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PRODTECT AUTOMOTIVE – MEETING THE REQUIREMENTS OF ELV

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ABSTRACT

With the implementation of the European directive 2000/53/EG on end-of life vehicles and 2005/64/EG on the type-approval of motor vehicles with regard to their reusability, recyclability and recoverability car manufacturers are obliged as part of the car type-approval to meet a recycling rate of at least 85% and a recovery rate of 95% . The calculation method for the recycling rate is defined in ISO 22628. For the EU type-approval, information regarding material (type and mass), parts to be disassembled, as well as a complete documentation of the recycling and recovery processes of all materials is needed along with the calculated recycling rate[1][2][3]. This paper presents a method of assuring the achievement of the required rates, integrated in the software tool ProdTect. The software module is developed by KERP together with MAGNA STEYR and IWF, TU Braunschweig. The DfR tool evaluates the vehicle end-of-life from the early concepts of the new vehicle as changes are more easily applied in this phase. This method starts with the definition of the minimal set of data that a vehicle model in the DfR software should have to be able to be assessed. This method also proposes an adaptive algorithm that allows an incremental product model definition in the DfR tool that follows the vehicle concepts definition levels from the first concepts to the detailed design. Product developers are flooded by an amount of new regulations that is difficult to handle. ProdTect allows producers to keep these requirements under control by providing a holistic overview. It turns product developers into product architects and helps realizing End-of-Life cost savings and legal compliance. Once passed on to the market, implemented cost savings measures will help increasing customer satisfaction and market share, thus turning regulatory challenges in competitive advantages.

Keywords: Design for Recycling, ISO 22628, Product improvement

1 INTRODUCTION

The design for recycling activities arise from the legislative requirements as well as from the ever increasing recognition of the need for sustainable economy and use of resources. Considering the large amount of materials contained in a car, and their complexity it is very important to be able to perform an efficient recycling.

In the context of modern car design it is very important to allow the integration of design for recycling in the earliest stages where the ability to influence product end of life performance is high. Design for recycling, plays an important role in the design for X concept. Missing information concerning the end of life performance of the vehicle have to be provided, along with expert knowledge to allow an efficient product improvement. The concept is presented in Figure 1.

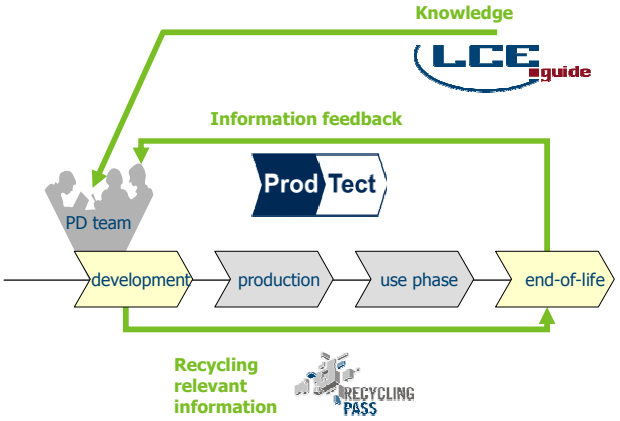

Figure 1. The development cycle

The assessment flow follows the scheme described in Figure 2. It starts with a model definition that is integrated in the data landscape of a typical automotive OEM. Existing data can be imported in different quality stages to allow incremental product assessment. Data describing the recycling processes in terms of technical capabilities, ecological impact and economical performance have to be available to perform the calculation. At the calculation stage end of life parameter such as recycling rate, pre-treatment steps, disassembly time and cost are calculated. If the end of life performance does not fulfil the requirements, a product optimizing can be performed. Recycling relevant design aspects of the vehicle are analysed and improvement potentials are identified.

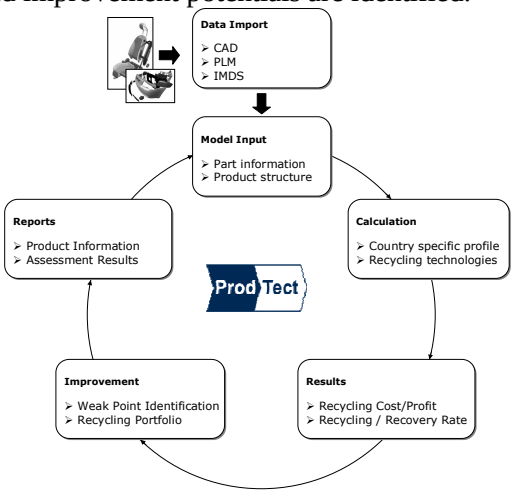

Figure 2. The assessment flow

Each module is described in the presented paper.

2 MODEL DEFINITION – INTEGRATION IN VIRTUAL PRODUCT DESIGN

Due to ever shorter product development cycles, the complexity of the system and the high number of requirements to be taken into account, the optimisation task a designer has to perform is extensive. A lot of requirements must be tackled simultaneously under time pressure. The environmental legislative requirements add an additional challenge to the design phase. Virtual car development is a very important aspect in automotive design. All development targets are checked virtually before the validation of physical prototype cars starts. An intense use of the existing internal and external information systems is a precondition for efficient virtual development. An analysis of complex product models regarding their environmental impact is possible only through extensive data availability

2.1 Model definition

The vehicle is defined in ProdTect as a parametric product model which incorporates a set of data needed to deliver maximum assessment accuracy of the end-of-life phase. The vehicle is modeled