

# 3D ICOM GmbH & Co. KG

## Innovative Composite Manufacture

Fibre composite technology in the 3D Group involves the manufacture of light construction components from carbon and glass fibres. Owing to their particularly useful structural characteristics, carbon fibres are used mainly in the primary structuring phase of aircraft construction. Glass fibres, which are less expensive, are the preferred material for construction of interiors and for parts which are not subjected to any extreme constant loads.

In comparison with conventional materials, fibre composites offer greater stability and are more lightweight. This is a huge advantage for airline companies faced with fierce competition - the flight qualities of the aircraft remain the same, but less driving power is required. Fuel consumption is also lower, meaning that costs are reduced. Aside from these advantages, the various aircraft components can be manufactured using fewer raw materials, which immediately increases cost-efficiency.

This business area operates from 3D ICOM GmbH & Co. KG in Hamburg.

## Scope of services:

The field of fibre composite technology covers the following services:

### Development

In addition to joint development operations and development orders for customers, 3D ICOM GmbH & Co. KG develops and designs fibre composite products for aircraft construction and defence technology as well as for special projects. This involves not only product design but also sophisticated engineering services. Calculations usually have to be made regarding the rigidity of the product and, to some extent, its aerodynamics. CAD software is used to do this. CAD software enables creation of three-dimensional volume models, on which appropriate load and flow simulations can be carried out. Where necessary, 3D ICOM GmbH & Co. KG can also integrate the developed product into an existing system environment.

In order to validate the products, test bodies, test parts or functional models are manufactured under conditions either close or identical to those of serial production. These test parts are then subjected to the required controls. Following completion of the development, i.e. following the construction and testing phase, the initial sample is manufactured under serial production conditions, which serves as final validation of the product and proof of its readiness for production.

### Production

3D ICOM GmbH & Co. KG manufactures fibre composite products from special, aviation-certified glass and carbon fibre fabrics. These materials are made of a combination of fabric and an unhardened thermosetting synthetic matrix, and are called "prepregs". They are initially stored at -18°C. The prepregs are then cut to size at room temperature on automatic CAD/CAM-controlled cutters.

The next production step involves specially trained personnel shaping the pre-cut parts by hand in a fully air-conditioned room. The pre-fabricated fibre-reinforced composite parts are

then cured at high temperature and under high pressure in hot presses or autoclaves.

Autoclaves are special large-volume tanks in which certain levels of pressure, vacuum and temperature can be combined automatically and maintained at a consistent level.

The 3D ICOM GmbH & Co. KG has autoclaves measuring up to 8 metres long, with diameters of up to 2.8 metres. The autoclave procedure is particularly suitable for high-precision structural components such as those used in aeroplanes. The necessary precision secondary machining is carried out using a five-axis CNC cutting technology.

During and after production, the quality of the product is tested in the in-house laboratory/test facility. The testing involves non-destructive testing methods (ultrasound), destructive mechanical tests on control samples, and chemical and microscopic analyses. Digital measuring devices also ensure that the parts produced match the specified dimensions exactly.

## **System technology**

Most special projects or special components require a high level of technical expertise, as the work involves aligning or calibrating several individual parts, to ensure they function correctly as a complex complete system. 3D ICOM GmbH & Co. KG therefore has special production facilities and project teams of people who have acquired the necessary knowledge and manual skills through many years of experience.

## **Quality**

3D ICOM GmbH & Co. KG, a manufacturing and maintenance organisation under the European Regulation 1702/2003 Part-21 and 2042/2003 Annex II Part 145