



Uncompromising quality in every detail is an integral part of the Audi mindset. It shapes the thinking of the entire company. That's why quality assurance staff and engineers, foremost among them head of quality assurance Werner Zimmermann, are involved in vehicle development from a very early stage. It's all part of the simultaneous engineering principle practiced at Audi that begins with the conceptual design of a new model and shapes the entire product realization process. >>



Climatic torture chamber: In the simulated weather tests, cars are first baked by artificial sunlight (02) and then frozen to minus 35 degrees (01).

Perfection as standard

Before a new Audi goes into production, it has to demonstrate its qualities in countless checks. It's a test marathon faced by every new model, from the Audi A1 to the Audi A8.

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03 Shaken not stirred: Four hydropulsers shake the frozen body and chassis to the core.

Inside the shop building—above whose entrance is written the word Meisterbock—is what you might call the standard template for each Audi. The Meisterbock, or master jig, is a framework of solid aluminum profiles. These represent exact design specifications against which the shape and fit of each individual body component can be analyzed geometrically using tactile and optical measuring instruments. Its functions include ensuring that the gaps between individual panels are as wide as necessary and as narrow as possible—a key factor in the superior appearance of the finished product. But Audi goes much further than optimizing the spacing between the panels: “For really superior gaps, their edges have to follow a perfect radius. One notable measure of the precision of a radius is the sharpness of its tangent line, the area where the radius meets the flat,” explains Peter Fischer, head of quality assurance at the Audi Neckarsulm plant.

But quality assurance doesn't just take place in closed rooms. After all, a car isn't built for indoors but for the everyday challenges of weather and roads, which differ vastly throughout the world. A new Audi has to complete approximately 2.5 million test kilometers in alternating scorching heat and icy cold to demonstrate its everyday practicality for all global markets.

Where it gets really hostile is in the INKA test. This Audi acronym is derived from the German for “Ingolstadt Corrosion and Aging Test,” a procedure that puts 12 years on every test car within the space of 19 weeks. It includes simulated storm tests in the climatic wind tunnel involving wind speeds of up to 300 kilometers per hour and torrential rain. Then there's the climatic chamber, where the car is subjected to merciless weather swings: First, at 35 degrees Celsius, it is sprayed with salt, then the heat is turned up to 50 degrees at 100 percent humidity. It is then baked by an artificial sun producing 1,000 watts of power per square meter, and finally cooled to minus 35 degrees before being shaken violently by four hydropulsers to test its response to extreme body distortions and chassis loads.

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The light tunnel reveals the immaculate quality of the paintwork (04 and 05), achieved in large part by brushing with antistatic emu feathers (06). The leathers for the interior go through 45 different load tests (07).



Immovable object: To keep the car in position in the climatic wind tunnel, it is firmly locked down (8). Calm before the storm: A full-blown tempest is heading toward the A8 in the climatic wind tunnel (9).

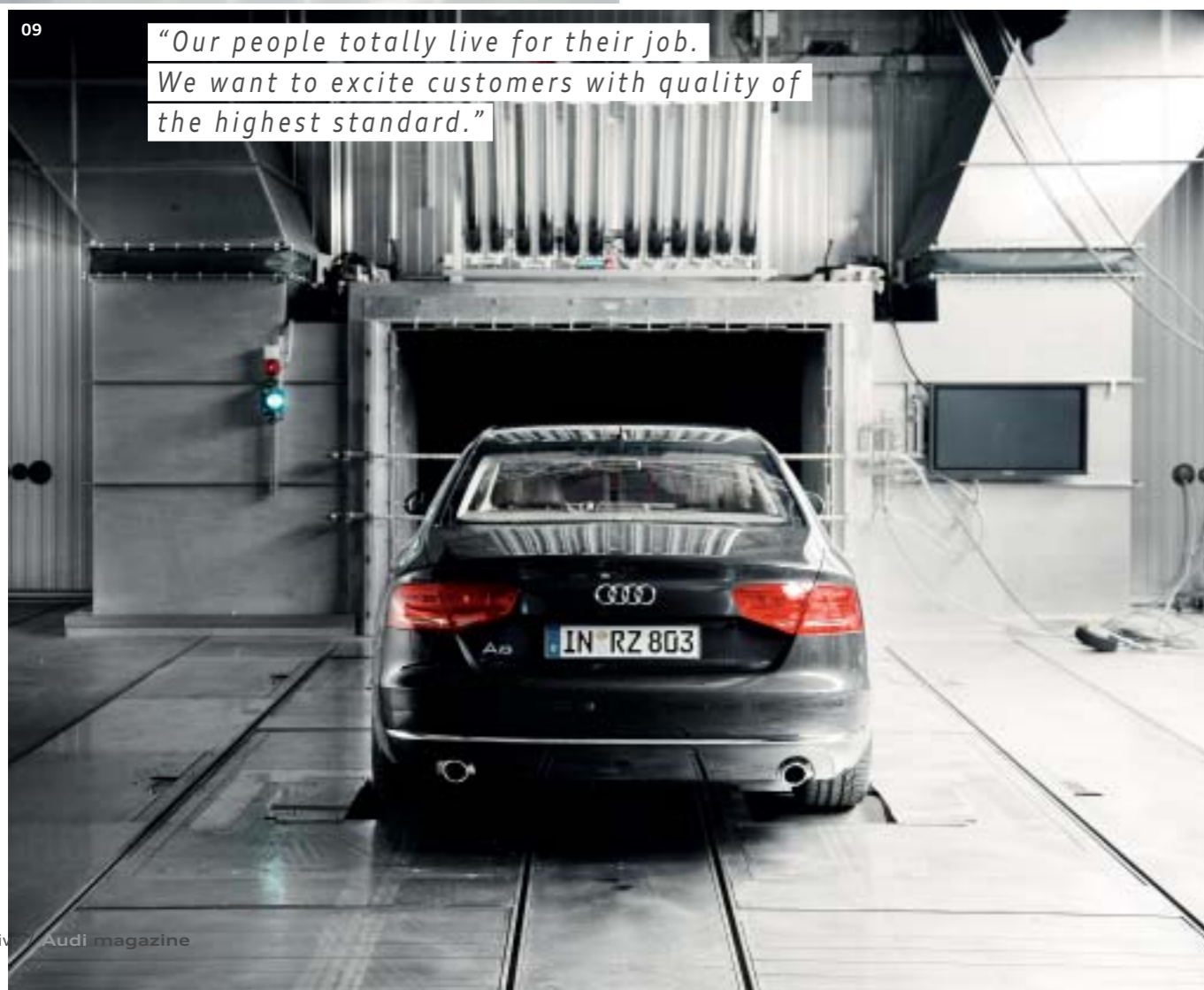
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But the quality of an Audi also has to be proven in the hostile conditions of the real world, which is why the cars are subjected to a series of grueling road tests. Each test car completes an average distance of 80,000 kilometers on specially prepared roads: Cobblestones, gravel tracks, saltwater and mud strain chassis and body to the extreme, but not just these. The test drivers, too, have to be made of special mettle to endure torture like this without complaint—above all the members of the “squeak and rattle” team whose job sometimes involves huddling in the trunk for a few kilometers of bumpy track to trace any unwanted noise. Peter Fischer says: “The teams love it, our people totally live for their job. We want to excite customers with quality of the highest standard. For that, we have to assess subjective criteria as well, the things that customers hear, see and feel in the vehicle.”

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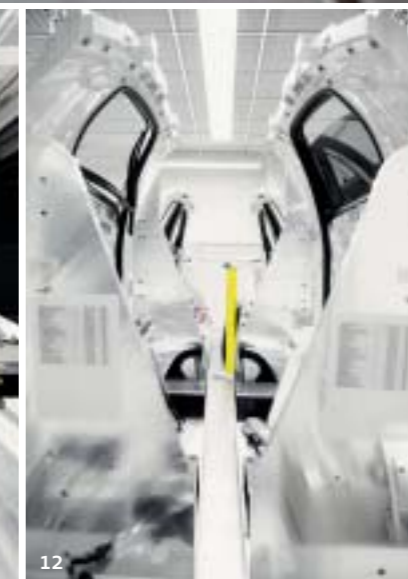


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Accurate to the last detail: On the master jig, gaps are measured to within a tenth of a millimeter and corrected if necessary (10 to 13).



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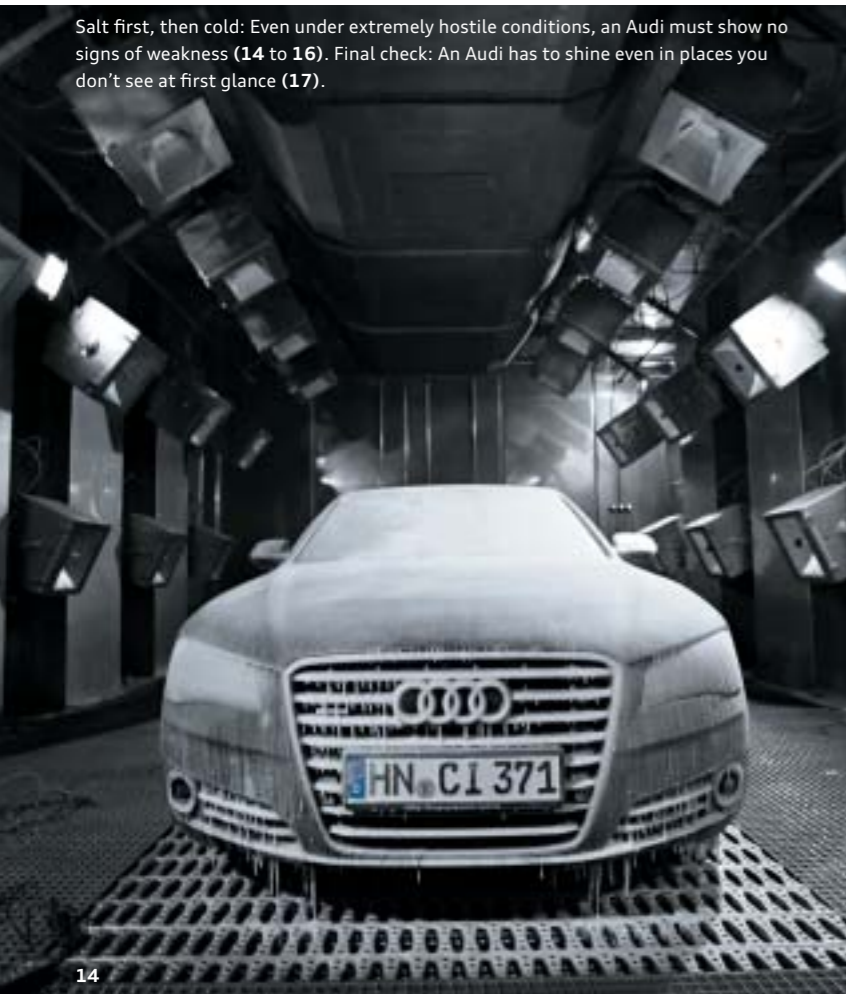
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The INKA test also shows how the materials in the interior have stood up to the extreme temperature swings. Even at the interior temperatures of up to 90 degrees occurring in the climatic chamber, colors must not fade nor plastics become brittle. The leathers used by Audi are tested for their durability in 45 different procedures. Clamped in automatic fixtures, the leather test specimens have to

demonstrate, for instance, how evenly they stretch, where they begin to tear, when they wrinkle and how resistant they are to abrasion.

But even the highest quality of all the individual parts can only provide full satisfaction if the end product looks absolutely perfect. To make a dazzling >>

Salt first, then cold: Even under extremely hostile conditions, an Audi must show no signs of weakness (14 to 16). Final check: An Audi has to shine even in places you don't see at first glance (17).



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The Audi plants in Ingolstadt and Neckarsulm

The plant in Ingolstadt, established in 1949 for AUTO UNION GmbH, has been the headquarters of AUDI AG since 1985 and is also its largest production site. Today, over 32,000 employees work here and more than 500,000 vehicles roll off the production line each year. The Audi A3, Audi A4, Audi A5 and Audi Q5 are produced in Ingolstadt. In association with Audi Hungaria, the Audi TT Coupé and Audi TT Roadster also pass through the body assembly and paint shops here.

The Audi plant in Neckarsulm is one of the oldest car plants in the world. The "Original Neckarsulm Motor Car" was built here back in 1906. Today, the Audi A4 Sedan, Audi A5 Cabriolet, Audi A6 Sedan and Avant, Audi A6 allroad quattro and Audi A8 are built here. At the wholly owned Audi subsidiary quattro GmbH, they are joined by the Audi R8, Audi R8 Spyder and the Audi RS 6. In 2009, AUDI AG produced 278,096 vehicles at the Neckarsulm plant where over 13,700 people are employed, including around 840 in quality assurance.

appearance in every sense of the word, the body is electrocoated and then brushed with naturally antistatic emu feathers before high-speed rotary atomizers apply successive filler, base, effect and clear coats—with a precision that ensures that, even though the entire layer of paint is only a tenth of a millimeter thick, it still shines with a deep gloss finish. At the end, even the strictest quality inspectors are satisfied. And you can even detect an undertone of pride when number one quality assurer Werner Zimmermann says: "Quality is what you can see, hear, feel and smell." // Hermann J. Müller

 To watch the perfection of Audi go to www.audi.tv.



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"Quality is what you can see, hear, feel and smell."

Photos: Sjoerd ten Kate for AUDI AG