



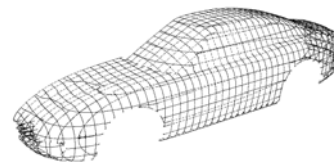
Modelling class A-surfaces in ICEM Surf



Object with Class A-surfaces and Highlight Diagnosis Display

Importing scan data

The sectional raw data provided for Class-A modelling in general consists of digitized data taken from scale models or existing products for reverse engineering purposes. The measuring data is generated with tactile measuring devices or optical systems. ICEM Surf can import all common data formats and facet models.



Sectional point data from clay model

The lofting spline

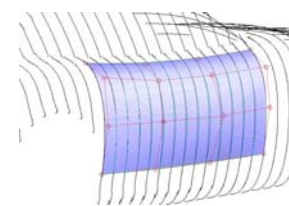
The sectional measurement point data is usually approximated via lofting with a lofting spline. ICEM Surf uses Bezier mathematics to do the same electronically: The Bezier control points correspond to the lofting weights. With the help of only a few control points an accurate smooth curve is created.



Sectional point data and Bezier curve

Direct surface modelling

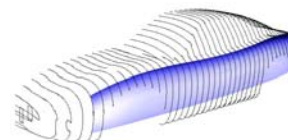
ICEM Surf offers lofting-based functions not only for curves, but also for surfaces. This means that the dynamic movement of control points lead to an immediate, controllable and dynamic deformation of the modelled surface geometry. Dynamic diagnosis sections, generated in the same planes as the measurement data permit immediate control of deviation. The internal surface quality is controllable using dynamic real-time diagnostic tools.



Direct controlled surface modelling

Creating theoretical surfaces

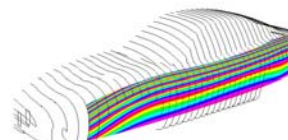
Modelling in ICEM Surf allows the user to always have the complete geometry form in mind, not just a local region. Large simple flatter areas are modelled first, over-building the regions where more detailed shape is required. Trim boundaries, tangent breaks and detailed surface regions are subsequently modelled after the design of the main theoretical surfaces are completed.



Creating supporting surfaces

Checking the surface quality

Reflected light indicates the surface quality particularly well, so for example connections of adjacent surfaces, which only have a tangent condition defined, appear as sharp edges. Only curvature continuous transitions smooth the surface form. To be able to verify this on the computer monitor early in the design phase, ICEM Surf offers a comprehensive set of diagnostic tools such as the highlight and reflection lines to display lines of the same light intensity.



Diagnosis of surface quality

Detailed Design

Once the theoretical surfaces have been satisfactorily defined, the detailed design can follow. As well as its powerful lofting functions, ICEM Surf employs a range of functions to obtain high-quality connections. Dependant on geometric conditions, a choice of connection transitions can be made. This lets the designer achieve the best possible result in the shortest period. The final step in the design process is to constrain the surfaces to the finished part boundaries by using the curves that define its openings and boundaries.



Completed Class A part



Benefits

- The system architecture being aligned to the principle of manual lofting makes it possible to create surfaces of the highest quality in comparatively short time.
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- The user can choose to design curves first and subsequently create surfaces.
- An even more efficient method is to directly model dynamic surfaces without prior curve description.
- In order to save time, design changes can be performed through modification of the original geometry instead of time consuming construction of a new geometry.
- Easy to learn and easy to use 3D modelling.
- Display and analysis of the surface modelling in real time. Modelling surfaces while the diagnoses functions are simultaneously activated provides the user with instantaneous visibility of the modifications being made (both numeric and graphic diagnoses).
- Surface and curve data from 3rd party systems can be imported and exported without any loss or geometrical change, regardless of their mathematical representation (NURBS, B-Spline or Bezier).
- Conversion of NURBS / B-Spline to Bezier representation of curve and surface geometry is possible and vice-versa. This allows the user to make use of the advantages and disadvantages of both math descriptions.
- Surface quality analysis (numerical and visual) directly within ICEM Surf, ensures the product is released to manufacturing correctly, thus preventing costly and time-consuming manual corrections to forms or tools later on.
- ICEM Surf produces small databases with cleanly structured geometry. This greatly accelerates the workflow in all subsequent design processes that use the ICEM Surf data.

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