelf," Fawaz relates. "They actually designed and developed a brand-new caliper for us. It blew us away!"

Michelin volunteered to make its vaunted Sport Cup 2 tires in a custom size for the Singer project. Bosch specifically calibrated ABS, traction, and stability control systems. Momo, Recaro, Hewland, and other suppliers made similar contributions—without charging huge money. Fawaz calls their enthusiasm and contributions "humbling."

Reportedly, the result is a Porsche 911 restoration that retains Singer's obsession for highlighting the beauty of sub-surface components in a lighter than ever, more dynamically rewarding package. The first

customer delivery is expected early next year, and the company expects to build about 75 such cars alongside its more standard offerings.

Singer's CEO says, "you just want to eat it." But, like Williams' "turned" engineers, we can't wait to drive it.

*Listing image by Singer*

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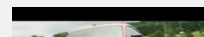
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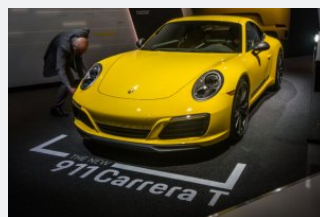
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