

# ECO EFFICIENCY

## SUSTAINABLE PRODUCT FEATURES

**DIEHL**  
Aviation



## ECO EFFICIENCY

We are responsible for our earth and its protection. Conscientiously using our resources and protecting our climate set the course for the future of all of us. Ultimately, we see values such as sustainability and fairness as an opportunity for future generations. For Diehl Aviation, this means **responsibly balancing ecological, social, and business aspects and including them into our daily decisions.**

With our eco efficiency innovations we want to contribute to the industry's goal of carbon neutral flight with more efficient products and also make a contribution towards circular economy with recyclable and recycled materials. There we address different stages in the life cycle of our products: production, operation and end-of-life to improve every aspect of our products.

The long term goal in circular economy is to have a closed loop for resources. Products that reached their end of life will be fully recycled and ideally no new resources need to be extracted. When addressing these aspects for our products we take different actions throughout the product life cycle.

## FEATURES

### Sustainable Product Features regarding Production of the Products

More Eco Friendly Products start for us with the material choice and optimized production processes:



RECYCLED  
MATERIAL

During the product design we increase the use of recycled materials to establish a **circular economy** and **reduce the use of virgin material**.



BIO-BASED  
MATERIAL

Bio-based materials are materials that are made from substances derived from living organisms for example, plants. We want to increase the use of bio-based material, to decrease the use of virgin materials and with this **reduce the use of fossil resources**.



WASTE  
REDUCTION

To decrease **resource use** in production, we constantly optimize our processes to reduce waste and material scrap.

### Sustainable Product Features regarding the end of life of our Products



RECYCLABLE  
MATERIAL

When considering the end of life of our products, we apply design principles and materials, that enable an **increased recycling rate**. One Example for this are mono-material components, e.g., made from thermoplastics, which could be shredded and re-used in a second molding process to produce a new product.



VOC  
REDUCING

To improve health and safety standards for our production staff even further, we minimize the use of materials and processes, which emit volatile organic compounds in production and over the lifetime of our products. For example, most of the paints we use are water based, and therefore VOC free.

### Sustainable Product Features regarding Operation



WEIGHT  
SAVING

The **biggest lever** how our products can contribute to a **reduction in carbon emission** is lightweight design. By developing increasingly lighter products, whether through new materials and technologies or completely innovative approaches in system architectures, we want to generate a positive impact on aircraft weight and thus fuel burn.



CO<sub>2</sub>  
SAVING

Major levers for reducing the carbon footprint of our products are lightweight design and increasing energy efficiency of our products. Smaller contributors to the carbon footprint are the materials and process energy we need to produce our products.



ENERGY  
SAVING

For our electrical products we found another lever to contribute to eco efficient flight. That is power consumption. As electrical power needs to be generated at the aircraft engines or APU, reducing the power consumption can contribute to **reduced fuel burn** and ultimately reducing inflight carbon emission. Reducing power consumption for our electrical products also has the side effect of reduced thermal energy. This is an enabler for optimized cooling designs, which will lead to additional weight savings.



WATER  
SAVING

Especially with our water-waste systems and lavatories we identified water saving innovations as another beneficial measure to generate a **weight saving** for the aircraft. For example, with optimized water consumption to flush toilets, operators can reduce the amount of water that is needed for the flight, thus reducing the aircraft take-off weight. Considering that water is a scarce resource, this has the side effect that **water consumption** itself can be reduced as well.

## TRANSLATING WEIGHT SAVING INTO CO2 SAVING

A weight saving can be translated into a CO<sub>2</sub> saving as follows:

With the Specific Fuel Consumption (SFC), aerodynamic performance, given by Lift-over-Drag (LoD), Aircraft weight and annual flight hours we can approximate the annual fuel burn of a given aircraft type.

**Fuel = weight / LoD \* SFC \* Flight Hours**

With this we estimate the fuel saving through an aircraft weight saving. This fuel saving can be converted to CO<sub>2</sub> saving using the chemical principles of combustion:

**Burning 1 ton of aviation fuel produces 3,16 tons of CO<sub>2</sub>.**

### Example calculation for Powder Coating

With a 30 % smaller surface weight of powder coating compared to decor foil, we estimate a **3,8 kg** (8,4lbs) weight saving for sidewall panels per single aisle shipset.

For a current large single aisle aircraft (e.g., A321NEO or Boeing 737-9) and a yearly utilization of 3600 flight hours, the above-mentioned weight saving generated with powder coating for sidewalls will translate into a **fuel saving of 500kg per year** per aircraft.

Due to this weight reduction, we can annually **reduce the carbon emission by 1,6 tons (t) CO<sub>2</sub>** per aircraft.