

Creating Space When the Space Just Isn't There

How To Get 4' of Plenum in a 2' Space

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among many

others. EMMC's passion is providing the best patient care possible with a focus on excellent service, clinical quality, and patient safety.

When EMMC wanted to build a new procedure room for transcatheter aortic valve replacements (TAVR) for patients who are at high risk for open heart surgery in an existing building several challenges were encountered.

When you look at any modern surgical suite, you will see a lot of medical infrastructure to support the functionality of that room, including overhead booms for exam lights, LCD monitors, medical gas stations, and other related equipment. The market is changing as these state-of-the-art surgical suites are being utilized to increase productivity and enhance patient flow. Sophisticated medical equipment can be attributed to reducing patient recovery times and minimizing infection risks.

However, in order to support these state-of-the-art rooms, there is a very intricate collaboration of overlapping structural steel supports, conduits, ducts, piping and other equipment above the ceiling that is vital to these rooms

functioning. This related infrastructure does require a certain amount of headroom above the ceiling, and for older facilities that are retrofitting their operating rooms, this can be problematic.

The design team was faced with a dilemma: how to get the required infrastructure above the ceiling with only 19" of available space for ductwork, laminar flow diffusers, equipment boom mounts, lighting, and an architectural ceiling grid. The original building in which the TAVR room was being planned was built in 1972, and the floor to floor distance was limited to 12'-0", and with the new headroom requirements of the required imaging and medical equipment, space above the ceiling was at a premium. The concern was that with the limited headroom, the project team might have to relocate the room to another part of the hospital which would have increased cost and delayed the project.

During the 2013 NEHES Fall Conference, Janette McLaughlin, Construction Project Manager at EMMC, attended a presentation on a new modular ceiling technology from Huntair called CLEANSUITE that incorporates all the required infrastructure into a modular, prefabricated system. The CLEANSUITE system is an all-inclusive, modular ceiling diffuser system that may be built in and hung directly above the patient table in an OR and other locations requiring low turbulence, laminar airflow. CLEANSUITE systems remove airborne particles and contaminants away from the area of the patient on the operating table, bathing the patient in HEPA-filtered air, while at the same time preventing entrainment of room air surrounding OR personnel and equipment. This seemed like an excellent application.

Initially the concern was that the typical module depth requires 24". The team contacted Huntair and learned that the module is a custom fabricated system that could potentially provide a solution.

SMRT Architects and Engineers, (a full service architecture, engineering and planning firm) provided architectural

drawings of the room along with the HVAC airflow requirements to Huntair to develop a customized module. After initial review, a concept drawing of a modular system was developed that met all the airflow and structural steel requirements that fit within the 19" of available headroom.

"This was an unusual project, where every quarter inch was important," said Kristen Damuth, senior architect with SMRT Architects and Engineers. "Usually we have more available tolerance, especially in an existing building."

The existing structure is a poured concrete waffle slab with 12" deep concrete ribs at 32" on center. This meant that all of the steel equipment supports, piping and ductwork had to be below the bottom of the concrete rib which was at 10'-8" above the floor. The height of the ceiling over the table had to be 9'-1" which left 19" of space for engineering infrastructure. The modular unit could not be bolted directly to the ribs so the team designed a steel support system for the unit that took 4" of that available space. That left the remaining 15" for the modular unit which would provide the air and the lighting over the table.

There were several rounds of intense coordination between multiple engineering disciplines along with the equipment manufacturer. "It was a bit nerve-wracking, but fun," adds Damuth.

McLaughlin commented on the impact of using modular construction for the TAVR room ceiling by saying, "The CLEANSUITE module allowed EMMC to construct an OR in an older section of the hospital previously used for out-patient surgery. Building anywhere else would have put an existing OR out of service for months and created inefficiencies in staffing and patient care".

