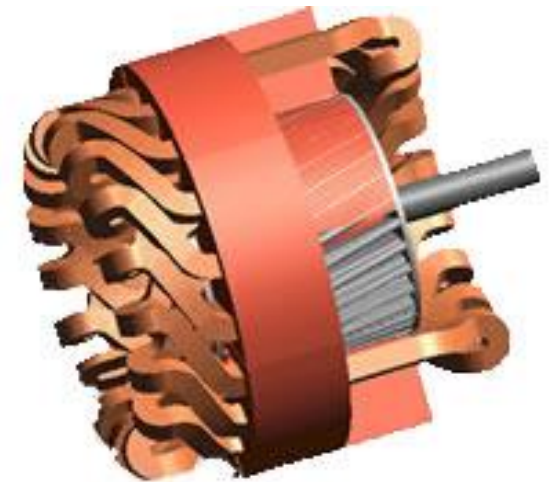


Accurately Modeling the Skewed Rotor of an Induction Motor

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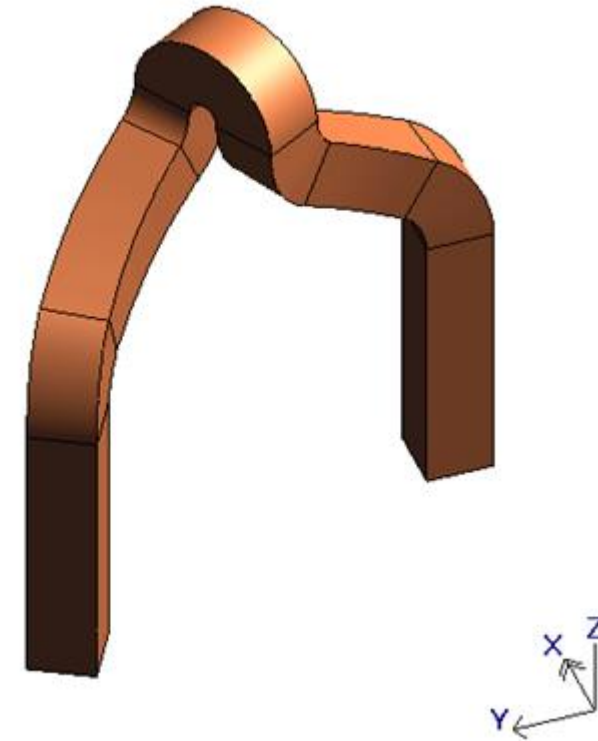
Induction motors are one of Simcenter MAGNET's specialties. The induction motor analyzed here is a typical three-phase motor, but Simcenter MAGNET's modeling improvements have made it easy to include features that were previously ignored. The rotors of induction motors often have skewed slots to minimize torque ripple; this is now easily created and accurately modeled. The stator windings in this model are realistic involute shapes, created with the multi-segment sweep option, which has powerful automatic blend calculations that facilitate the creation of these and other complex coil shapes. Accurately modeled coils allow end effects to be studied.

The periodic boundary condition allows the modeler to take advantage of symmetries; in this case, only a 60-degree section is modeled, reducing the problem size by a factor of 6.



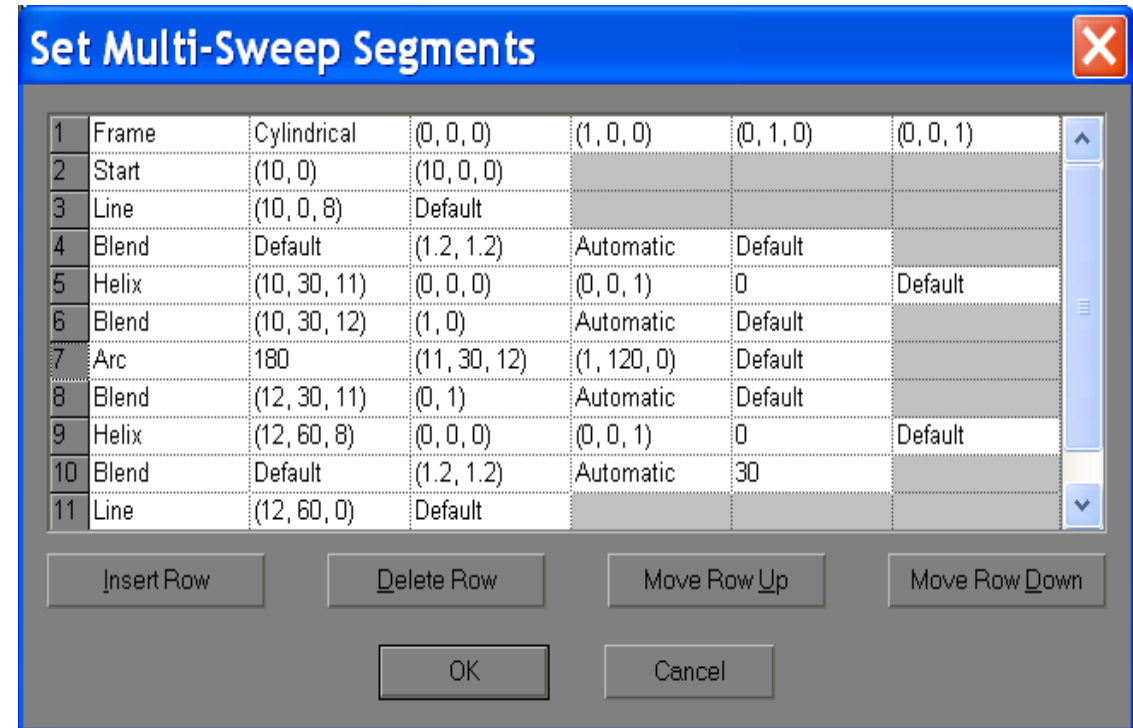
Stator Involute Windings

A picture of half of a stator involute winding is shown on the right. Once this segment is created in Simcenter MAGNET, multiple instances of it can be imported, with transformations applied, in order to create the full set of stator windings. The possible transformations that can be applied to objects in Infolytica's software packages are scaling, rotation, mirroring and shifting. Any number or combination of these transformations can be applied in our software.



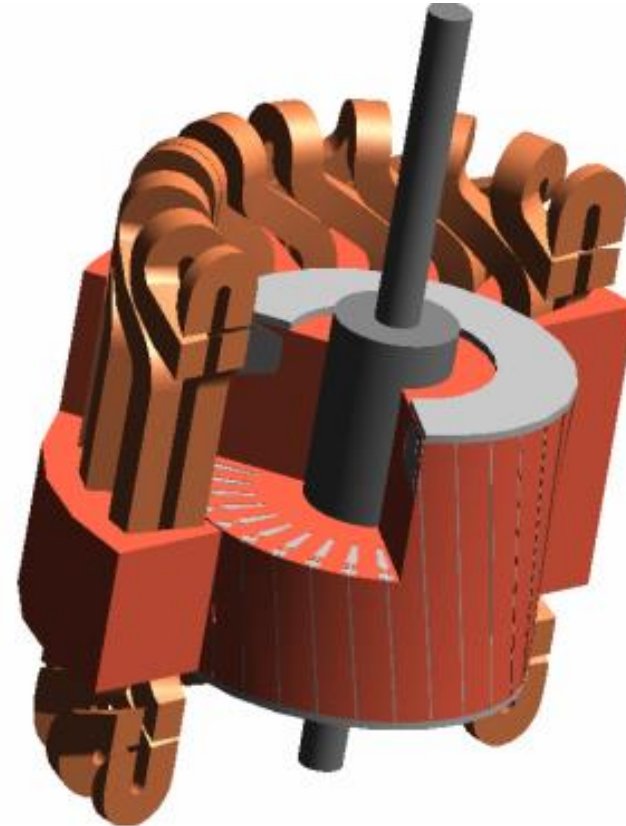
Easy Design of Involute Windings

To facilitate the design of 3D devices in our software, a multi-segment sweep feature was added to allow for the easy design of complex paths such as the involute shown here. The image to the right is a snapshot of the dialog box associated with the involute winding.



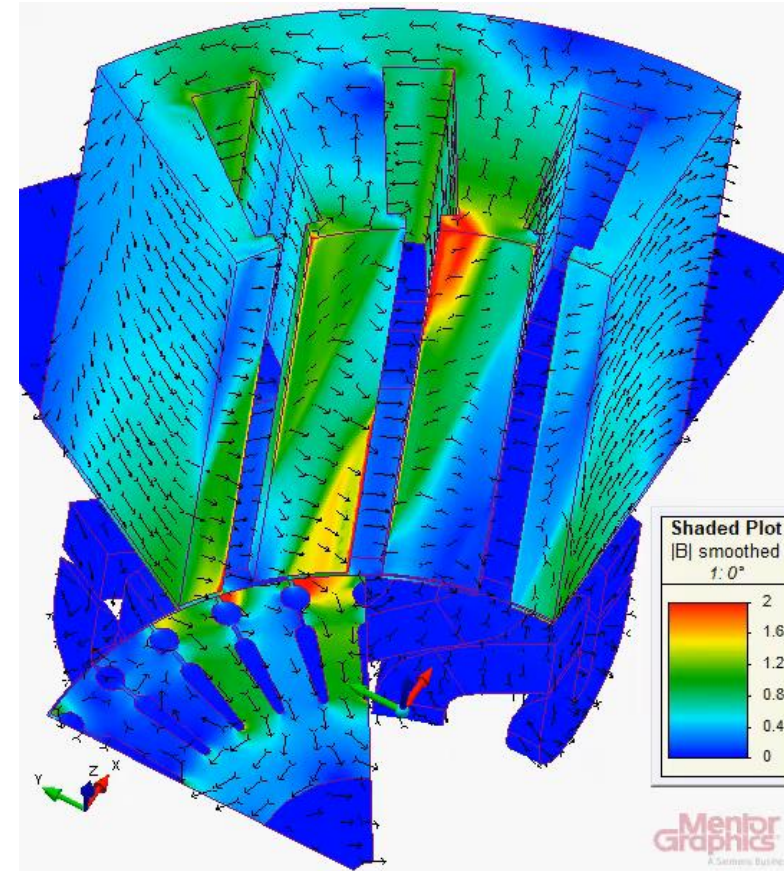
Cutaway View of the Induction Motor

An exploded view of the induction motor is shown here; parts of the motor are removed in order to see better the windings and skewed rotor.



Magnetic Flux Density

This is an arrow and shaded plot display of the magnetic flux density. The rotor is not displayed in this field view, as only a slice through it is shown. Note the effect of the skewed rotor on the stator field.



Mesh Generated in Simcenter MAGNET

To the right is the mesh generated by Simcenter MAGNET for the induction motor with a skewed rotor. Because of symmetry, it is only necessary to model a 60-degree section of the motor. The odd-periodic boundary constraint, available in all of Infolytica's software products, makes this easy to do. In the snapshot, some objects are removed so that the rotor and stator can be seen clearly. The complete mesh has 1 280 000 tetrahedra and 234 000 nodes.

