“Simulation has enabled KSR engineers to optimize inductance sensor designs prior to building a prototype. The new approach substantially reduces the time required to engineer its products to fit customer applications. The net result is a substantial decrease in engineering costs and a reduction in time to market.”

Lingmin Shao  
Technical Specialist  
KSR International

Ryan Elliot  
Sensor Team Leader  
KSR International
An electronic throttle control works behind the scenes to remove the mechanical link between the automobile accelerator and throttle, and instead controls the throttle with an electric motor. An electronic control unit (ECU) determines the correct throttle position based on data collected from two automotive sensors that track the position of the gas pedal. The motor that controls the throttle is then driven to the required position via closed-loop control from the ECU.

**Challenges**

Most inductance sensor applications can be addressed by a common design; however, as KSR expands the technology to different applications with different sensing ranges and packages, a custom design is required. Trial-and-error takes approximately three months to develop custom inductance sensor designs. The company needed to reduce development time, and therefore, costs and time to market.

**Technology Used**

ANSYS® HFSS®, ANSYS® Nexxim®

**Engineering Solution**

- Use ANSYS HFSS to compute the full electromagnetic field pattern inside the sensor then reduce the full 3-D electromagnetic behavior of the structure to a set of high-frequency circuit parameters.
- Employ ANSYS Nexxim to simulate sensitivity of analog and wireless frontend circuits, as well as, robustness and capacity needed.

**Benefits**

- Simulation helps KSR engineers to address the issues that inevitably arise in real-world applications and to correct these issues before manufacturing.
- KSR has reduced the time required to engineer a custom inductance sensor application from three months to only two weeks.

**Company Description**

KSR is an industry leader in the design, engineering and manufacture of an array of products for the transportation industry (autos, light trucks, ATVs), including automotive sensors, electronic throttle controls, adjustable and fixed pedals, electric steering control units and power modules.