

Prefabricated Materials Help To Innovate Health Care Construction

**A Case Study at the
University of Kentucky Albert B Chandler Hospital**

Presented By



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The client

Today, academic health centers are competing to provide superior access to the highest-quality health care in an evolving and competitive marketplace. All hospitals must be prepared to adapt and respond to the pressures within their health care communities. There is tremendous impetus for change including patient and doctor needs, health care reform, escalating costs, and advances in technology. And, there is a mounting need to reduce costs while simultaneously improving access and patient outcomes.

In 2012, the University of Kentucky Albert B. Chandler hospital system completed construction of a new, 1.2 million square foot patient care facility. The new emergency department alone is twice as large as the previous facility (now roughly the size of a football field) and includes the region's largest robotic hybrid operating rooms as well as eight new, state-of-the-art, multi-purpose operating rooms. Other sophisticated hospital features combine the *art* and *science* of medicine and were designed to support patient care for the next 100 years. The construction of this new patient care facility was central to UK HealthCare's visionary plan to become a premier regional medical center concentrating on cancer, trauma, neurosciences, organ transplantation and pediatric subspecialties. As a result of its latest move, UK Chandler Hospital was recognized by the Associated General Contractors Association with a "Build Kentucky" Award for its new patient pavilion's ability to deliver on its mission of becoming a Top 20 public research institution by 2020. The Hospital was also recently *ranked the No. 1 hospital in Kentucky*, according to the 2012-13 Best Hospitals rankings published July 17, 2012, by U.S. News & World Report.



"Our mission is to provide high-quality, patient-centered surgical care to every patient every day," said Dr. Bernard Boulanger, UK HealthCare surgical services director. "Coupled with our highly trained surgical team, these new operating facilities and technology improvements provide us with the environment to provide an exceptional level of care."

The challenge

To help deliver on this mission, the University of Kentucky contracted with AECOM (Ellerbe Becket) of Minneapolis, GBBN Architects, Inc., and Turner Construction to provide the engineering, design, and construction services required to facilitate the building of the 1.2 million square foot, 12-story facility. Among the hospital's equipment needs were the latest in ICU, acute care, trauma and surgical solution technology. UK's goal was to create patient care environments that are both functional and flexible – using state-of-the-art ceiling mounted surgical lighting and equipment delivery systems.

The design and build team tackled the project by combining *prefabrication* principles



together with *building information modeling* (BIM) software design tools and electronic document management to identify and source the right structural and equipment needs, and to plan the project schedule and budget. Prefabrication from an all-inclusive model assures project team members that structural elements will be fabricated and installed as

specified in the model. In the end, this allows for better insight and predictability, better project workflow, and ultimately, better project outcomes such as on-time delivery and cost control.

During the infrastructure planning stages, Turner Construction's engineers and Construction Manager teamed with engineering subcontractors to source pre-fabricated solutions that were engineered and assembled off-site then delivered and installed to the job site just in time. Turner knew that prefabrication work that is completed off-site under controlled conditions improves safety and quality of the project; and, that building systems that have been pre-assembled can be rapidly installed, requiring less rework than traditional methods, thereby improving job site workflow. By the end of the planning stage, Turner was able to establish a budget that was \$3 million under Chandler Hospital's initial target.

Turner Construction collaborated with the engineers at Healthcare Technology Corporation (HTC), inventor and manufacturer of patented, pre-fabricated ICU, OR and ED boom and light mounting solutions. HTC worked together with Turner to review critical information revealed by BIM engineering to identify the specific requirements for mounting various ceiling supported boom and surgical lighting equipment with differing payload and deflection requirements. The boom and lighting equipment were specified in the ICU, Acute Care, Trauma and surgical solution spaces that had utilized a variety of overheard building structure types.

The pre-engineered, prefabricated solution

Healthcare Technology Corporation's versatile line of ICU, OR and ED boom and light mounting solutions, called Accu-Mount Support Systems, addressed Turner's need for a high quality, low-cost, prefabricated solution and the hospital's need for securing state-of-the-art equipment that meets strict standards for deflection, location and safety.

The *proper design and location* of surgical boom and light mounting systems are imperative. Equipment boom and surgical light manufacturers have strict mounting system deflection requirements to eliminate equipment drift and minimize brake wear. In addition, strict elevation windows for mounting plates are required to allow for proper equipment attachment to the mounting system and to ensure a proper ceiling cover fit. Elevation windows must also be maintained to meet seismic loading requirements on the mounting studs used to attach the equipment to the mounting system. Lateral positioning is important to ensure proper equipment placement as well as to confirm that the equipment and ceiling cover fit within the designed ceiling grid.

Benefits of Pre-engineering and Prefabrication

1. Installation and on-site time is greatly reduced minimizing construction costs & congestion
2. Product quality control is easier to achieve, regulate, maintain and oversee
3. Pre-engineering and testing ensures the supplied products meet and exceed the service requirements the first time, reducing re-work costs and expenses
4. Non-welded attachment arrangements increase site safety and reduce potential failure points

In order to meet most boom manufacturers' requirements, a mounting system should not deflect more than 0.2 degrees at the mounting plate; some manufacturers require an even

lesser deflection of 0.1 degrees. Accu-Mount Support Systems are engineered, designed and tested to meet these requirements.

Rather than custom designing, engineering and field fabricating each mounting system, Turner selected HTC's patented solutions that use pre-engineered and tested components, assemblies and sub-assemblies. Healthcare Technology Corporation has designed hundreds of mounting configurations for most boom and light manufacturers' products and their systems to accommodate a variety of building structures including, steel, bar-joist, concrete, pre-form and wood.

Healthcare Technology Corporation's trained fabricators and AWS certified welders, including two on-staff certified AWS welding inspectors, ensure that all of the Accu-Mount Support Systems meet strict safety and quality standards.

The specially designed clip and attachment assemblies allow the mounting systems to be easily positioned and repositioned, if necessary. In addition, the mount designs and clip arrangements *eliminate the need for field welding and fabrication, thereby greatly reducing install time and cost while increasing site safety.*



At UK Chandler Hospital's new patient pavilion, HTC provided a total of 153 Accu-Mount Support Systems, designed to attach to both the steel and concrete form building structures. The support systems were supplied for a vast majority of equipment weights, moments and types and included mounts for tandem ICU booms, single equipment booms, anesthesia booms, surgical lights, exam lights and flat panel monitors.

Accu-Mount Support Systems are the optimum choice for a properly designed, prefabricated solution for mounting all types of ceiling suspended boom and lighting equipment, and is flexible, safe and cost effective. In its 9 years since inception, Healthcare Technology Corporation has worked with numerous manufacturers, construction companies, architects and structural engineers and installed thousands of Accu-Mount Support Systems – guaranteeing a properly specified and working system the first time and well into the future.

The Future of Health Care Innovation at UK Chandler Hospital

“The hybrid OR combines state-of-the-art imaging capabilities with the ability to perform surgical procedures in one operating room. Industrial robotic technology is utilized with an imaging system that can be controlled at the OR table, allowing for the whole patient to be easily imaged in a manner not available elsewhere in the Bluegrass. The functionality and flexibility of the robotic arm lets it move to almost any position around the patient, allowing the surgeon to see internal organs from various perspectives with access to more anatomical details, including the most minuscule blood vessels. By having complete information to determine a precise diagnosis, surgical planning can be more specific and treatment more targeted. Having the technology at their fingertips enables surgeons to go directly from diagnosis to surgical remedy.”

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