Fraunhofer IBP

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eco DESIGN® Tool ENDAMI
FOR SUSTAINABLE AVIATION

The Clean Sky Initiative (CS JTI)

Clean Sky is the most ambitious aeronautical research programme ever launched in Europe. Its mission is to develop breakthrough technologies to significantly increase the environmental performances of airplanes and air transport. Resulting in less noisy and more fuel efficient aircrafts, as a key contribution to achieve the Single European environmental objectives.

The Clean Sky JTI (Joint Technology Initiative) was founded in 2008 and represents a unique Public-Private Partnership between the European Commission and the industry.

The CSJU will deliver demonstrators in all segments of civil air transport, grouped into six technological areas called "Integrated Technology Demonstrators" (ITD).

eco DESIGN® for Airframe (EDA)

eco DESIGN® is one of the six ITD's in Clean Sky. EDA is meant to tackle environmental issues by focusing on the following tasks:

- To identify and maturate environmentally sound materials and processes for aircraft production, maintenance and use phase.
- To improve the field of end-of-life aircraft operations including reuse, recyclability and disposal issues.
- To provide means for an ecolonomic design process in order to minimize the overall environmental impact of aircraft production, use, maintenance and disposal.

eco DESIGN® Tool ENDAMI for Sustainable Aviation – The Facts

The eco DESIGN® Tool ENDAMI allows aircraft designers without specific knowledge of Life Cycle Assessment (LCA) to generate results for different design alternatives. This helps to identify relevant hot spots over the entire life cycle, from individual parts up to complete aircrafts. It supports development processes by comparing aviation materials and technologies.

eco DESIGN® – integrating LCA based environmental information into decision making as early as in the design of products and systems – constitutes the most viable approach in finding environmentally sound future air traveling concepts.

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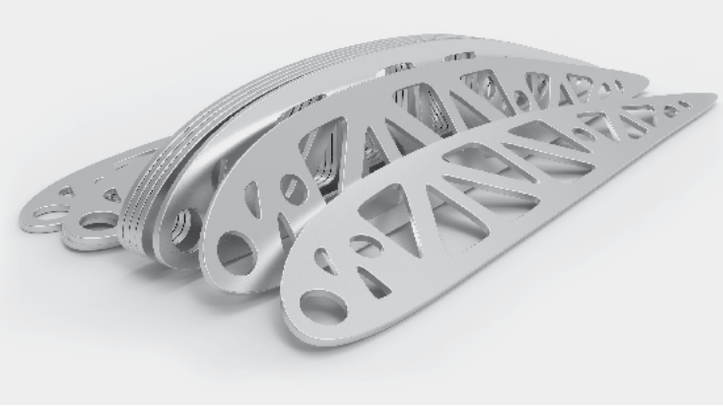
eco DESIGN® Tool ENDAMI FOR SUSTAINABLE AVIATION



eco DESIGN® Tool ENDAMI – Sustainability in Aviation

With the growing environmental awareness in society, the demand for sustainable products and services increases. Hence especially in the expanding aviation sector, a reduction of the ecological impacts is intended to improve aviation's ecological footprint.

Modeling a whole Life Cycle Inventory (quantifying all material and energy flows) in a ISO compliant way, requires comprehensive expert knowledge. Furthermore aircrafts are complex systems with millions of different parts and various, aviation specific materials.

To enable aircraft designers without specific LCA background to assess the environmental impacts of existing as well as of conceptual aircrafts, the web-based eco DESIGN Tool ENDAMI was developed with an easy-to-use interface.

eco DESIGN® Tool ENDAMI – Simplified Tool Tailored for Aviation

To perform LCAs in aviation, major process routes and their interdependencies with environmental impacts were identified. Those major dependencies were parameterized in generic aircraft LCA models and finally linked to their components and process parameter settings.

The LCI modeling is thereby transferred to a central server, providing aviation specific background data, which is maintained by LCA experts ensuring a high data quality. The LCI models can be extended and new aircraft parts can be added. The server, a pool of parameterized LCI models for aircraft parts, relies on the comprehensive GaBi LCA database, is an extension of the GaBi LCA software and supports Design for Environment.

To model the environmental impacts of different aircraft types, designers are able to modify components by varying weights and surfaces, material properties and production processes. In relation to a "reference airliner" different scenarios can be setup to compare the environmental impacts of different design alternatives of aircrafts and their components.

The results are available as inventories with a detailed list of various, individual selectable emissions or as aggregated environmental impacts (e.g. Global Warming) and new impact methods can be added as proposed by ISO.

eco DESIGN® Tool ENDAMI – Advantages

- Easy-to-use interface
- Complex expert LCA models in the background
- Compliancy to ISO standards (14040, 14044)
- Add and evaluate different scenarios
- Detailed LCA from Cradle to Grave based on expert background models
- Comprehensive, high quality data
- Aviation specific datasets integrated

Client-Server Architecture – Benefits of Central Data Storage

- Transfer of complex LCI modelling to a central server which is maintained by LCA experts
- Pool of parameterized LCI models for aircraft parts
- Central data storage and maintenance ensures data consistency
- Updates are available for every user
- Definition of Access Rights for different design teams