



## Dress Rehearsal

**04/07/2017** A pilot hall is where production of a new car model is rehearsed and perfected. The most modern facility of this type is at the Porsche plant in Leipzig. Its staff concentrates on takt times, the art of automotive engineering—and underwear.

Andreas Schmidt has seen and experienced quite a bit. But nothing excites him more than how “the ideas and sketches from the designers and engineers in Zuffenhausen and Weissach end up turning into something as complex as a car.” Schmidt (54) is the director of quality at the Porsche plant in Leipzig. He looks through the glass doors of the big conference hall at the new Quality Center, with its outer master jig and cubing station. A Panamera Sport Turismo is waiting in the audit room, perfectly illuminated on a flawless white surface. And not just any Gran Turismo—it’s the first series-produced car of the new model line. The reference for everything that will follow. The car that will have to pass muster under the glaring lights and the gaze of thousands of critics at its upcoming motor show premieres. Schmidt and Alexander Fijak (40), who directs the pilot hall, carefully inspect every millimeter of the car with both their eyes and their hands. “Absolutely fascinating to see how perfectly the new Sport Turismo has turned out,” murmurs the quality director. “All we have to do is build every series-production car just as perfectly.”

The first reaction is to smile. The second is to frown. Just build it? If it were that easy, there wouldn't be any need for the new Quality Center. It was Schmidt who drew the first sketches for this complex with a ballpoint pen on a sheet of paper. That was in April 2014. Thirteen months later, the new building, with its six thousand square meters of floor space, was opened. Its heart—Fijak's domain—is the pilot hall. A father of two who loves to build remote-controlled model cars, Fijak is a resourceful tinkerer and most likely the perfect person for the job he summarizes in just a few words: "Each new Porsche will have to move along the assembly line in a precisely defined sequence with just the right takt times. Here we determine how that will work."

## The pilot hall team assembles the painted parts of the car body

Two hundred and ten assembly steps and the associated takt times are needed to build a Panamera Sport Turismo. Forty Porsche employees simulate these takt times at twelve stations. Going through the process that will be stipulated for production, the pilot hall team assembles the painted parts of the car body, piece by piece, until the finished vehicle stands on its wheels—ready to be driven. Zählpunkt 6 ("Meter point 6") is the internal production term for this moment at Porsche in Leipzig. It's the in-house debut of the sport sedan. The engine ignites. Two hundred and ten defined steps of the assembly process start to sing in harmony.

A native of Leipzig, Fijak was one of Porsche's first employees at its plant in the Saxon city. The team had only fourteen members at the time. "When I started, the halls were just shells," he recalls. That was in November of 2000. It quickly became clear that the Leipzig site also needed a pilot hall in order to make Porsche's goal of building different models on a single assembly line a reality. That makes a plant extremely flexible, but the logistics are complex. "You can't have any problems on the line that will cause downtimes," says Fijak. In order to prevent that from happening, he and his team test every production step meticulously and systematically in advance. Do all of the components fit together as planned? How much time is needed to mount this part or that part? Is optimization possible? "On occasion, the underwear can bunch up a little," says Fijak with a grin. Everything below the visible surface of the car body—all of the mounting points, for example—are what the assembly workers refer to as "underwear." Generally, those parts are not supposed to be seen. But they have to fit well. And they have to serve their purpose.

"It can happen that something is overlooked in the CAD phase," explains Fijak. CAD stands for computer-aided design. What engineers used to sketch on a drawing board they now generate in the form of 3-D models on a computer. If one detail of a CAD model doesn't fit, though, that's not the end of the world, according to the expert. "There's still enough time to find an excellent solution." The road from the first design sketches to the start of production generally takes four years. The pilot hall enters the picture roughly one and a half years before the start of series production. If a component really needs to be completely redesigned, it takes six months at most for the revised version to be ready for production. Right now, in the final phase before production is launched, the main focus is on testing different sets of optional features and making sure suppliers' parts adhere strictly to all of the dimensional specifications. And, of course, continually simulating the assembly process is crucial. No

plastic clip should turn out to be too weak and break. No threaded connection should be anything less than perfectly straight. "But those are minor concerns," says Fijak. By contrast, any errors from the CAD phase have to be corrected promptly. "An engineer might not realize that a component designed on the computer will collide with another component when it is actually installed within the specified takt time." Then Fijak and his team have to decide whether that component can be installed earlier than originally planned. Or whether it might make sense to shift the mounting point. Or whether a completely new design is needed.

The solution is usually quickly found, thanks to close ties between the sites in Saxony and Swabia. One important tool is a 3-D printer that can produce both metal and plastic parts up to roughly the size of a basketball. "Usually that's enough," notes Fijak. "If it has to be bigger—let's say we need a transmission model—then we have that done by a service provider." The changes needed on a component are viewed on a large-scale display in the pilot hall and discussed with the design team in Stuttgart. As a result, a mounting point might be moved slightly, the new version of the component printed, and then the assembly tested and ideally approved.

## Test run on the assembly line

"It's important that all the steps in the process—including the automated ones—run smoothly and efficiently within the right takt times," insists Fijak. He emphasizes the word "efficiently" by tapping three times on the yellow shell of a crash-test car body now making its way along the assembly line. Robots are not part of the assembly team in the pilot hall, but their sequences and movements also have to be determined. The specialists at the pilot hall make sure robots will have enough space on the line. They know how thick the arms of their mechanized colleagues are and how their joints work, and they help with the programming. They also decide what the subframes for the handling devices should look like. These are small, flexible cranes that lift components like the dashboard into the car. And finally, the pilot hall team considers the ergonomics of the production facilities. How high and how far from the assembly line should the shelves be? How high should the car body be elevated above the floor when the engine and transmission are installed?

Once Fijak and his team have completed a certain part of the production process, they put the new sports car onto a segment of the regular assembly line and carry out a test run. "That's one of the advantages of our flexible production process," says Fijak. Normally everything works at this stage, and at some point the car runs the full distance on the line. The pilot hall specialists then train the assembly personnel before turning their attention to the next Porsche coming down the pipeline. Fijak is already looking forward to that. "We'll soon be starting from the beginning again—to test the production of a new model." And which one will that be? Schmidt cannot reveal specifics. Only this much: "Our colleagues at the Weissach Development Center and in Zuffenhausen are already well on their way." So all Leipzig has to do is build the new car.

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