

Questions to Ask When Upgrading/Building MRI or Radiology Facilities: Part Four

By MARK BAY

In our final article of this series, we can delve a little deeper into some of the questions that affect cost and efficiency of the finished facility; layout, construction materials, safety concerns during construction and after construction for both patients and employees alike. In other words, proper site planning is essential to an efficient, high quality facility that brings both patient and staff into the equation.

As most already know, MRI is an acronym for Magnetic Resonance Imaging. The technology was first successfully used in 1973 and then further developed for use on humans in 1977. An MRI creates a very powerful magnetic field and radio waves to produce an image of various parts and systems of the human body. The magnetic field created by an MRI is many hundreds of times greater than the Earth's magnetic field. While this technology allows creation of valuable images that detect disease, this technology creates some unique issues for the environment surrounding the magnet itself as well as internally as to the image acuity. Since radio waves are essential in creating the image, careful planning is essential. Quite often, the details required in constructing the RF enclosure itself is overlooked by some members of the design and construction team. The RF shield is a support component of the MRI and not a building material. The slightest error in construction of the RF shield will result in poor imaging. Having to correct an error in RF construction once initial testing has begun can be catastrophically expensive depending on the severity of the error and whether it can be identified easily.

Amongst the many decisions to be made early in the planning process is deciding on the material that will be used for the RF Shield enclosure. There are four common materials that are used

most frequently for RF Shielding; copper, aluminum, steel and galvanized steel. All have their own advantages and drawbacks. Careful planning and choices are essential, and the many variables to look at when making this decision become a team effort. Shielding needs based on the equipment (strength of the magnet) and its location is first and foremost. RF shielding protects the image quality, as well as the surrounding environment. What electronic equipment will be in proximity to the MRI room and its support equipment? Are the operator and other personnel passing by the MRI being considered? A strong magnetic field can adversely affect pacemakers and some metallic implants. Another consideration is whether the technicians installing the shield are experienced in the material chosen. Welding seams on copper is very different than welding seams on steel. Each metal has different conductive properties as well as different corrosive properties. Knowing the type of shield that will be installed prior to contractor selection, will contribute to the success of the installation and perhaps the quality of the imaging once installed.

Another consideration one must include in careful planning of a project is the actual layout of the facility. If one is considering a leased space where other businesses are located, what type of businesses are adjacent becomes an important factor to be taken into consideration with the size Magnet (MRI) being installed. Most common is a 1.5T MRI Scanner which will produce a smaller Gauss field than a 3T MRI. Ever larger MRI's have been developed and may become more commonplace. The type of construction will also factor into the equation here as well. How well the walls are insulated for sound between businesses may also be a factor.

Has a patient emergency been considered in the layout of equipment or accessibility if a patient must be removed



quickly? Although many layouts for MRI facilities are similar, not all are created equal. Where is the defibrillator equipment? Is it far enough away to not be affected by the Gauss field and is it close enough to be accessible if an emergency happens? If a stretcher or gurney is required, can it easily reach the patient and is it of material that can enter the MRI room safely? What is the method of communication between the operator and the patient while the MRI is operating? Can the operator view the patient at all times during the MRI? How is access to the room controlled? Contractors or employees entering the room with unsecured tools or materials create dangerous and expensive circumstances. Entering the MRI room before removing credit cards, phones, and other items with magnetic strip information can result in all the information on those cards or phones being entirely erased.

What is the advantage of having a construction team involved in the planning as well as the construction of an MRI facility? Utilizing the expertise of subcontractors with MRI installation experience in the planning stages is they have experienced the errors and/or missteps in previous projects which the designers may not yet have encountered. Subcontractors with MRI experience know the power of the magnetic field generated by MRI equipment and take the proper precautions when working in and around an MRI room both before and after the magnet is "active." Au fait subcontractors are wary of the materials

and the tools they use. Once the MRI is ramped up, entering the room with a pair of unsecured metal pliers, for example, can create a dangerous projectile and cause considerable damage to the MRI, not to mention the cost to remove the tools from the MRI.

In summary, careful systematic planning and building of a design and construction team is tantamount to a successful installation. More important perhaps, is being sure that your entire team has MRI experience and that that team is complete. We have covered some of the variables involved in such an endeavor and may have answered some of your questions and likely have generated additional ones. There are countless questions to ask, and a single person cannot answer all of them. My hope is that if you are considering an MRI project, be it a building from the ground up, a leased or rented space or upgrading your existing equipment, you will have more information to work with after this series of articles. I would not climb a mountain without collaboration with those who have climbed that mountain before me or without careful systematic planning. Choose your team carefully and what you build, will last!

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