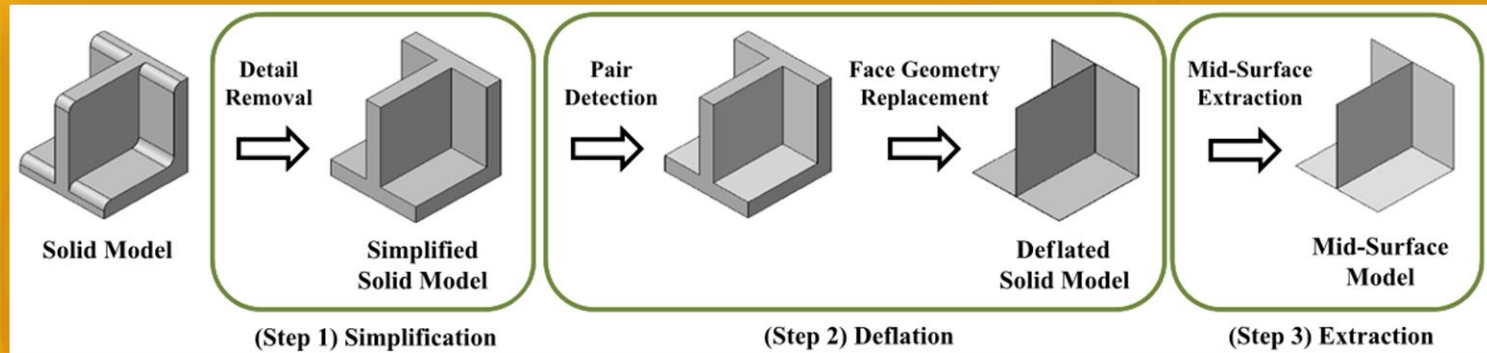


GEOMETRY IDEALIZATION



Ref. Engineering Analysis With NX Advanced Simulation – Chapter 2
P. Goncharov, I. Artamonov, T. Khalitov

Terje Rølvåg. terje.rolvag@ntnu.no

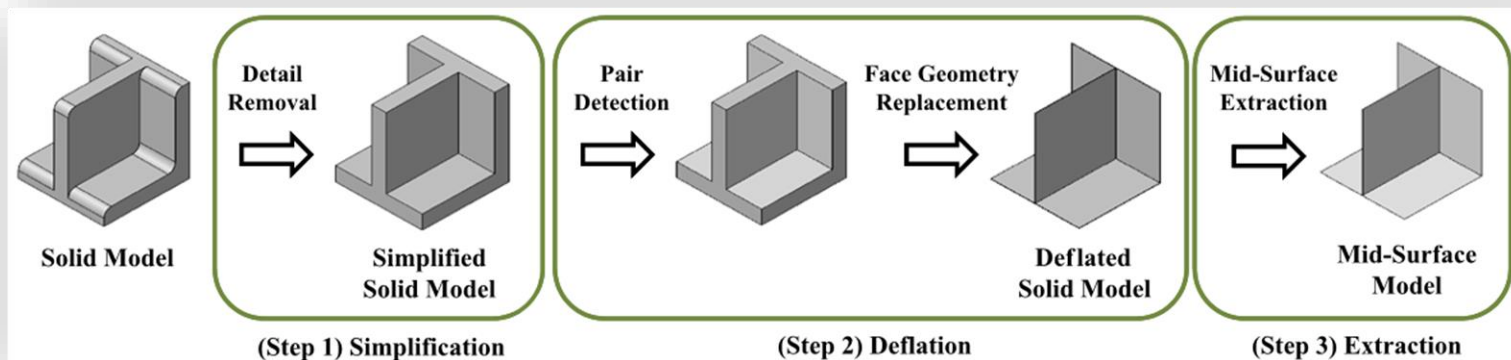
GEOMETRY IDEALIZATION

Problem:

- **How to prepare geometry for meshing?**

Objective:

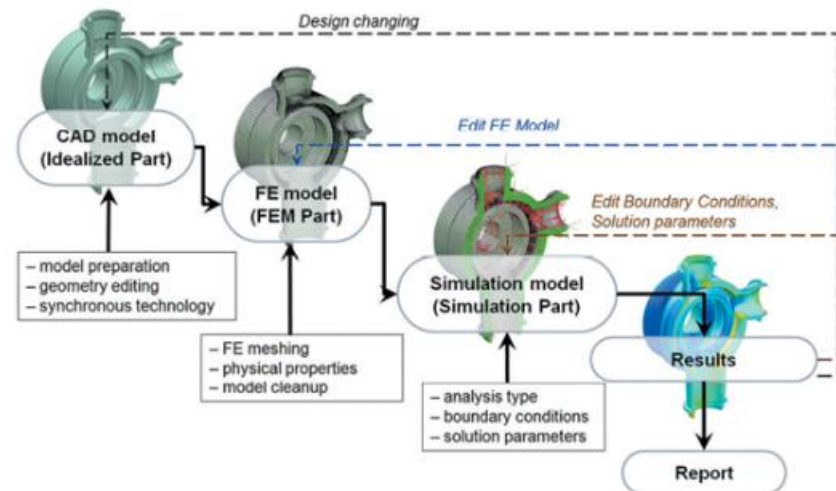
- Learn why and how to idealize geometry using the **Model Preparation**, **Midsurface** and **Synchronous Modeling** toolbars



GEOMETRY IDEALIZATION

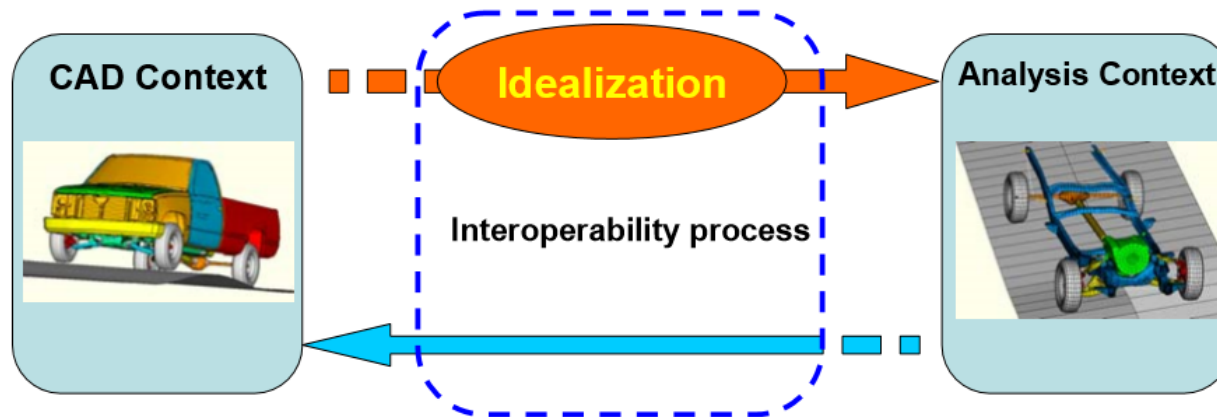
Sub-problems:

1. Why, when and how to do geometry idealization
2. Toolbars for geometry idealization
3. Geometry idealization tasks



WHY DO GEOMETRY IDEALIZATION

Geometry Idealization means adapting, simplifying and modifying CAD models representing the real object. Idealization is needed because the requirements that the CAE engineer has for geometry differ from the design engineer.

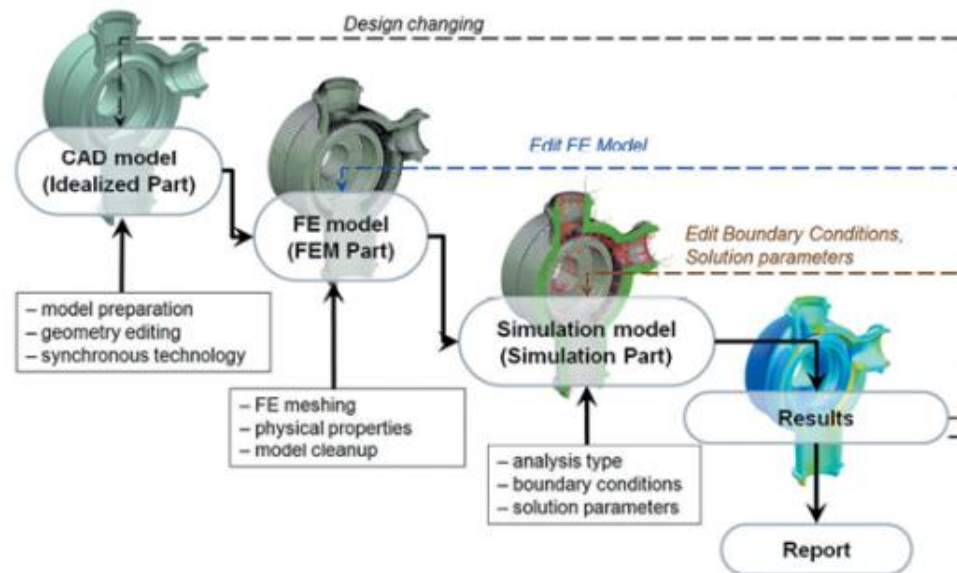


In structural analysis, the details to be eliminated are defined by entities of small size which are not carrying boundary conditions, not subjected to stress concentrations and which do not influence the deformation and stress field in the remainder of the part.

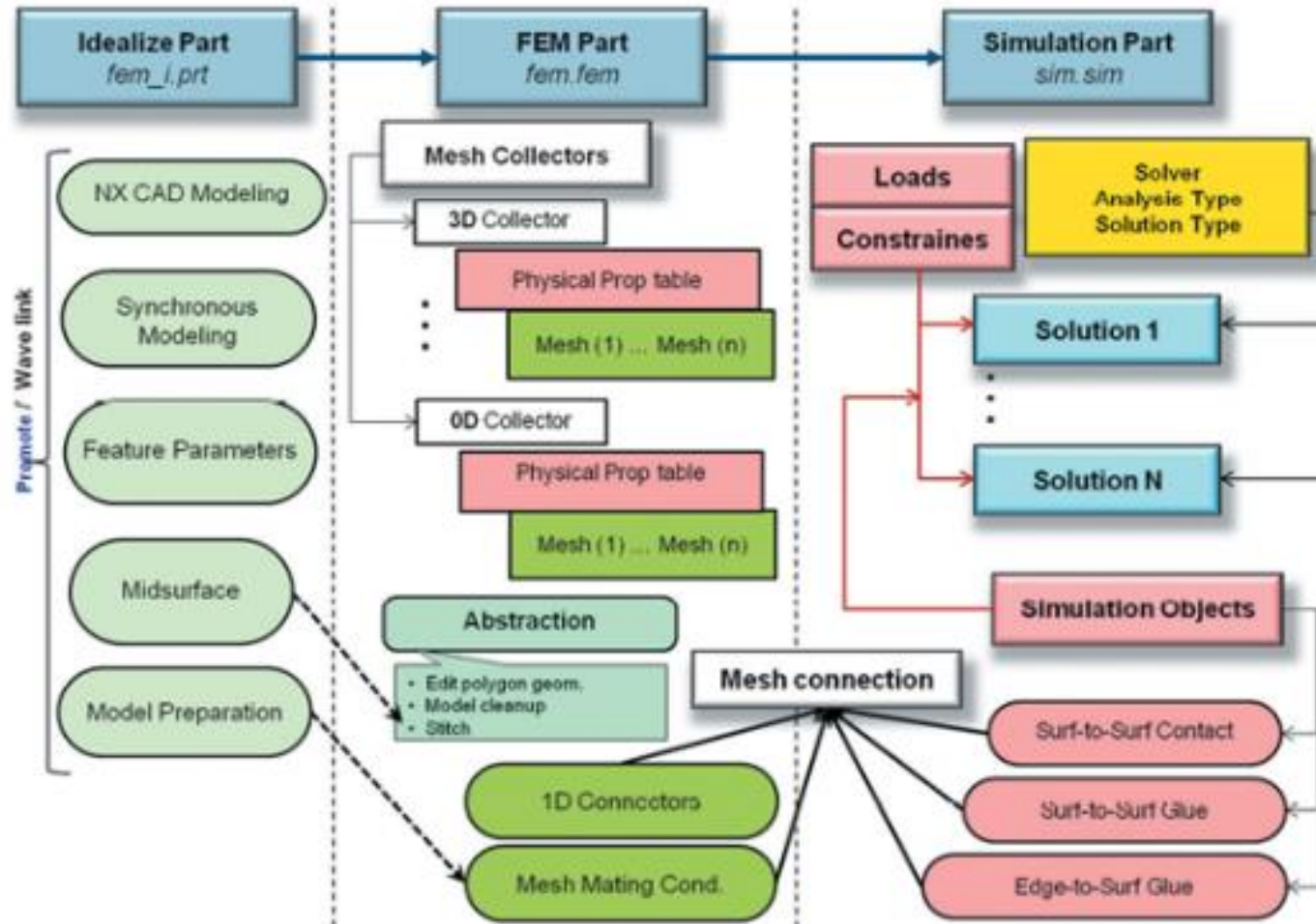
WHEN DO GEOMETRY IDEALIZATION

Geometry Idealization can be performed on:

1. The original/master geometry (*name.prt* file)
2. The idealized geometry (*name_fem_i.prt* file)
3. The polygonal FEM geometry (*name_fem.fem* file)

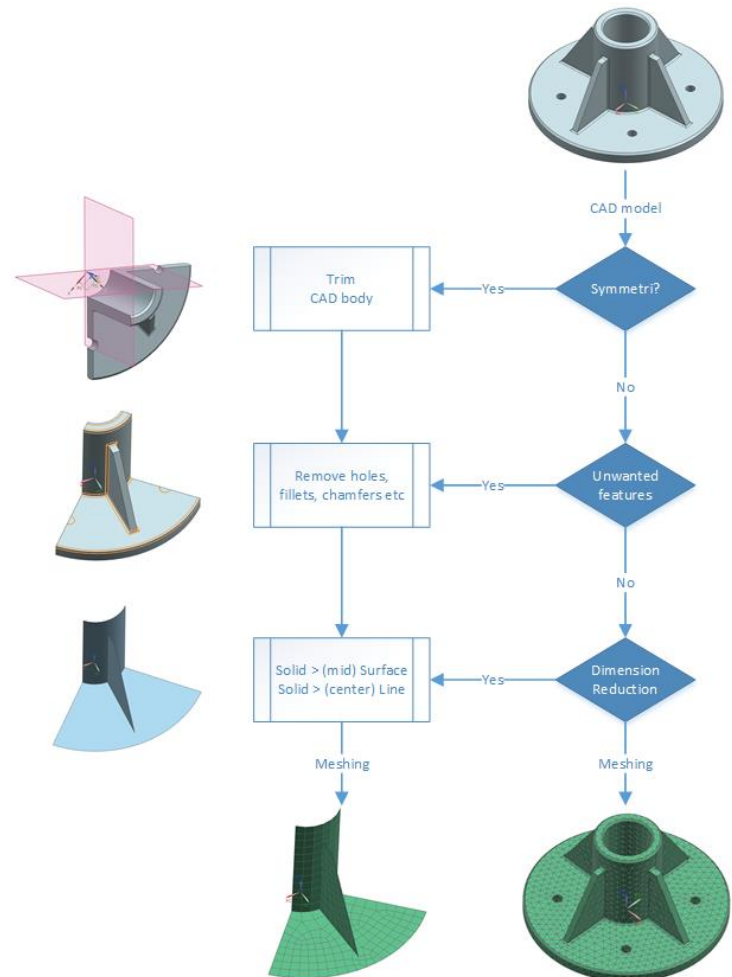
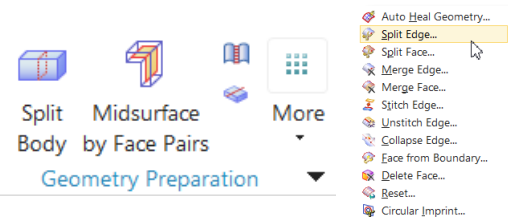
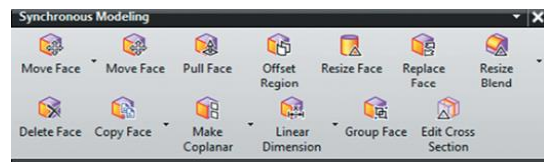
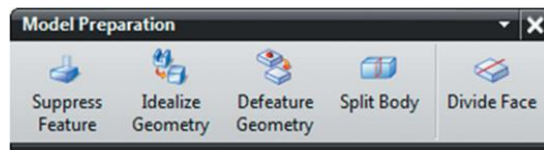


WHEN DO GEOMETRY IDEALIZATION



HOW DO GEOMETRY IDEALIZATION

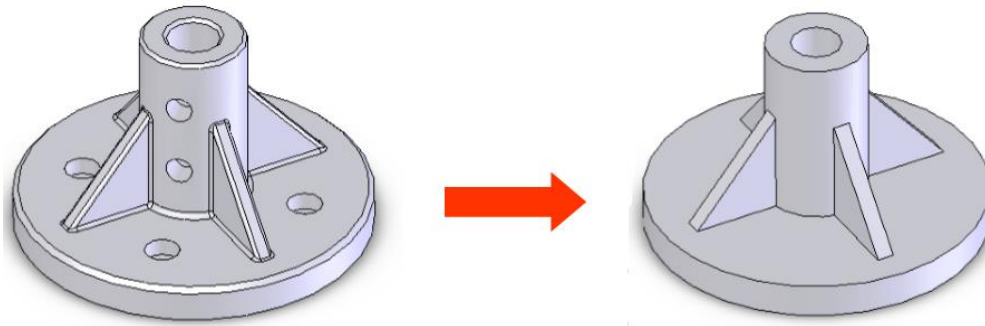
Recommended Idealization process.



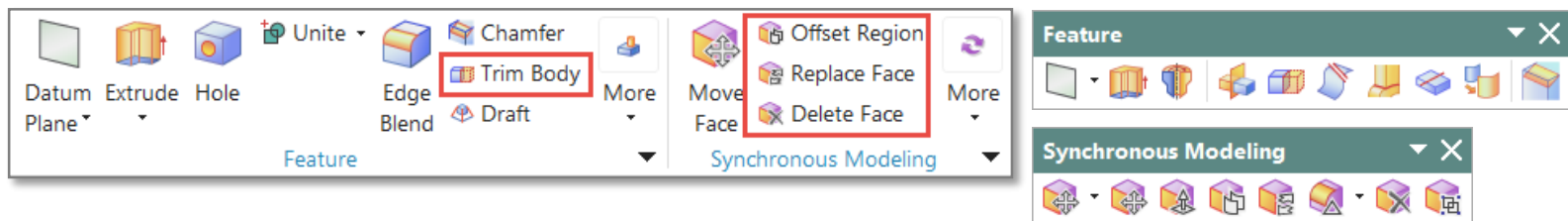
HOW DO GEOMETRY IDEALIZATION

Removal of details (on idealized or master geometry)

It consists in removing or modifying details in order to simplify the simulation model (or analysis model) without affecting the results of the analysis



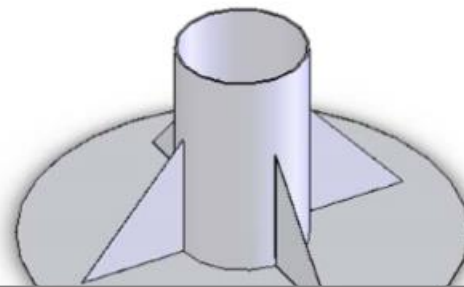
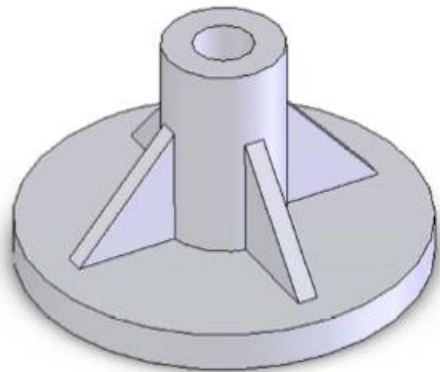
You can remove details using the *Feature* and *Synchronous Modeling* sub-group (or NX 8.5 toolbar) commands on .prt files



HOW DO GEOMETRY IDEALIZATION

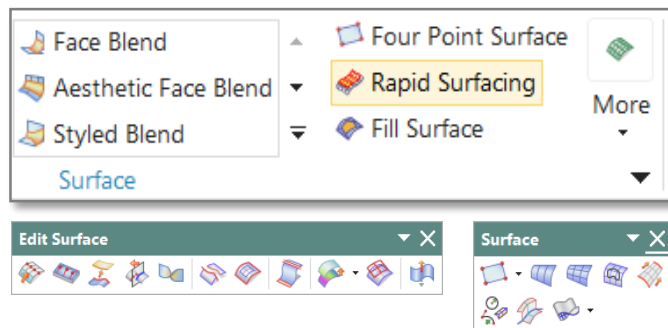
Reduction of dimensions (on idealized or master geometry)

The dimensional reduction consists in transforming a 3D model (volumetric elements) into a 2D model (plate) or 1D model (beam).



Midsurface by Face Pairs

Creates a continuous surface feature that resides between opposing faces of a thin-walled solid body.



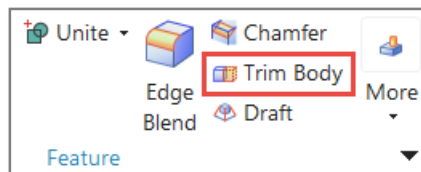
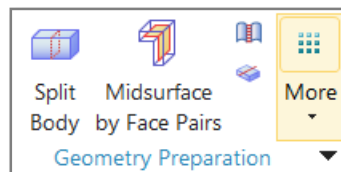
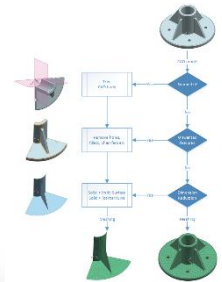
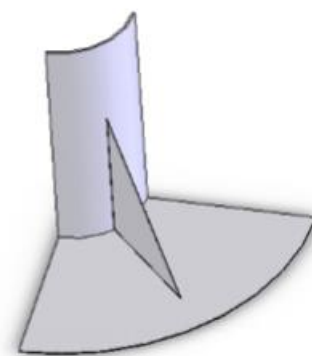
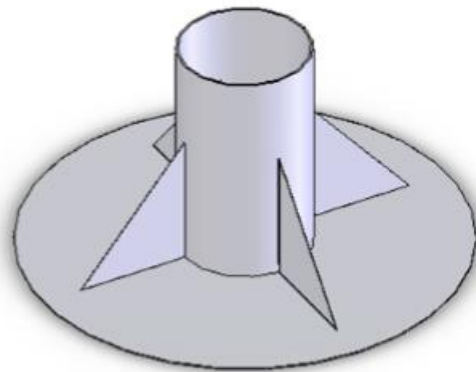
You can transfer 3D models to 2D using the Surface-Midsurface subgroup commands

(or equivalent NX 8.5 toolbars)

HOW DO GEOMETRY IDEALIZATION

Use of symmetry (on idealized or master geometry)

The use of the symmetry of the problem (geometry and boundary conditions) enables further simplifications.

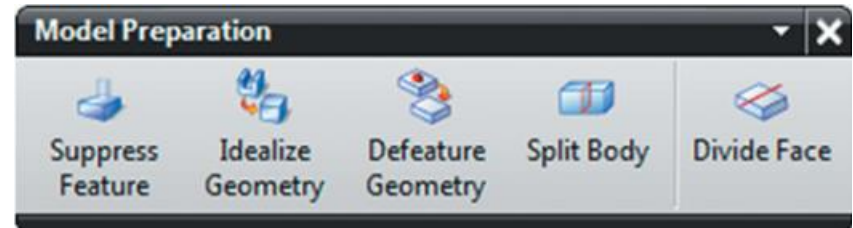


You can cut or split solids using the Model Preparation sub-group (or NX 8.5 toolbar) commands

GEOMETRY IDEALIZATION

Idealization NX toolbars (Applicable to .prt files):

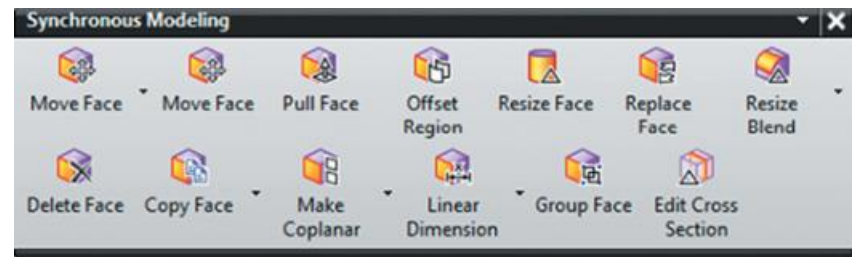
Model Preparation



Midsurface

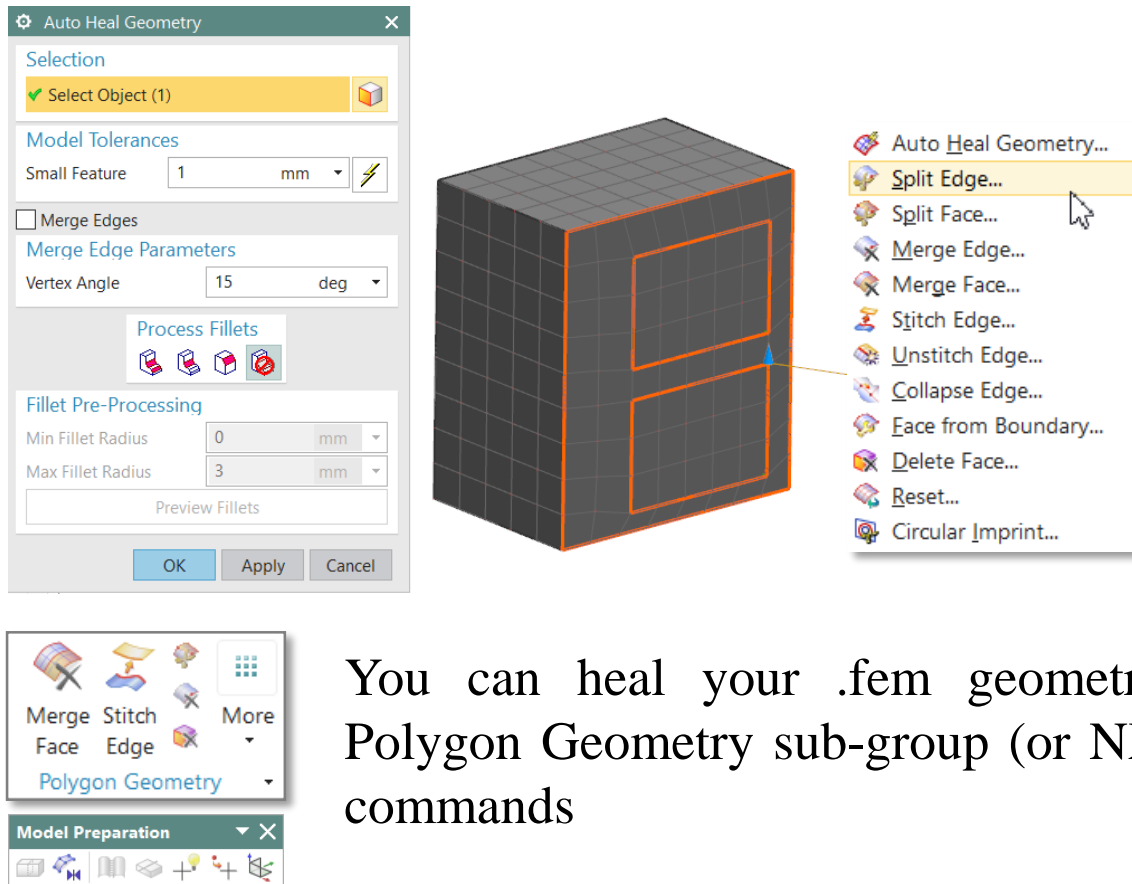


Synchronous Modeling



HOW DO GEOMETRY IDEALIZATION

You can also simplify / modify the polygonal geometry (.fem files).



You can heal your .fem geometry using the Polygon Geometry sub-group (or NX8.5 toolbar) commands

GEOMETRY IDEALIZATION

Your task list:

1. Watch the Synchronous Modeling Lecture 1 tutorial ([click here](#))
2. Watch the idealization video on my YouTube channel ([click here](#))
3. Prepare parts for meshing (see examples in Its Learning zip file)
4. Read Chapter 2 – Preparing a geometry model in the text book

Then you are ready to complete the mandatory **Geometry Idealization Multiple Choice** test next Thursday