

GUIDANCE

HOMOGENOUS PARTS

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Catena-X
Your Automotive Network



HOMOGENEOUS PARTS

The sustainability manager of a company has the task of calculating the PCF (Product Carbon Footprint) for the products of a company. In many cases a company offers variants of a otherwise very similar product. To simplify the PCF calculation for these products, it is possible to treat them as homogeneous parts. This means PCF quantification is performed by a simple interpolation between PCF values for limiting variants.

This guide explains which criteria are applied to homogeneous parts and what you need to do to prove that parts are homogeneous part.



Requirements

Challenges in calculating a PCF for homogeneous parts:

1 Generic criteria to be met by homogeneous parts:

Not all different products can be treated as homogeneous parts. Four general requirements need to be met to qualify a product family as a family of homogeneous parts.

1. The same main function
2. The same product standards
3. The same manufacturing technology, processes, and materials
4. The same supply routes

3 Homogeneous parts in intermediate production stages:

For some products the required correlation between product variants may be shown for intermediate production stages, whereas the final product does not show the correlations anymore due to specific additional process steps or add-on parts.

In this situation the PCF quantification for the intermediate part may be done via interpolation for homogeneous parts and addition of the CO₂e-emissions for later process steps or add-on parts

2 Detailed proof of homogenous parts:

To proof that products are homogeneous a correlation with a specific product parameter must be identified for more than 20 product variants. If the correlation satisfy a coefficient of correlation of more that 90 % it justifies the homogeneous nature of the parts.



Use Case

Example: High Pressure Gasoline Injectors

High-pressure injectors for direct petrol injection are manufactured in many different variants to enable different installation positions in the engine and use in a wide variety of engine combustion processes.

How to do the Analysis?

Step 1: Check generic requirements for homogeneous parts

The product group HDEV6 under consideration consists exclusively of fuel injectors for petrol engines with direct injection that meet similar technical specifications. The same production processes are used and the materials and components come from the same suppliers.

Step 2: Identify relevant interpolation parameters

The PCF was determined individually for 24 different variants of the injector. Plotting the PCF of the 24 variants against the weight of the injector shows an obvious linear correlation. When checking the quality of the correlation, an R^2 value of 97.7 % is obtained. This fulfills the requirement for the verification of homogeneous components. The PCF for all other variants of the HDEV6 injector can be determined by simple interpolation for the respective injector weight.

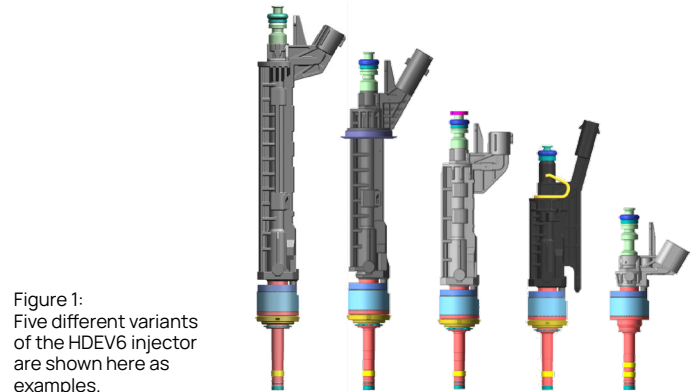


Figure 1:
Five different variants
of the HDEV6 injector
are shown here as
examples.

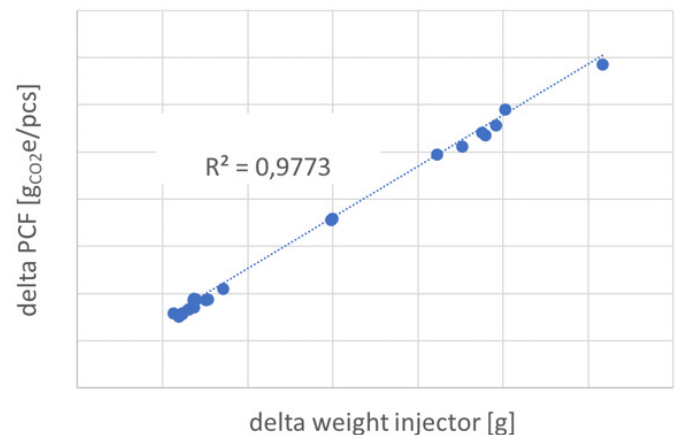


Figure 2:
In our example, we have determined the weight as the unit for determining the correlations. It is nice to see that all injectors correlate on one line.

PCF Correlation

Results and Findings

The PCF calculation for homogeneous parts allows to simplify the quantification of a variant specific product carbon footprint drastically. A simple interpolation provides the specific PCF of the variant, if a sufficient quality of correlation can be shown.

Links

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