

EU Project Boosts Efficiency in Production of Lightweight Aerospace Components

Inline inspection and simulation prevent defects in carbon fiber wings

Production numbers of A320 passenger aircraft are increasing to a level of 60 planes per month. Lightweight, carbon fiber components are a key factor to achieve fuel-efficient planes. However, these components cost several hundred thousand of Euros and great care has to be taken during the production process. The project ZAero includes key players of the Aerospace industry and aims to make these complex production processes more efficient.

Large carbon fiber parts such as components of the wing sections are manufactured in complex lay-up and curing processes. To ensure that the parts are free of defects, many hours of production time are spent on quality control. Currently, each inspection process is done after a manufacturing step, which leads to down-time and reduced efficiency. Within the ZAero project methods for automatic inline inspection will be developed. This will allow a continuous monitoring of the process and avoid defects or enable their immediate correction. Efficiency gains of 30-50% are expected.

Inline inspection for lay-up and curing

In the ZAero project sensor technologies will be developed that continuously monitor the lay-up process while it is being done. This enables the machine operators to make correction and thus avoid the production of expensive scrap or costly re-work.

For the curing process sensors will be embedded in the part to monitor the curing of the part. This process takes several hours and currently, there is no information about the actual status of the part during that time. In the worst case, part quality is insufficient and the parts are beyond repair. With the new sensor technologies monitoring will be possible and corrections can be made while the process is still running. This will avoid defective parts.

Simulation to improve efficiency

To assess the effect of possible defects, extended simulation tools will be developed. The goal is to evaluate the performance of the part “as manufactured” in comparison to “as designed”, which is standard today. This will enable the experts to determine whether a part is suitable for its intended use and to make correct decisions about how a particular defect is to be treated.

Also, the increased flexibility and efficiency of the production process will lead to new logistical challenges when handling the very large parts in the production process. This is solved by logistical simulation models that assist the operator during production planning and scheduling.

Industrial implementation of project results

The results of the project will increase the efficiency of key production steps for large carbon fibre parts in the aerospace industry. To allow the efficient production of 60 A320 planes per month, the final development and integration of the new technologies will be started right after the research project is finished.

ZAero fact sheet

ZAero	Zero-defect manufacturing of composite parts in the aerospace industry
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