Witte offers the service to assemble fixturing systems that meet complex customer requirements.

WITTE QUALIFIES HUGE FIXTURING SYSTEMS ON GIANT METRIS LK CMMS

A vehicle door, an aircraft reinforcement segment, or a cell phone cover – numerous new components are mounted on Witte fixturing systems to accelerate accurate design development. Using modular, high-tensile aluminum bars and cubing units, Witte assembles workpiece clamping systems of any size and shape to meet specific customer needs. To monitor the dimensional accuracy of fixturing systems up to 12 meter long, Witte runs automated inspection on giant Metris LK CMMs in Germany and Singapore. High-quality Witte fixturing systems help customers worldwide reliably measure and tune part shapes as well as investigate system assembly and spacing, before committing to serial production.

SPEEDING UP THE PROTOTYPE-TO-PRODUCTION PROCESS

New materials, tighter tolerances and ever-complex parts set new challenges for manufacturing communities. In times of compressed product development processes, vehicle, aircraft and other manufacturers depend on reliable tools and effective procedures. According to Jürgen Barth, General Sales Manager at Witte headquarters in Bleckede, Germany, companies want to guarantee high manufacturing quality and minimize the risk of applying costly and lengthy countermeasures once a new model is taken into production. “Fixturing systems from Witte allow newly designed components and assemblies to be mounted exactly according to CAD-specified positions. Such accurate fixturings enable customers to reliably assess the quality of their products in every aspect. Lessons learned at this stage are indispensible in optimizing and finalizing product designs and getting manufacturing quality up to level.”

In its relationship to many automotive and aerospace OEMs, Witte acts more like a partner than a supplier. Based on CAD data of vehicles that will only be released in one or two years from now, Witte engineers start designing dedicated fixturing systems using a virtual design process. On computer screens, they pick dimensionally stable building blocks – base plate, extruded bars, cubing elements, and many other specialized units – and assemble the core of fixturing systems.

At positions where freeform sheet metal or other product parts need support or clamping, design engineers select standard or innovative stereolithographic supports and/or high-precision mechanical or pneumatic clamps. Jürgen Barth explains that using these highly accurate virtual designs and getting manufacturing quality up to level.”

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A Metris LK horizontal arm CMM runs in shifts to verify the positional accuracy of fixtures’ reference positions.

The size of the machine can accommodate a single fixture up to 12 meter long, or multiple smaller fixtures.

HIGH MEASUREMENT ACCURACY AND REPEATABILITY GUARANTEED

In a next step, the fixtures are physically assembled in the shop. To verify critical reference positions on the fixtures, the measurement room at Witte in Bleckede is equipped with a large Metris LK horizontal arm CMM. The impressive size of the machine accommodates fixtures for aviation and other product parts up to 12 meter long. Witte selected the CMM for its stress-free ceramic guideways and premium drive technologies, which reconcile fast operation with high measurement accuracy and repeatability. Touch-sensor CMM inspection routines are defined and simulated entirely off-line.

After loading the inspection routines, the CMM picks the right touch probe and sequentially moves the probe to a series of reference points, and precisely acquires their datum points. A large automotive fixture system, which fits the entire exterior side of a vehicle, for example, consists of approximately 500 support and clamping points. Typical for aviation applications are parts of a much larger size and pneumatic clamps that secure parts from scratches. The information contained in the inspection reports enables technicians to make slight adjustments to the fixture system, if needed. Before fixture systems leave the Witte factory, final quality control is executed using a similar inspection routine. Measurement results populate certification reports that serve as quality tags for fixture systems Witte ships to customers worldwide.

PERFECTING MANUFACTURING QUALITY BEFORE SERIAL PRODUCTION

"Witte establishes maximum measurement throughput by applying the concept of multiple large transportable sandwich plates," says Jürgen Barth. "While the CMM is busy inspecting fixture systems mounted on one sandwich plate, Witte technicians assemble and mount new fixtures on the other sandwich plate. When inspection is finished, both sandwich plates are simply swapped and a new inspection round starts. This approach increases measurement productivity because it drastically reduces CMM idle time. In Bleckede, 5 operators perform inspection using 100% sampling rate by running CMM metrology jobs in multiple shifts."

"Based on our extensive experience and in-depth collaboration with manufacturers worldwide, we advise our customers to apply strict metrology-related guidelines," stated Jacob De Mol, Regional Sales Manager America. "With automotive and aerospace suppliers located on different continents, outgoing inspection at the supplier side and incoming inspection at the OEM should preferably be executed exactly the same way. At Witte, we apply the same consistency principle ourselves, as six years ago we installed an identical Metris LK horizontal arm CMM in our subsidiary in Singapore."

As a conclusion, Jürgen Barth points at the fact that the accuracy performance and stability of the Metris CMMs fit in Witte’s strategy to fabricate professional fixture systems that are dimensionally stable. “Moreover, Witte’s experience in defining appropriate clamping point locations and securing high measurement repeatability speeds up and improves the prototype-to-production process of our many customers. Similar to Metris, Witte realizes strong business growth through product innovation and worldwide presence.”