

OFFLINE-PROGRAMMING OF A ROBOT CELL FOR NEXT GENERATION COMPOSITE WINGS

The usage of the CATIA V5 integrated offline-programming systems FASTCURVE and FASTTIP optimizes the manufacturing of composite wings. The successful aerospace project „Next Generation Composite Wing (NGCW)“, funded by the British Government, proves that the necessary adhesive dispensing and drilling processes for these kinds of wings can be efficiently programmed with CENIT’s software.

The Hyde Group Holdings Ltd is a global company in the Airframe and Aero Engine engineering and manufacturing sectors. The group employs 1,400 people and has three operating divisions, the Engineering, the Tooling and the Aero-products Division. The company has the ability to assemble many of their customers’ components, from small sub-assemblies to complete assemblies. This enables customers, e.g. Airbus, GE Aviation, Bombardier and BAE Systems, to move further up the supply chain and to capitalize on the savings achieved by simplifying their own supply chain. The Hyde Group provides customer dedicated cells for small sub-assemblies, large major airframe components and finished aircraft parts for both civil and military clients.

Hyde has been partner of the major future technology aerospace project “Next Generation Composite Wing (NGCW)”, funded by the British government. The intention of this project was to ensure that Britain’s companies

The new technologies should be efficiently automated by applying robots. An aileron – with nearly five hundred holes and three different hole sizes – should act as a demonstrator. The parts and the assembly were created

“Demand for composite wings, especially for single aisle aircraft, will grow beyond current supply capability so that new methods are being developed to ensure that demand can be met. CENIT’s software helps us to efficiently program the new technologies. Therefore, we strongly recommend FASTCURVE and FASTTIP to our clients.”

Richard Waring,
Technical Director Hyde Group



have, now and in the future, the adequate know-how and equipment to design and manufacture outstanding light-weight aerospace components. In the framework of this project the following technologies were focused:

- accurately adhesive dispensing and
- drilling of many holes in different size.

by using CATIA V5 – the standard software of leading aerospace companies.

One big task within this very ambitious research program was the development of the automated robot cell for adhesive dispensing and drilling. This cell was developed in close coopera-

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tion with KUKA UK for users like GE Aviation and Bombardier. The KUKA robot was equipped with a Zagar MQ 50 end effector to machine holes. The multiple workpiece layers of the aileron could be compressed by the pressure foot of the effector.

As the FASTSUITE components – FASTCURVE and FASTTIP – are well-known and established in the aerospace industry, the Hyde Group was very confident that these CATIA V5 integrated systems were perfect for efficiently offline-programming the new methods. „We needed a reliable partner who was capable of programming point-to-point applications as well as curve-guided processes.“, says Richard Waring, technical director, Hyde Group. „In CENIT we found a partner who already has proved the required capabilities in many projects. We are very pleased with every task which CENIT solved for us – from specification to the final implementation.“

Process implementation kits (PIK) have been developed for advanced programming and simulation with FASTTIP and FASTCURVE on the basis of a detailed specification. After installation and approval of the PIKs, all Hyde programmers received training in using the full potential of these PIKs.

FASTTIP and FASTCURVE is based on

DELMIA V5 Robotics, enabling comfortable CATIA V5 working. Within this modern environment users can program and simulate their dispensing and drilling operations. Powerful automatisms and interactive functionalities support the users on their way to realize efficiency for program generation, e.g. multi-selection and sequencing. After the aforementioned customizations FASTTIP interprets technology data, e.g. drilling position and orientation, coming from UDFs and automatically creates suitable programs.

The dispensing application needs contours to be able to generate toolpaths. The contours are created with the comfortable contour search of FASTCURVE on the basis of native CATIA V5 data. After the definition of contours the contours are approximated – always according to the user settings – in linear and circular segments. The accurately generated tool movements lead to the required dispensing quality of the bond.

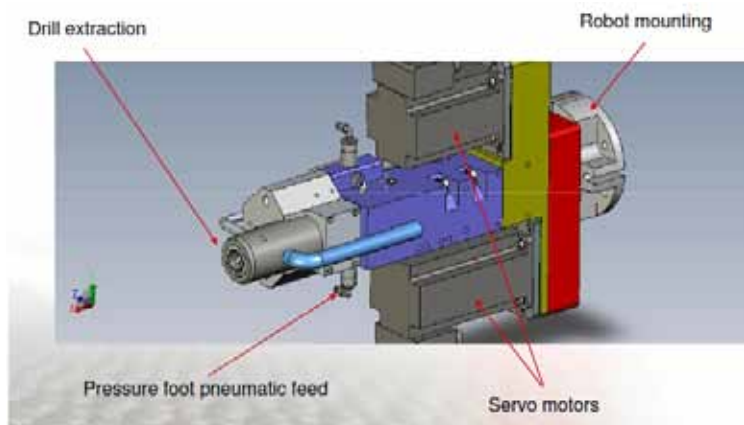
At any time, all automatically defined drilling positions and dispensing paths can be edited or deleted. Start and end position of the tool path as well as depart and approach movements are modifiable. Furthermore, technical events can be placed along the tool path to directly influence and control the process.

The highlight of the FASTSUITE components are the integrated simulation. This ensures correct and collision-free programs for the process of dispensing and drilling processes. Due to the detailed simulation the Hyde Group was able to find and approve an optimized robot cell layout and to generate accurate programs.

CENIT supported the Hyde Group in proving that their new designed robot cell for assembling light-weight components is applicable in the field of advanced composite wings. The 3D offline-programming systems FASTCURVE and FASTTIP were customized for Hyde's robot cell. Before the physical deployment of the robot cell, the CENIT's software showed the feasibility. The high level of production programming and engineering decision support allows Hyde to investigate and refine the new manufacturing methodologies. As a consequence the following benefits are obtained:

- Cost and risk reduction
- Consideration of manufacturing constraints during the design phase
- Early starting of workpiece programming
- Shorter programming time

Now, Hyde's robot cell as well as CENIT's software have already been successfully introduced at Hydes' aerospace clients.



CONTACT

CENIT
Industriestraße 52-54
70565 Stuttgart

Tel.: +49 711 7825-30
Fax: +49 711 7825-4000
E-Mail: info@cenit.de
Web: www.cenit.de