
Improvement of the Generation and Maintainability of Turbine Blade Models in Catia V5 with Respect to the Overall Engineering Process

Stichworte / Themenbereiche: Gas turbines, parametric development,

Environment

Gas turbine blades operate in an extremely hostile environment. Their design is a complex and challenging task involving high requirements on aerodynamics, cooling, mechanical integrity and manufacturing.

The mechanical design has to take into account all the constraints imposed by the demanding boundaries. Thus the CAD system plays a key role in achieving the targets. The geometry (CAD) is becoming more and more pivotal for the development process, playing an integration role, where the different disciplines link in either by providing geometry or as a consumer.

Many iteration cycles are required until a stable design is achieved. Thus, the need for robust and parametric development models becomes apparent. Furthermore, closed update loops without human intervention are needed to enable design optimization and, as final goal; a robust design approach. Further downstream, a seamless chain from first sketch to manufacturing models helps to reduce turnaround times and guarantees model consistency thus keeping an adequate audit trail. The whole process is embedded in the corporate PLM chain.

Content of Work

Within the scope of the work the following tasks need to be accomplished.

- Become acquainted with the requirements and dependencies/processes in gas turbine blade design in close cooperation with methods and design group (department).
- Develop a robust parametric development model.
- Take into account interfaces to engineering.
- Take advantage of CATIA v5 parametric and associative capabilities to improve the generation and maintainability of development models.
- Validate the methodology with a pilot design.
- Develop a methodology for the derivation of production models taking into account manufacturer's requirements in terms of formats, parameterization, tolerances and annotations.
- Investigate and document the requirements on which the methodology is based.
- Apply a suitable methodology to consider requirements related to specific manufacturing processes.
- Validate the methodology with a pilot design.
- The chosen methodology shall take into account the requirements of the corporate PLM workflow, especially in terms of data administration and management (VPDM).
- Document the developed methodology in an ALSTOM internal document, based on this thesis.
- Written final report and final presentation.

Informationen & Administration

Thomas Heinz-Schwarzmaier, thomas.heinz-schwarzmaier@power.alstom.com

Andreas Kunz, CLA G9 – kunz@iwf.mavt.ethz.ch