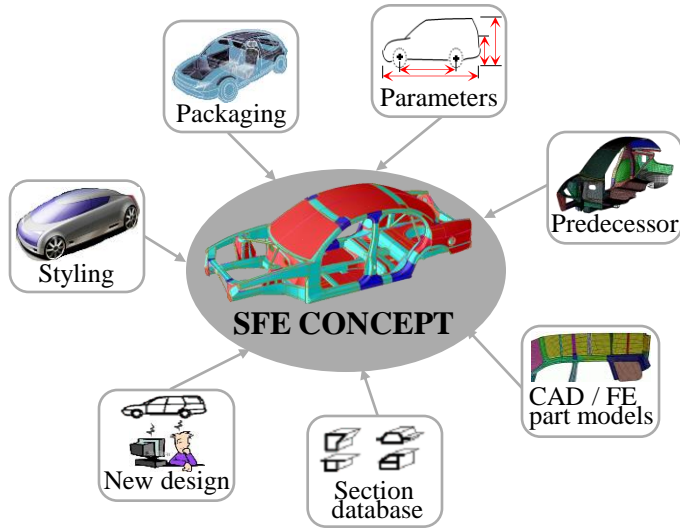


# SFE CONCEPT®

## Powerful Tools for Fast Parametric Design



- Enable Upfront CAE
- Fast and easy generation of design concepts
- Quick parametric model variation
- Quickly study multiple design concepts
- Break the dependence on traditional CAD geometry before simulation work can begin
- Faster Design turnaround
- Parametric shape & topology optimization

## SFE CONCEPT®

In automotive design, it is important to assess the mechanical behavior of a structure in order to select a feasible design out of several variations. Thus, it should be possible to set up the geometrical description of the structure in a very fast and flexible manner.

SFE CONCEPT® offers specially adapted solutions for this purpose. Design is performed in a purely declarative way, using abstract high order elements. Based on implicit parametrical descriptions of geometry and topology, the model can be assessed at every design stage using the built-in finite element generator.

The design may start up with an entirely new geometry or with an imported and converted CAD or FE geometry.

SFE CONCEPT models can be modified quickly by moving influence points, stretching or bending base lines and changing cross sections. This can be done interactively or in batch mode. A consistent geometry is always maintained.

It is possible to store model parts in a library. When imported to a new design, these parts are automatically attached to the new geometry.

SFE CONCEPT can be run in various optimization environments: shape design variables can be defined and exported together with shape base vectors. Upon change of these variables, a new geometry is calculated and re-meshed, if necessary.

## Geometry and Topology

**Influence points** are the only objects having cartesian coordinate information. If moved to a new location, all other objects will follow, maintaining a consistent geometry.

**Base lines** are used for information transfer from one object to other objects.

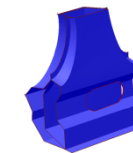
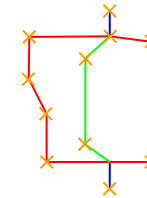
**Cross sections** form the shape of beams and joints. Section segments can be added, removed and modified parametrically.

**Beams** are created by applying cross sections to the base lines.

Beam curvature follows the base line curvature.

Parameterized **joints** are generated automatically between adjoining beams.

Free-form **surfaces** can be created using base lines and beam or joint edges. Surfaces adapt to any change in the master objects (edges defining the surface).



## Optimization of design processes by using powerful simulation tools

SFE software tools deliver important product knowledge in the initial development stages by using virtual prototypes. Focal points of SFE services and products are: saving development time and costs, shortening time-to-market cycles and improving product properties.

**SFE software:**  
 SFE CONCEPT®, SFE CONCEPT RAIL,  
 SFE AKUSRAIL, SFE AKUSMOD™,  
 SFE MECOSA

**OEM references:**  
 BMW, Mercedes-Benz, Fiat, Ford, GM, GM-Daewoo, Chrysler, Honda, Jaguar, Land Rover, Mazda, Mitsubishi, PSA, Porsche, Brilliance, Volvo, VW.

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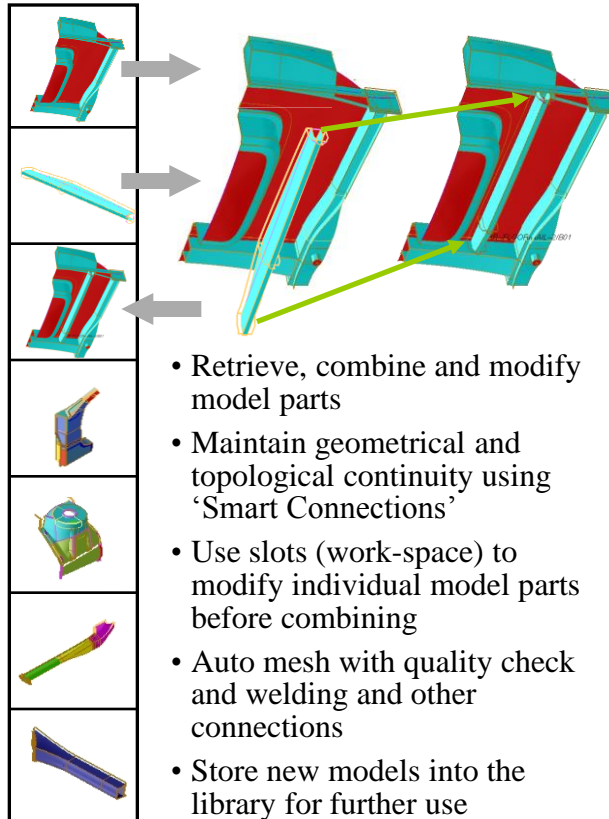
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## Modular Construction

Store model parts or even entire modules in SFE CONCEPT's built-in library. Libraries can be populated with reusable modules. Using 'Smart Connections', individual parts from various models attach themselves to a new model automatically at appropriate location. This facilitates quick and easy generation of model variants and new design concepts.



## Shape Optimization

Shape optimization with large modifications. Define shape design variables as well as upper and lower bounds within SFE CONCEPT. A design variable can be any combination of SFE CONCEPT parameters, e.g. point locations, section geometry or line curvatures. On demand of either the FE solver or an external optimization tool, the design variables are automatically updated and new shape base vectors are calculated. SFE CONCEPT takes care of a consistent geometry and, if necessary, remeshes the model. The entire process is automated and runs in batch mode.

