Medical Equipment Company Cuts MRI Service Time by 50% With a Handheld Analyzer

EXECUTIVE SUMMARY

Magnetic Resonance Imaging (MRI) systems, a common Internet of Things (IoT) device found in modern hospitals, help healthcare professionals quickly uncover problems inside a patient's body through use of high-power magnetic fields. To produce these large magnetic fields, the MRI coils are driven using high voltage (several kilovolts) and high current (hundreds of amps) and therefore, require regular maintenance. During that process, the RF coil inside the MRI must be tuned for impedance matching and RF leakage. If this step is not done, or is done improperly, the result is often noisy scanned images with poor contrast.

To make this maintenance process as fast, accurate, and easy as possible, one Japanese medical equipment company turned to Keysight Technologies with its handheld FieldFox RF and microwave analyzer. FieldFox's solution provides full range of benchtop measurement capabilities for common MRI IoT devices in a portable, ruggedized form. Critical data is collected at the edge, uploaded to the cloud, and analyzed for troubleshooting and maintenance across a wide variety of field situations.

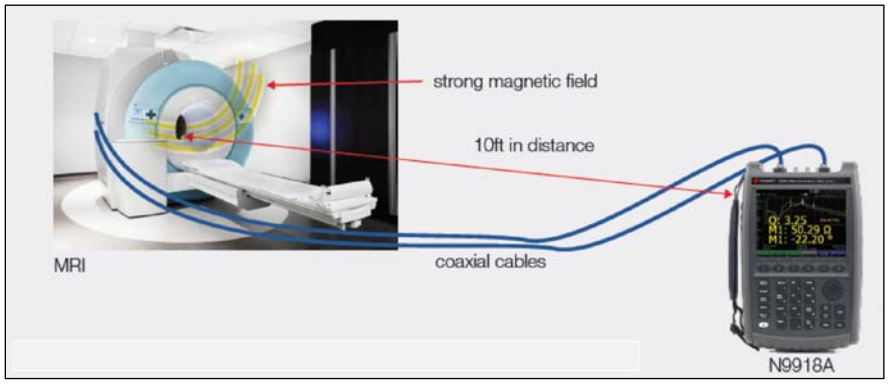
> *"Thanks to Keysight's portable solution, we were able to cut our service time by half, without having to go back and forth to tune the MRI RF coil."*
>
> - Service Technician

THE CHALLENGE

During routine servicing of its MRI machines, the company faced two primary challenges. First, its technicians had to physically drag a benchtop vector network analyzer (VNA) into hospitals to conduct the MRI RF coil tuning process. Without a power socket in the MRI room, the instrument had to be powered through a power socket in another room and connected, via a coaxial BNC cable, to the back of the MRI machine. For every maintenance cycle, the technician would set up the equipment and then go back and forth between the instrument and the MRI machine to adjust the coils. It was a complicated, time consuming process and limited by the reach of the benchtop machine.

The second challenge was conducting on-site surveys to ensure no stray RF waves were entering the MRI room from nearby wireless devices. Technicians had to verify that no external RF signals, or stray RF waves, were interfering with the MRI's operation and disrupting its digital image generation. They also had to routinely check for shielding effectiveness in the MRI room, since shielding conditions and effectiveness change over time, leading to inaccurate MRI scans and patient diagnostics. While RF scanning is typically done every time an MRI machine is serviced, it is rarely conducted separately due to the high cost of test setup. As a result, the technicians were not able to find and fix problems when they first occurred.

THE SOLUTION



MRI maintenance setup using the FieldFox RF and Microwave

To solve these challenges, the company utilized the FieldFox handheld RF and microwave analyzer. Its portability allowed the company's technicians to easily transport it on service calls.

A large readout display mode meant that even when the technicians had to keep the instrument at a safe distance from the MRI machine, they could still see the measurements displayed and tune the MRI's RF coil without having to constantly run back and forth. This meant that the tuning process overall was substantially faster. And, because FieldFox was so quick and easy to set up, the technicians conducted more RF scanning, not just during routine maintenance calls.

RESULTS

Using the portable FieldFox analyzer was a win-win for both hospital administrative staff and the company's technicians. The downtime required to service MRI machines was cut by 50%, allowing hospitals to schedule more patients for scanning. Technicians reported faster service call times resulting from the simpler setup and operation of the portable units, and less test equipment damage. And, because on-site surveys could be conducted easily, where and when they were needed, RF interferes were found earlier. The result was as much as a 30% increase in the reporting of potential RF shielding gaps during field calls.

About Keysight Technologies

Keysight Technologies, Inc. (NYSE: KEYS) is a leading technology company that helps enterprises, service providers, and governments accelerate innovation to connect and secure the world. Keysight's solutions optimize networks and bring electronic products to market faster and at a lower cost with offerings from design simulation, to prototype validation, to manufacturing test, to optimization in networks and cloud environments. Customers span the worldwide communications ecosystem, aerospace and defense, automotive, energy, semiconductor and general electronics end markets. Keysight generated revenues of $3.2B in fiscal year 2017. In April 2017, Keysight acquired Ixia, a leader in network test, visibility, and security. More information is available at **WWW.KEYSIGHT.COM**

About the Industrial Internet Consortium

Keysight has been a member of the Industrial Internet Consortium since 2016. The Industrial Internet Consortium is the world's leading organization transforming business and society by accelerating the Industrial Internet of Things (IIoT). Our mission is to deliver a trustworthy IIoT in which the world's systems and devices are securely connected and controlled to deliver transformational outcomes. Founded in March 2014, the Industrial Internet Consortium catalyzes and coordinates the priorities and enabling technologies of the industrial internet. Visit www.iiconsortium.org.