

# SAAB Aerostructures wins orders using cost-effective jig-less tooling concept

Sweden is a high-cost country, but SAAB Aerostructures keep winning orders – currently supplying the latest programs of both Airbus and Boeing with composite parts. Richard Lindqvist of SAAB shows us one of the key techniques used by SAAB Aerostructures to remain a preferred supplier to the big integrators.

The difficulties of large, tight-tolerance composite parts are well known – due to the large dimensions and variations introduced during the autoclave curing processes, it is very challenging to maintain tight process control.

As a consequence, it is very complicated and costly to produce tooling for large, high-precision composite parts since the tooling must be able to compensate for inherent process variations – costly if not outright impossible.

If we consider the example of the rudders SAAB Aerostructures supply to Airbus, this problem is clearly illustrated. Since both sides of the rudder sits in the airflow, it is critical that the hinges are positioned with extreme accuracy relative to both surfaces – in other words, the drill template must be best-fit to both surfaces. Doing this in tooling is very difficult and achieving traceability and a stable process virtually impossible.

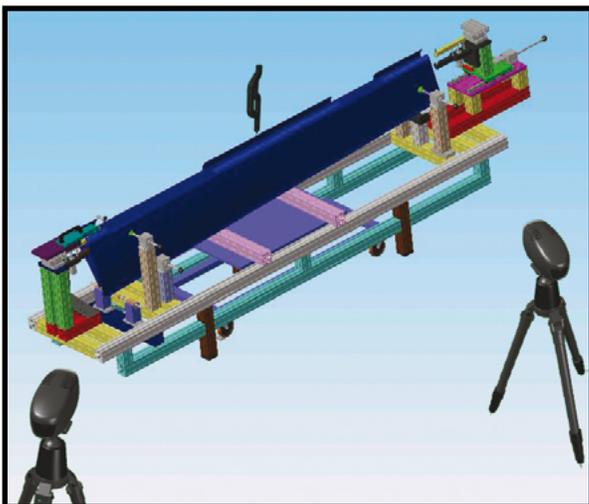


## The art of simplicity

The first impression of SAAB Aerostructures' solution is simplicity: A dedicated production cell where the only fixed tooling is a re-settable simple holding fixture that just holds the entire rudder in a stable position. The drill templates are separate bits of tooling and they are not mechanically connected with the holding fixture.

How does this work? Richard Lindqvist explains: *"The precision in this cell does not come from expensive tooling, but rather from a relatively low-cost portable measurement system from Metronor."*

Metronor makes portable measurement systems based on electro-optics. Using a wireless hand-held probe, the systems provide data in much the same way as a conventional coordinate measuring machine, but handles large measurement volumes, runs on a laptop and fits in a small rollaway case. The Metronor DUO and SOLO systems are in use with over 200 customers all over the world – primarily in the aerospace and automotive industries.



Lindqvist continues: *"The process is conceptually simple: First we measure the as-built geometry of the rudder which obviously has to be within the specified tolerances. Then, we align to the functionally critical geometries of the rudder to obtain a best-fit alignment. This is done by simply probing the critical entities with the Metronor and applying a constrained best-fit to the measurement results – all built into the system and its software. Finally, we use the measurement system to position the drill templates individually into their optimal positions given the exact geometry of this particular rudder. This guarantees that we produce an end product of the best possible fit given the small variations inherent in the materials and processes specified by the integrator – and produce no scrap parts."*

## Smart manufacturing

The production cell is developed by SAAB Aerostructures themselves, and the results are impressive. Throughput is a full 8 rudder shipsets per day for Airbus. The same approach is also used on parts for Boeing's Dreamliner program. Richard Lindqvist explains: *"We think these cells demonstrate that smart manufacturing is just as important as lean manufacturing. Having long experience with Metronor and the many built-in opportunities of their systems, it was simple to bypass the time and expense of very complex tooling. This Metronor-based cell is just one example of how SAAB Aerostructures stays competitive by trying to work smarter."*