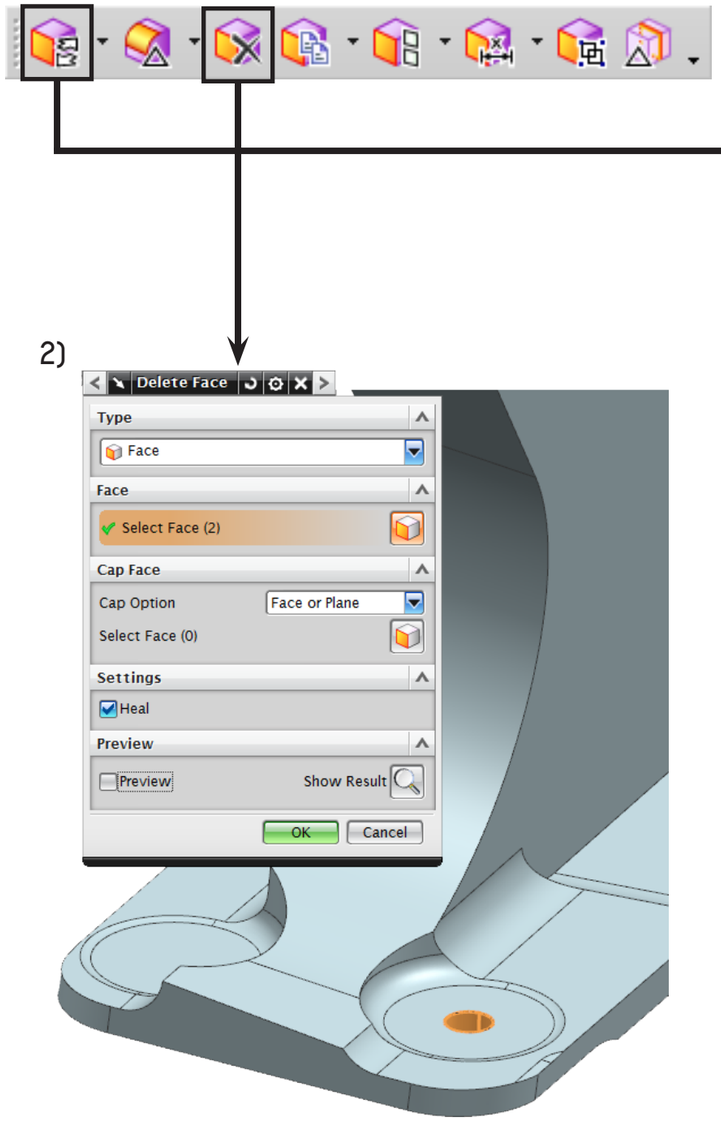
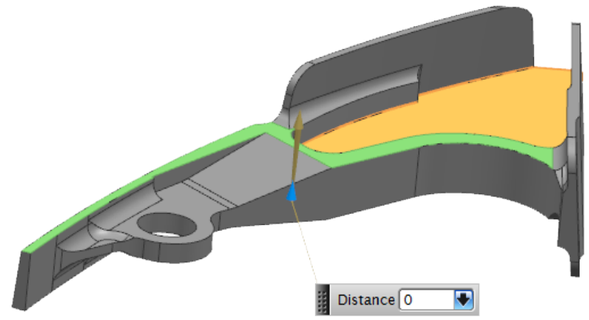
TOPOLOGY OPTIMIZATION process description; generating design space

Topic: Generating the design space	Name: Steffen Johnsen	Date: 10.04.2013	Approved by: Terje Rølvåg

When performing a topology optimization, the algorithm changes the relative density of the elements created when meshing the model. The relative density is a continuous value ranging from 0 (void/ hole) to 1 (the real density of the material). Reducing the density of an element will also reduce the stiffness of that particular element, and its contribution to the overall stiffness will decrease. The algorithms can only decrease or increase the density of elements that were present at the beginning of the analysis. This means that no material will be added during the optimization beyond what was already present. It is therefore of great importance to define a design space that is as large as possible within the constraints of the surrounding environment (other parts, operational specifications, size specifications, etc.). The larger the design space, the better the proposed solutions will be, since the number of possible configurations will increase.

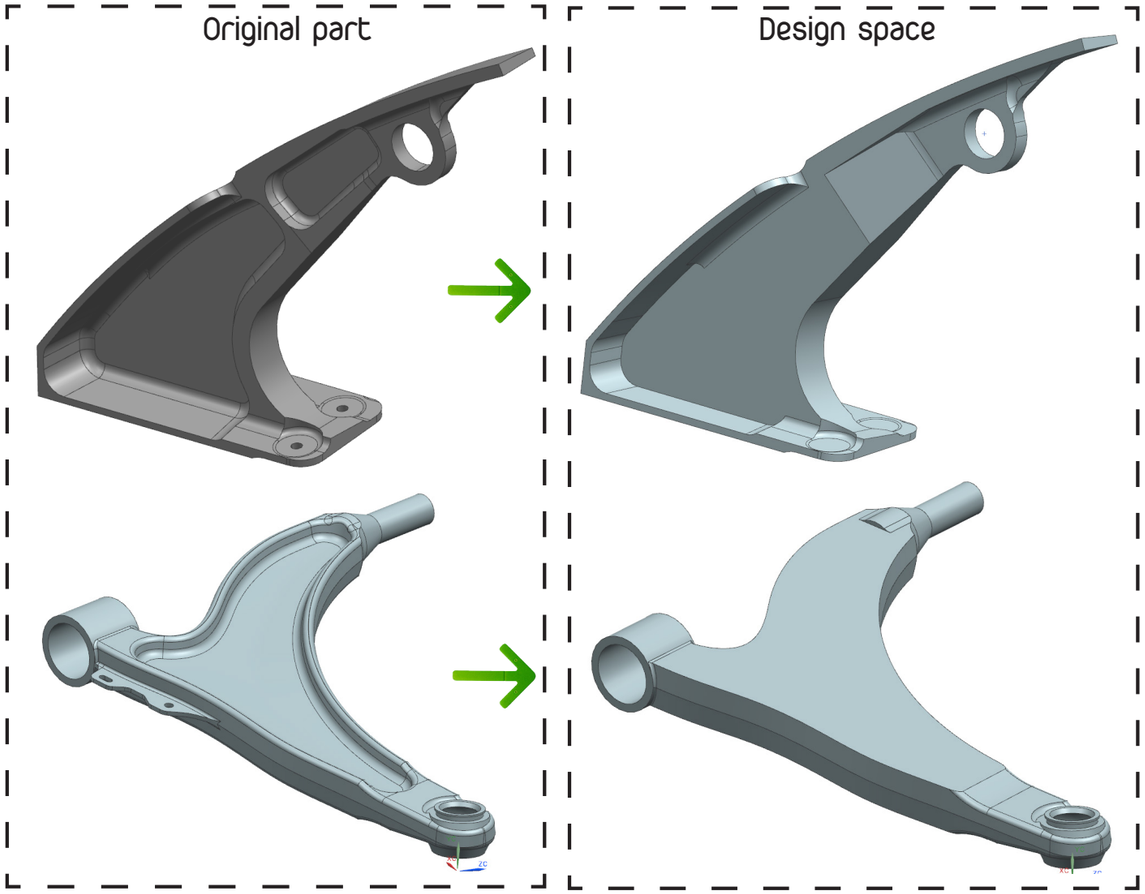
Best practice when defining the design space is to use the Synchronous modeling functionality in the NX Modeling- environment (See Toolbar or click Insert > Synchronous Modeling). The most widely used functionalities are 1) Replace Face and 2) Delete Face, that will assist you in removing features and closing voids. Make sure to preserve all features that are important for the functionality of the part. These can be frozen for later use, so that they are not affected by the density updates.





Replace Face

Delete Face



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