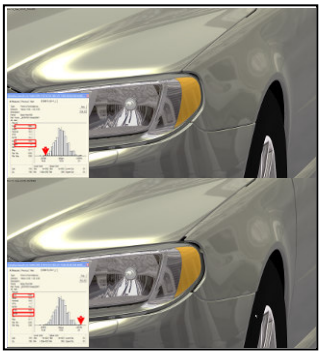
Master Thesis –
Defining Materials in an Automotive Environment to Support Realistic Virtual Evaluation

Background



Virtual development is an important concept in today's product development environment. By implementing virtual development, the number of physical mockups and prototypes may be minimized, which in turn will decrease project time and cost. In the automotive industry, virtual evaluation is of special importance throughout the whole project. This has to do with the fact that several loops are executed in the concept phase, the detailed design phase and the industrialization phase. In these loops, realistic outcomes of the final product, or its manufacturing environment, are simulated and evaluated.

An important part in this environment is to simulate and visualize the effects of geometrical variation and how it affects the customers overall perception, Perceived Quality, of the vehicle. In these visualization models, high fidelity representation of material appearance is desired to increase realism.

Objectives

Develop a general toolbox for modeling and capturing (from spectral measurements) materials for real time rendering with support for texture maps, colors and bump mapping. BRDF (bidirectional reflectance distribution function) will be used to describe surface attributes. This will support virtual evaluation of the Perceived Quality, with focus on materials common in a vehicle environment.

Actors and stakeholder

The main actors are mainly Perceived Quality engineers building virtual visualization models in early phases of the development. The work is a collaboration between PPD (Department of Product and Production Development) at Chalmers University of Technology and Volvo Car Corporation (VCC) and will be conducted at both the company and at the university.

Method / Approach

The work will be divided into the following work packages.

- Make an inventory and classification of surface material common in a vehicle environment.
- Create a toolbox for modeling and capturing parameterized materials.
- Matching of material parameters to measurement data.
- Export functionality for input to material library in RD&T.
- Demonstration on an automotive case in RD&T.

Prior knowledge

Knowledge in computer graphics and programming skills are preferred. Furthermore, knowledge in material appearance related to computer graphics is desirable.

Time schedule

The thesis work is planned to cover 20 weeks of full studies as a two-person project.

Expected outcome

A toolbox for modeling and capturing parameterized materials. The toolbox shall have export functionality for RD&T. Further, a demonstration on an automotive case in RD&T is expected.

Contact

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