



## State of the Art Composites Facility

Located in the heart of the UK's "Motorsports Valley", Formtech Composites is situated in a bespoke ex-F1 facility which has the highest level of equipment and infrastructure available including two Aeroform autoclaves, large oven, fully pressurised clean room with large freezers, a fully equipped trim and assembly area and final inspection facility.

The facility is an expansion of Formtech's German machining centre which boasts a large range of specialist machining equipment such as Matsuura 5 Axis machining centres with pallet loading, spark and wire eroding machines, jig, teeth and cylindrical grinding.



Figure 1 - Large Aeroform Autoclave

## Quality

Formtech Composites operates to aerospace and Formula One levels of quality control with full traceability on every

part that is manufactured. The highest level of equipment and infrastructure provides a unique capability to provide a "full service" to customers covering design, machining and composite manufacture and assembly.

## Process Equipment

Formtech Composites has two state of the art Aeroform autoclaves with full temperature and pressure control. The systems are fully calibrated and temperature mapped to aerospace specifications and has full logging and traceability on cures.



Figure 2 - Small Aeroform Autoclave

The largest Aeroform oven at Formtech Composites provides an internal working section of 2700x2500x2000mm in size and is fully controlled up to 200°C for post cures, debulking and adhesives.



**Figure 3 Aeroform Computer Controlled Oven**

A smaller 550x450x840mm computer controlled oven provides another level of flexibility in manufacturing which gives Formtech the ability to provide more optimised services to customers.

**Table 1 Autoclave Specifications**

Specification	Large	Small
Diameter (m)	2.35	1.3
Table Length (m)	3.60	3.2
Max Pressure (BAR)	8	15
Max Temp (°C)	210	400
Heating Method	Gas	Gas
Thermocouples	36	18
Vacuum Ports	12	6



**Figure 4 Computer Controlled Oven**

## ***Vapour Degreaser***

A vapor degreaser provides Formtech with a level of quality that surpasses many process requirements but adds another area of process control that delivers a higher level than competitors. The internal working dimensions are 2000x625x625mm.



**Figure 5 Vapour Degreaser**

## ***Clean Room***

The fully pressurised clean room consists of 170m<sup>2</sup> of working area with two large freezers capable of storing a large amount of stock. Formtech operates an aerospace level of operations with all staff using protective overalls and hats. The clean room has a full air lock system with standard mats to provide a true clean environment for manufacture



**Figure 6 Formtech Clean Room**

Another part of the continual drive to increase efficiency and quality in order to deliver value to money to our customer is through the use of Formtech's Gerber DCS-2500 ply cutting machine which allows optimisation of "kit" cutting for multiple jobs minimising waste and increasing accuracy and quality.



**Figure 7 Gerber DCS 2500 Ply Cutting Machine**

## **Assembly**

Formtech Composites prides itself on quality and part of that quality promise is to provide a full final assembly service: a true "Tier 1" solution. Using a Faro Arm inspection system all final assemblies can be checked so that the parts that leave the Formtech factory can go straight "to the track" with no need for intermediate steps.



**Figure 8 Final Assembly**

With full process tracking parts can be prepared to a number of quality standards including Vapormatt and etching before final assembly to either bespoke Formtech standards or to the customers own exacting requirements.

## **Inspection**

Formtech Composites are able to perform a number of types of inspection starting from ultrasonic flaw detection using a Krautkramer USN 60 to full CMM inspection equipment.



**Figure 9 Krautkramer USN 60 Ultrasonic Flaw Detector**



The Faro Arm also provides an excellent tool for inspecting large assemblies of parts such as complete front wing assemblies, engine cover, and rear wing assemblies.



**Figure 10 Platinum Faro Arm**

The Mitutoyo Crysta Apex C 7106 coordinate measuring machine provides the capability to inspect parts to a high level of accuracy and rounds out the department's capability in quality control equipment.



**Figure 11 Mitutoyo Crysta C 7106**



**Figure 12 Nosebox loaded into the small autoclave for processing**

## ***Testing***

One of the unique engineering capabilities that Formtech Composites has is the ability to reduce the development time on a component while also reducing the risk and increasing the understanding of a composite structure. For more information on how acoustic emission testing works please see the paper written by Formtech's Managing Director, Mark Preston: [Acoustic Emission Technique to Assist the Formula One Designer in Structural Design](#).



**Figure 13 Acoustic Emission Testing of an F1 Monocoque**

Combined with ultrasonic inspection capabilities, acoustic emission testing allows Formtech Composites to add extra value to development of components.