

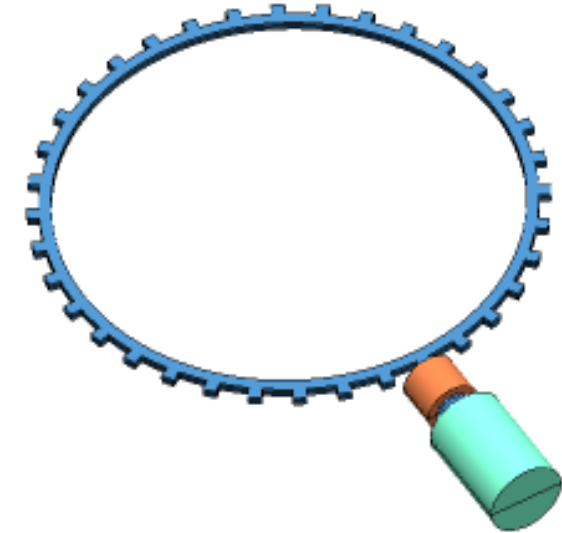


Position and Speed of Metal Components Measured with Variable Reluctance Sensor

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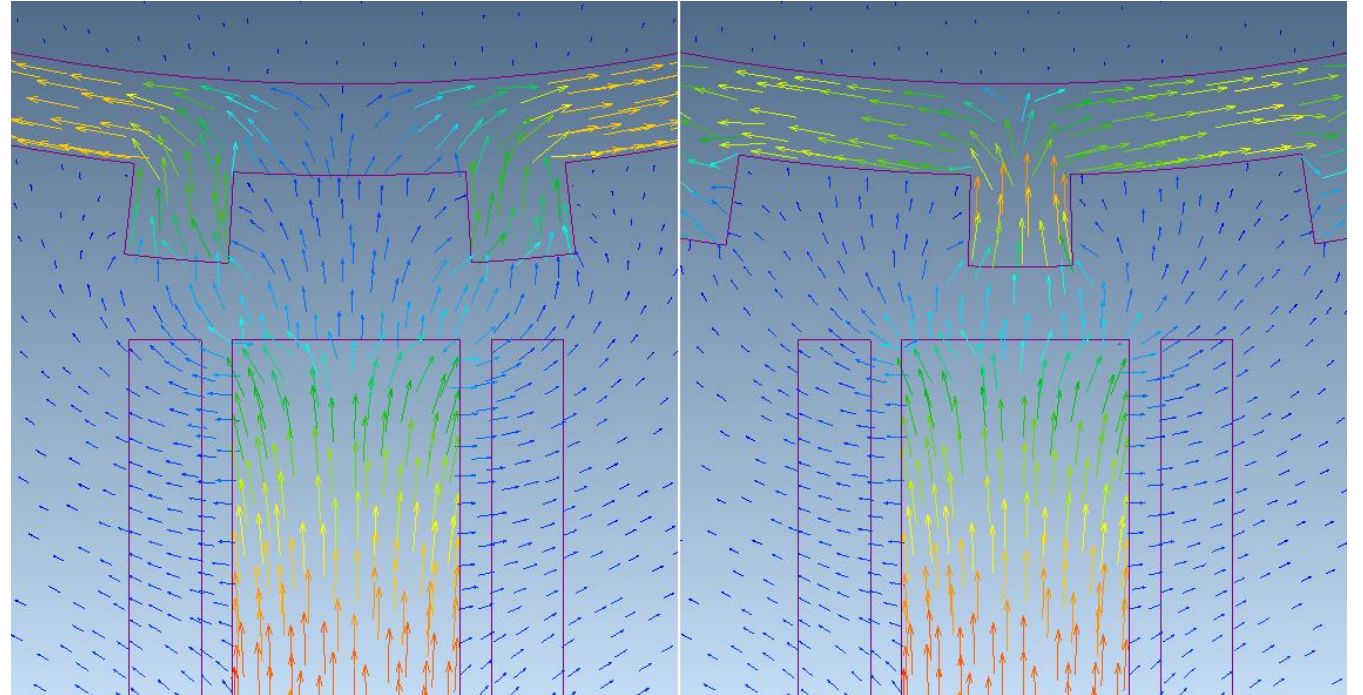
Variable reluctance sensors are used to measure position and speed of moving metal components. This sensor consists of a permanent magnet, a ferromagnetic pole piece, a pickup coil, and a rotating toothed wheel.

As the wheel rotates, the reluctance of the flux path through the coil changes, and the flux linkage through the coil changes, which results in a change in voltage that is measured by an external circuit.



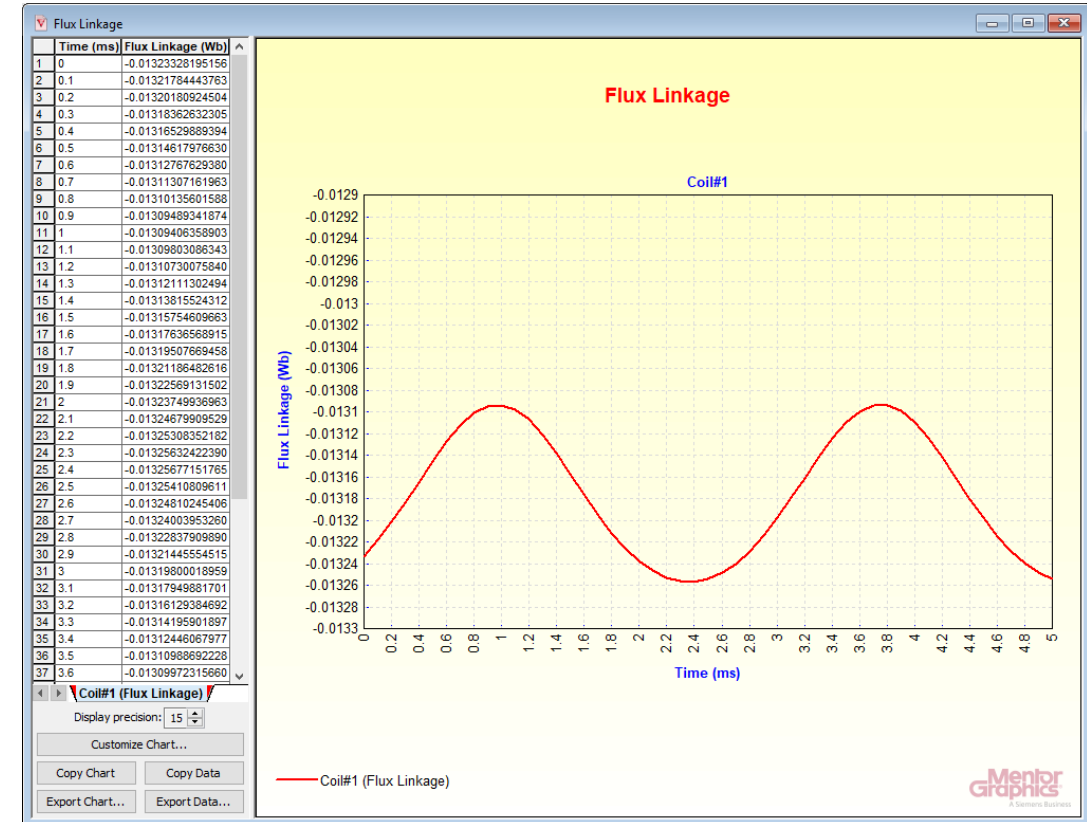
Maximum and Minimum Flux Linkage

The path of the flux generated by the permanent magnet varies as the toothed ring rotates in the field of the VR sensor. These images show the positions of maximum and minimum flux linkage.



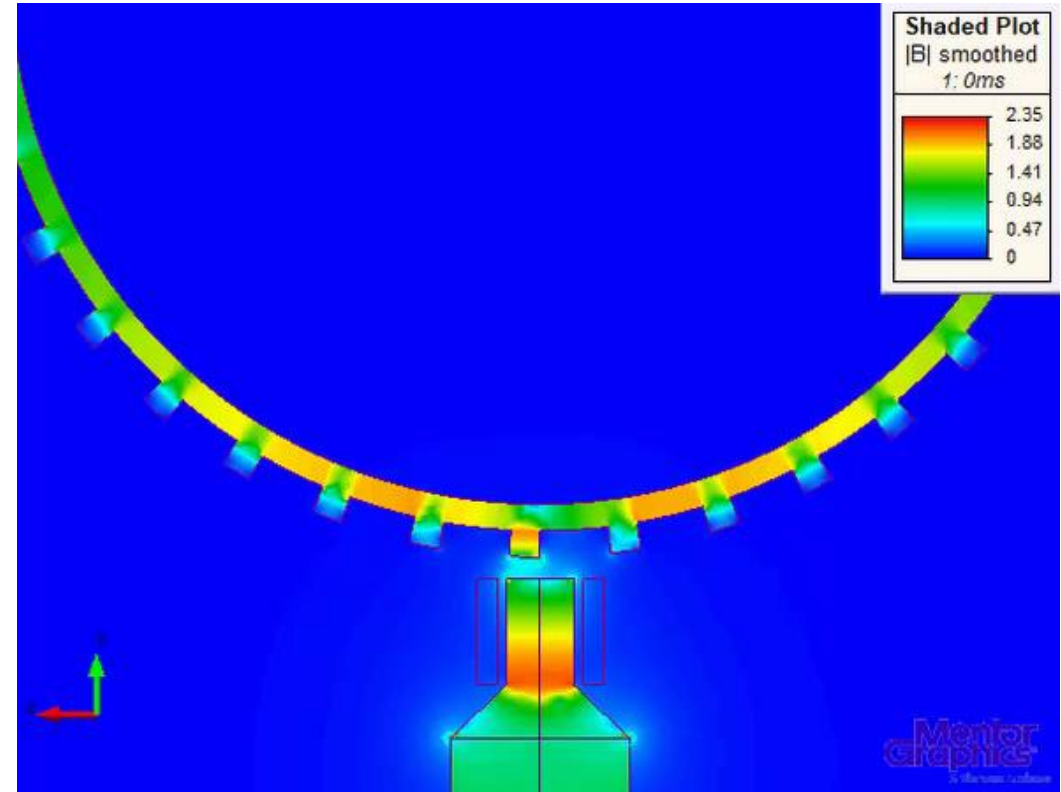
Flux Linkage Variation

The flux linkage varies periodically as the teeth pass the sensor. The flux linkage variation converts to a voltage signal that can be calculated in Simcenter MAGNET. Here, the ring's rotational speed of 600 RPM, with 36 teeth around the ring, translates to a period of 2.78 ms for the sensor's output signal.



Magnetic Flux Density in the Ring

This animation shows the magnetic flux density in the ring as the sensor operates.



Remesh Region around the Ring

Mesh controls are specified to refine the mesh in the air gap around the ring, optimizing the results and the solving time. This is a view of the plane of symmetry at the rear of the half-model. The transparency of the AIR material was temporarily suppressed.

