

A Modelica Library for Scalable Modelling of Aircraft Environmental Control Systems

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In this paper, the Modelica library developed in the Clean Sky project TEMPO [1] is presented. The aim of the library is to support scalable system models for aircraft environmental control systems, which can be modified in detail and characteristic to be used during different phases of the design cycle without the need of rebuilding the system model or switching to another software tool.

The design process of complex technical systems such as aircraft environmental control and cooling systems can be broken down into characteristic design phases (figure 1a). Depending on the design phase, models of the system under development may differ in structure and complexity, as they are designed to answer design phase specific questions. The library presented in this paper aims at using the object-oriented features of the Modelica language to integrate multiple layers of models. Each layer corresponds to a set of models designed for use in a particular design phase. The design phase-specific models are integrated such that a single system model that has been assembled from available library component models can be “scaled”, i.e. reused, for a simulation activity of a different phase of the system design cycle.

The library structure and the chosen container model approach (figure 1b) to integrate the different detail levels is outlined. The functionality of the library is then demonstrated at the example of a generic aircraft environmental control system architecture.

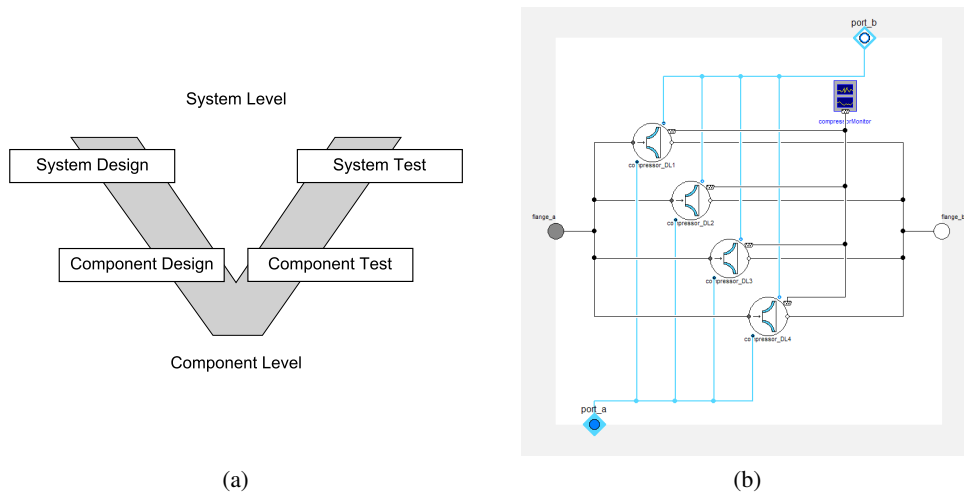


Figure 1: (a): V-diagram showing the different phases of a system design cycle. (b): Diagram layer of a scalable component model using the container approach

References

- [1] Clean Sky JTI, “Systems for green operations technology demonstrator overview.” <http://www.cleansky.eu/content/project/system-green-operations>, accessed October 2013.