



OFFLINE-PROGRAMMING SOLUTION FOR AUTOMATED A380 WING ASSEMBLY

One major challenge in producing aircrafts is the management of thousands of fasteners along the PLM-process chain. Airbus UK relies on the FASTSUITE Aerospace solution from CENIT AG. This CATIA V5 integrated solution uses the fastener information of the CATIA V5 engineering model and transfers it into the advanced 3D offline-programming system FASTTIP for drilling and riveting.

Persistent customer focus, commercial know-how, technological leadership, world-wide presence and manufacturing efficiency of Airbus have enabled the great leap forward to the leading aerospace manufacturers. Revenues over 28 billion Euros in 2009 – about half of all commercial airliner orders – outlines this strong position of this enterprise occupying 52,000 employees. The company owned by EADS continues to broaden its scope and product range by applying its expertise to the military market. Airbus relies on industrial co-operation and long-term partnerships with major companies all over the world. The PLM solution CATIA V5 from Dassault Systèmes is corporate standard.

The A380, captivating people around the world, is manufactured by Airbus. The wings of this huge aircraft are delivered by Airbus UK in Broughton, where the West factory was built for the A380. The primary structures of the curved wings are composed by many spars, ribs, stringers and skins. An A380 wing is subdivided into ten skins. The huge amount of fastener installations for two wings – 160,000 rivets – is fully automated. The Low Voltage Electromagnetic Riveters (LVER) from ElectroImpact enables automated assembly of the wing skin panel to stringer and buttstrap joints. There are two types of assembly lines. The lower panel lines are 175 meters long and the upper panel lines are 156 meters long.

The NC-program driving the very complex LVER machine controls 40 axes including the flexible jig. The requirements on the NC program for this valuable assembly machine are

very high. Originally the NC-Program was generated by another system, but this system offered no functionalities for detailed and reliable simulation. As a consequence the riveting process showed unwanted uncertainties. In order to meet the requirements, the 3D offline-programming of the LVER machines had to be addressed with a new offline-programming solution. The main pre-requisites were: CATIA V5 integration, comfortable programming of huge cad data sets, reliable machine simulation and collision detection.

The biggest challenge in the offline-programming of the LVER machine is the requested high level of automation in NC programming. Due to the number of controlled NC-Axes it is not possible to program each axis manually. Hence, a knowledge based approach became necessary. The right answer for all this was the offline-programming solution FASTTIP de-

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veloped by the CENIT AG. In the year 2006, Airbus decided to set this V5 integrated system also as a corporate standard.

The CENIT solution is based on the standard software FASTTIP. The specific requirements of the LVER machine concerning automation, programming and process simulation could be fulfilled by the development of a so-called Process Implementation Kit (PIK). This PIK covers the whole process knowledge and supports the high automation level in programming. Another important highlight was the easy usage of the fastener information included within the CATIA V5 engineering model of the A380 wing. With the aid of the process feature viewer the fasteners can be linked to process features. This enables a high level of automation in programming and quick reaction to design changes. Missing rivets can be detected and moved fasteners can be repositioned. All the time the user has

powerful functionalities to manually modify sequences and single operation design.

After validating the generated riveting programs by simulation taking into account all controlled NC axes, the NC program can be transferred to the LVER machine. The user simply has to define some parameters describing the LVER riveting process per position.

The customized FASTTIP solution leads to the desired reliable offline-programming of the automated assembly machine from ElectroImpact. Due to the simulation and collision detection the high investment in the A380 wing panel machine can be actively protected. The challenge of many fasteners and design changes was successfully mastered.

► PROFILE CENIT AG

CENIT AG has been a consultancy and software specialist for the optimiza-

tion of business processes in Product Lifecycle Management, Enterprise Information Management, Application Management Services and Business Optimization & Analytics since 1988. CENIT currently has over 720 employees world-wide and its customers include Allianz, BMW, Daimler, EADS Airbus, LBS, Metro, AXA and VW. A large number of customers are medium-sized enterprises, particularly in the financial services, automotive and mechanical engineering sectors, such as Dürr, ISE and Emil Bucher.

CENIT is headquartered in Germany (Stuttgart), where it is present in all the major cities. It also has a branch near Detroit to cater for the American market. CENIT is also represented in Switzerland and since 2006 in Romania. With the foundation of another subsidiary in Toulouse CENIT stresses its reputation in the aerospace industry. The internationality of CENIT's business gains more importance with a further consistent expansion of these subsidiaries.

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