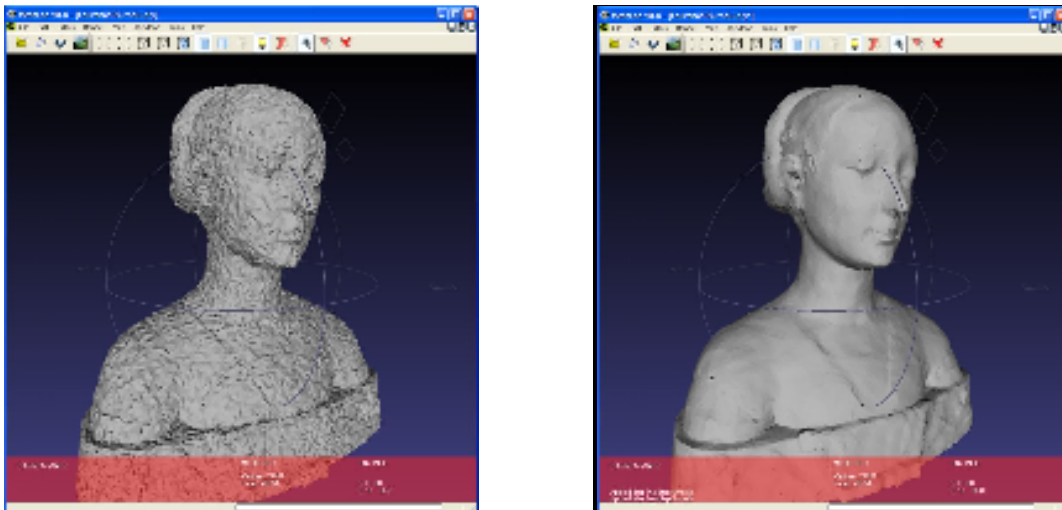


## Study of mesh smoothing methods and the application to car body models

To analyze the mechanical behaviour of car body models in design process in BMW, unstructured discrete triangular meshes are created from scanned car body models. Gaussian curvature, which reflects the load-carrying capacity of the car body model, can be estimated with a high accuracy if the initial triangular mesh is a good approximation of the smooth surface. However, the meshes obtained from real world objects are often “noisy” and have random errors compared to real smooth surfaces.

MeshLab is an open source software for the processing and editing of unstructured 3D triangular meshes. It has implemented a functionality which can filter the noise of the meshes to obtain meshes with better quality. From the source codes, we can study the algorithm in the software and compare it to other smoothing methods as described in the literature. During the project, triangular meshes of 3D geometries will be created with some noise and the algorithms will be evaluated further by applying them to these meshes.



**Fig: A mesh with some random noise (left) is smoothed by MeshLab (right)**

The tasks of this project are

- To create triangle meshes of 3D geometries in STL format and add some noise to them.
- To learn the filtering algorithm in MeshLab and compare it to other smoothing methods.
- To choose and implement the most competitive algorithm in MeshLab and apply it to real industrial models.

The implementation of the language will be C++.

The work will be mainly supervised by Quanji Cai (cai@bv.tum.de), Chair for Computation in Engineering and will be instructed by Wolfram Volk (Wolfram.Volk@bmw.de), Product and Process Planning for Technology Forming, BMW Group.