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SOUND & COMMUNICATIONS

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HANGING HEAVY OBJECTS

BY ANDREW T. MARTIN

A process for assessing overhead suspension applications.

Professional contractors often have to be concerned with designing and installing rigging systems that hang heavy objects above people's heads. Based on my organization's successful experience with rigging and risk management in designing and delivering more than 18,000 rigging systems, we have developed a simple process. Outlined here is the tool we use when confronted with overhead suspension applications.

Mission

What must be accomplished at the end of an installation? The answer generates much more understanding about the scope of work and relative design challenges within a project. Perhaps the scope of work only includes hardware for the load being suspended but the building structure is omitted. If this is the case, communication with the customer regarding the needs of the building structure is essential—and be sure to get commitments in writing, confirming that the structure will accommodate the defined needs.

If connection to the structure is a part of the scope, then it should be understood that the budget will include a professional engineer, qualified to assess the building structure and to assure that the installation will not damage the building or fall down.

Perhaps the suspended object must be rigged in such a way that it will blend in with the surroundings aesthetically, while maintaining optimum performance characteristics. A system such as this will require numerous hours of design and redesign,

RIGGING SYSTEM DESIGN CHECKLIST	
✔	Type of structure
✔	Condition of structure
✔	Access to structure
✔	Options for attachment to structure
✔	Engineering of structural attachment
✔	Other concerns about structure
✔	Distance from structure attachment to the load
✔	Isolator, sway brace or grommet needs
✔	Ability to inspect the suspension system
✔	Visual impact of the suspension system
✔	Obstructions to the suspension system
✔	Other concerns about the suspension system
✔	Method of connection to the load
✔	Special needs to install the load
✔	Positioning and handling of the load
✔	Obstructions to the load
✔	Visual impact of the load
✔	Other concerns about the load
✔	Rigging system for the load
✔	Adjustment needs internal of the load
✔	Other factors affecting installation
✔	Compliance with standards
✔	Product traceability, risk management
✔	Reputable brand names and vendors
✔	Training and/or qualified installers
✔	Cash flow responsibilities and factors
✔	Scheduling responsibilities and factors
✔	Other factors affecting the business transaction
✔	Other factors affecting safety
✔	Other factors affecting performance

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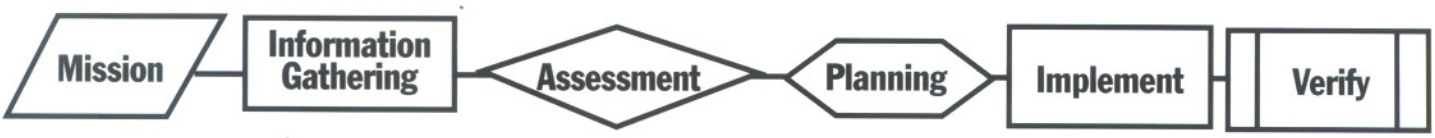

and then modification may continue after design submittal. As a result, the budget will reflect the expense of a complex design. If, however, system function is the only factor and how the rigging looks does not matter; then a more cost-effective, but equivalently safe, design approach will be used.

Regardless of the outcome, analysis of the mission is one of the most critical stages within the process. Without a clearly defined mission, valuable time can be wasted on solutions developed for unnecessary needs, or a critical need may be overlooked.

Information Gathering

Once a clear mission is stated, it is time to compile the data needed to create a rigging system that will do the job, be safe and save as much time and money as possible. The accompanying checklist is used when entering into a rigging system design.

Assessment

The next stage in the process is to weigh the information gathered against the mission of the project and sort out the most important factors. Then try to reduce those factors to as few as possible. By doing this, the most effort is spent on the most important factors and not wasting time on minor details that may otherwise seem important if the mission were not clear. In most cases, the project assessment can be whittled down to about five primary issues. These five issues should take 80% of the planning time; the rest should fall into place naturally.

Planning

This process phase is second in importance only to implementation. Without proper planning, the entire project can fall apart—figuratively and possibly literally. Planning includes logistics, finance, vendor management, documentation, communication of timelines and, most importantly, a clear mental picture of how the project should be completed.

Tools such as schedules, drawings and outlines help with planning projects. Many different approaches to the planning process can be used, varying from very loose generalities to incredibly detailed scheduling charts incorporating spreadsheets and charting software. Any of these approaches can be successful, depending on the individuals in charge of the plan; the planning system must be a fit with the people using it.

Implement

The manager of the project is responsible for communicating project

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SOUND ADVICE

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this case, each horn's "acoustic center" should be located on an imaginary sphere. Usually the apex of the horn's side wall angles can be assumed as the acoustic center. This is the point in the horn from which sound is radiated into the coverage angle. The object is to align the acoustic centers on an imaginary sphere.

Unfortunately, most horns have different horizontal and vertical acoustic centers. In our long-throw/short-throw situation, the vertical acoustic centers would be aligned resulting in the long-throw somewhat overhanging the short-throw horn. Sound from the short-throw would then reflect off the underside of the long-throw horn, creating wave front interference unless this surface was to be treated acoustically.

Now back to our three identical side-by-side MF horn cluster. Let's make this the MF portion of a full-range cluster. We now need to think about the HF devices. Like the MF portion of the array, we want to keep the HF components as close to each other as possible.

But there is a catch-22 here. At the MF-to-HF crossover point, some frequencies will be produced by both the MF and HF drivers. If we locate the HF array below the MF array, we'll create problems at and around the MF/HF crossover frequency resulting from the physical distance between MF and HF drivers. We could coaxially locate the HF horn/driver inside the MF horn improving that situation, but then there'll be interference in the overlapping coverage areas of the HF horns. This compromise must be understood when designing arrays, because you can't have it both ways and there is no right answer.

Finally, we decide on the low-frequency components and locate them above the MF array. Now we have a point-source. Right? Net even!

You can imagine that the distances between the devices producing common frequency ranges and the interference that must exist at crossover frequencies between the HF, MF and LF portions of the array cause serious aberrations in frequency response and directional characteristics. These can be improved through use of different crossover filter slopes, delays, tweaking of drive levels and bandpass filtering to individual components (frequency shading).

All this is subject material for a seminar, not a monthly column; I suggest you get to one soon if this has peaked your interest. More next time. ■

DOWN TO BUSINESS

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rep take it to? How do they find the persons in the firm who care or, for that matter, the persons who even get it?

I guess it boils down the following nag I have: Where are the next-generation practitioners in our business who understand the technology and the convergence? The lack of pace in developing qualified individuals to participate in this current and future convergent-technology workforce is quite disturbing. The time is coming when this convergence will include not just the AV/IT scenario we've been bantering around the past few years, but all building and customer services. It will then be important to be able to integrate the remote control and monitoring of Power Management and backup, Environmental Control, Facility Access, Emergency Egress, Security Surveillance, Crisis Response, as well as all of the audiovisual services to which we're accustomed.

In the past few weeks, I spoke with a half dozen small and mid-sized systems-contracting firms in the Midwest, East and South. Each of them shared with me a general vision and direction of their company for the foreseeable future. Surprisingly the responses were similarly narrow-focused. None of them had a horizon past the next two years. None of them had a plan to expand expertise beyond their current expertise. All of them often found it difficult to find qualified installers and technicians. All but one showed little concern. What am I missing here? ■

HANGING HEAVY OBJECTS

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expectations to everyone involved, and then seeing to it that those expectations are met. To that end, the communication of the five issues from the assessment phase, combined with the mission, can be a great inspiration for keeping forward momentum throughout the project.

Communicating the carefully selected primary issues of the installation keeps all parties focused on the important factors. It is important for everyone involved to remain focused in order to complete the project. This results in a quicker installation without sacrificing quality or safety.

Without a doubt, the single-most influential factor within any project is the *people* involved. Educated, experienced and motivated professionals will carry a rigging project successfully through completion every time. These types of individuals simply do not give up and will not waiver from a safe and prudent approach to the project at hand.

Verify

Progress and performance must be measured at regular intervals. This way, confidence can be generated resulting from the knowledge that primary issues surrounding the rigging installation have been handled appropriately to fulfill the mission and retain safety.

Measures can be worked into the rigging design using a number of different methods, the most common indicating installer performance, project milestones and system quality. These measures are designed specifically around the top five issues for the installation. If there is a challenge with any item being measured, a quick evaluation can lead to the fast elimination of the challenge as well as a tremendous accumulation of expertise to be applied to future projects.

In closing, I would like to offer my insight into rigging heavy objects over people's heads. Understandably, many individuals get nervous when dealing with this topic. However, when approached with care, logic, education and determination, a rigging system is not a thing to fear. A well thought out process can minimize concerns for safety and of the unknown. That being said, rigging heavy objects over people's heads is a dangerous business; if you are not comfortable with the task, ask for the assistance of someone who is. ■