Generating surfaces from measured scan data with ICEM Surf

Importing scanned data
Almost all data formats can be read into ICEM Surf: individual points of tactile measuring devices, point clouds or facet models from laser scanners or photogrammetry systems. Individual data formats of leading manufacturers like GOM or Steinbichler supported in addition to ASCII-based formats or the standard STL format.

Processing sets of scanned data
In ICEM Surf several point and facet data sets can be merged together to one complete model. Filter functions allow intelligent user-defined reduction of the data and ICEM Surf can generate facet data from the cloud point data. It should be emphasised that ICEM Surf can utilise or modify both cloud point and facet data, both globally or locally.

Structuring the scanned data
To start to develop surfaces from the scanned data, the user defines a mesh that defines the boundaries of the surfaces to be created. This can be done by quickly generating a number of planar sections. These sections can have a constant offset, or they can be defined graphically by the user to reduce the amount in less complex regions.

For surfacing requirements ICEM Surf utilizes curve sketch functions to define free-form curves on feature lines. The system supports the user by automatically displaying these feature lines, which are identified automatically on the facet geometry. Generally the more accurately and smoothly these feature lines are defined, the better the quality of the generated surfaces.

Automatic creation of surfaces
The resulting curve matrix is sufficient for ICEM Surf to automatically create a surface model at the touch of a button. Most of the facet data is taken into consideration as the surfaces are generated, resulting in a close approximation of the shape. The deviation is dependent on surface order and smoothing values. This can be further refined or approximated by switching from Bezier to B-Spline surface math, and increasing the number of segments. This allows the user to reach a suitable compromise between smooth surfaces and a closer adaptation of the scanned data.

Nominal and actual comparison
A coloured contour plot in ICEM Surf allows the user to compare the quality of the created surfaces in regard to the deviation from the original data. A deviation range in millimetres is assigned to each colour. Additionally the user can graphically select points on the data for precise deviation values. The quality of the aesthetic surface generated can be subsequently analysed using further diagnostic functions, such as the highlight function.
Benefits

- Importing and processing of all common facet and point cloud data formats.
- Point data can be converted into facet data.
- Facet models can be modelled globally or locally, using a user-defined region.
- The scan replacement option allows for quality improvement of the imported facet models and also the detail modelling of areas not captured in the digitizing process.
- Creating fast and almost fully automatic surface mesh from predefined facet data.
- Easy to use and easy to learn.
- The desired surface structure can be displayed via curves, section or a combination of both.
- Depending on the boundary structure of the curves, the generated surface data can be used downstream in the development of Class-A surfaces.
- By setting appropriate settings, the user can achieve the best compromise between a low deviation from the supplied data and the smoothness of the surface model.
- The user can decide to surface the entire facet or curve data or just locally defined regions.
- Real-time diagnostic functions support the user in evaluating the achieved surface quality and the deviation.
- Poorly defined facet models don’t have to be initially corrected since, if required, you can model independently of the scan data, saving time and cost.
- Quick surface design and surface creation to Class-A quality is possible with only one single software package.

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