3D Engineering Services in the Aeronautical Industry

Digitizing the interior of a Boeing 737

Engineering services play an important role in many industries and more and more companies decide to call upon 3D engineering services providers to carry out specific and/or demanding projects. The advantages are quite obvious: project engineers are highly knowledgeable and their acute experience of 3D engineering equipment and efficient work methodology makes for increased efficiency and shorter turnarounds which in turn translates into increased quality and lower costs for the clients.

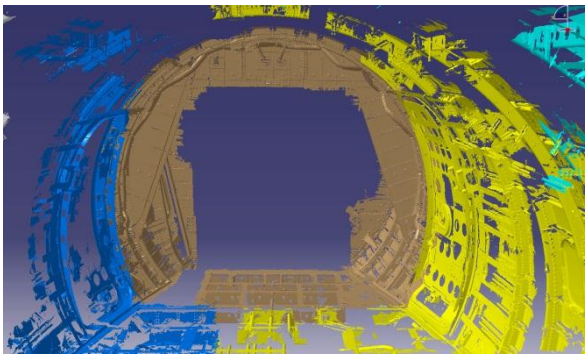
In 2010, Canada-based company Creaform has opened a subsidiary in Leinfelden-Echterdingen, next to Stuttgart, where it offers 3D measurement systems and 3D engineering services for industrial applications, whether on the customer's premises or in its own laboratories. Creaform supports medium as well as large global companies in Germany and abroad with engineering projects from all industry sectors, including the aeronautics and aerospace industry.

Creaform's 3D engineering service offer includes scanning services, dimensional inspection and 3D inspection for quality control, reverse engineering, design, application development, finite element analysis and CAD services.

Working with leading aeronautics companies such as Boeing, Pratt & Whitney, Rolls Royce and CAE, Creaform was able to position itself as a reliable and performing aeronautics service and equipment provider. For instance, Creaform digitized the interior of a Boeing 737 BBJ2 for an aviation service company, which used the virtual 3D reproduction to design, manufacture and assemble the plane's interior furnishings to meet the needs of its clientele.

The project consisted of 2 steps: conducting a full scan of the plane interior and creating 3D model files. To complete the 1st step, a team of Creaform applications engineers travelled to the client's facilities in Germany. The engineers came equipped with Handyscan 3D scanners, a Leica long-range

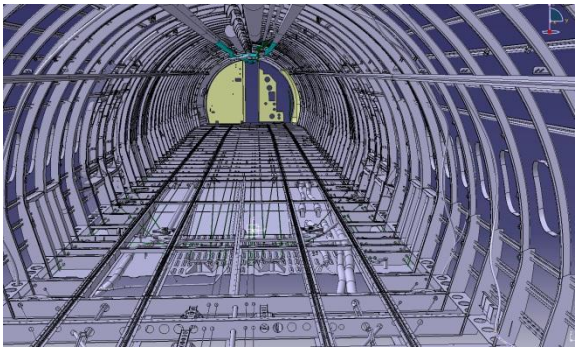
scanner, MetraSCAN optical CMM 3D scanners with C-Track sensors and a MAXscan for the photogrammetry part. Once the data was acquired and compiled, the files were post-processed before being transferred to Creaform's CAD Department in Lévis for step 2.



Using CATIA V5 software, Creaform designers reconstructed the plane's interior, including the various elements of the plane's structure, such as floor beams and plates, frames, longerons, mechanisms, and various types of piping and wiring. Work was broken down into parts according to the plane's sections. Using digital files, solid models of airplane elements were recreated. These solid models can be sectioned, and planes or surfaces can be built directly on top of them. For objects with continuous sections, solid models were generated either as an extruded section following a direction or as a scanned section following a trajectory. For non-continuous parts (e.g., in the case of certain mechanisms), the elements were broken down into basic pieces that could be redefined using simple geometric functions.

Surface models were used to render some objects whose shapes were too complex. The surface models were then thickened to obtain solid models. In the case of this reconstruction, the degree of precision required enabled us to reuse reconstructed elements in different places, such as for the pulleys that guide the control cables.

To complete the project, all reconstruction files were assembled to produce a 3D model of a Boeing 737 interior and delivered to the aviation service company, which used the virtual 3D reproduction to design, produce, and assemble the plane's interior furnishings to meet the needs of its demanding clientele.



Reconstructed CAD 3D model of the fuselage

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