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Stage Operations

INSTRUCTOR

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COURSE OBJECTIVES

At the completion of this session, participants will be able to:

1. Explain the basic elements of sound, lighting, staging and rigging.
2. List the resources that a facility manager can utilize to help make good decisions in regards to sound, lighting, staging and rigging.
3. Identify and name tools the Venue Management Industry uses to help reduce risks.
4. Define common terms from the IAVM Stage and Concert Glossary.

Introduction

The purpose of this course is to provide basic information on the ways stage operations impact a facility and the decisions made as a venue manager that affect the facility from a financial, operational and risk management aspect. Theater 101 cannot be taught in an hour, but hopefully the information gained in this session will assist in your decision making as a facility manager. While being able to "talk tech" with the technical personnel or having enough knowledge about sound reinforcement and acoustics to understand why the sound for a particular event is unintelligible might have its advantages, the responsibility of a facility manager is first and foremost to preserve and protect the facility and the people in it.

For that reason, the primary focus in this session will be on stage related safety liability issues, particularly in regards to rigging systems. While risk management and life safety issues will be discussed in other sessions, stage related issues are unique enough to be addressed independently. Rigging issues are prominent in every facility type and involve every aspect of stage operations, especially in the areas of sound and lighting. Because improper operation and maintenance of rigging systems can cause catastrophic damage and injury this topic warrants considerable discussion.

> *"All the world's a stage...but I wouldn't want to paint it."*
>
> Stephen Wright, Comedian

Stage Operations

Stage operations occur in every type of public assembly facility (i.e. convention centers, arenas, stadiums, amphitheaters). If you deal with display or entertainment lighting, risers, platforms, stages, overhead signs or displays, scoreboards, speakers, microphones, or personnel lifts, you are involved in stage operations. If you are regularly confronted with issues such as sound levels and intelligibility, lighting levels, where to put the mixing console, crowd

> "Know what you don't know. If you do not know – ASK!"

control, etc., you are involved in stage operations. If you book, market, sell tickets for or coordinate any type of an event that takes place on a stage, you are involved in stage operations. The more you know about any of these issues, the better prepared you will be to make sound decisions that may have a serious impact on your facility from a financial, operational and risk management level.

Stage operations encompass many subjects in the areas of sound, lighting and rigging. If you do not have a background in any of these areas, you may have to rely heavily on your technical staff or other industry professionals for advice. The key to success here is do not make decisions in a vacuum. Ask several different people for their opinion, and chances are if you are hearing the same thing, you are getting good information. One of the advantages of belonging to a professional international association like IAVM is you have the opportunity to develop relationships with Allied Members who are readily available to provide information but you cannot be afraid to ask.

> *"I recall an incident at a convention center where someone thought it might be a good idea to paint the unpainted cinderblock walls of one of the theaters black. The thought was this would be more "attractive" and if the black stage draperies didn't mask the backstage areas at times like they should; the walls would be much less noticeable. What no one thought of was that by painting the cinderblocks black, they became sound reflective instead of sound absorptive and the entire acoustics of the theater would be changed. No one thought to ask why they were unpainted in the first place"*
>
> — Robyn Williams, CVE Portland'5 Center for Performing Arts

Acoustics 101 "Do you hear what I hear?"

To understand sound and how it works one must have a basic knowledge of acoustics. Acoustics is the study of the performance of sound energy or the way in which sound performs in a given space. The study of acoustics is a science unto itself, but there are a few basic concepts that would be helpful for a facility manager to know.

Sound is affected by the surfaces around the source of the sound. Hard surfaces reflect sound and softer surfaces absorb sound. An example of this is the load in of a concert in one of the older arenas where little sound absorptive construction material was used. If something is dropped on the stage you can hear the sound repeat itself as it bounces around the hard surfaces of the arena. In other words, you can hear the sound "echo" throughout the seating bowl.

Sound is also affected by air volume. The more air volume present, the more reverberation there is. Reverberation is the length of time it takes for sound to decay as it goes from its most audible point to its most inaudible. Think of a violinist standing on a stage. From the first draw of the bow to the lingering sound after the bow is finished drawing is reverberation. Reverberation has nothing to do with loudness. It is a function of the space. Unlike an echo, reverberation creates a wash of sound with no discrete echoes. Echoes happen when sound leaves the source, travels through space using time, hits a surface and returns to the source.

While this all seems simple, it is important to remember is that the size, shape and construction of your space will affect the sound. When building or renovating a facility, it is important to understand how it is going to be used. Is it a symphony hall where natural sound that enhances the musicians will be expected? Or is it a sports arena that is home to a pro sports team and clear spoken sound is needed in a space that can accommodate thousands of people? Each space will have different acoustical needs.

In the case of the symphony hall, a long reverberation time might be desirable. Tall curved ceilings can help the sound flow evenly from the front of the stage to the rear of the seating area. The rear walls may be covered with a sound absorptive material to prevent sound bounce and echoes. An acoustical shell on the stage can help push the sound out towards the audience while the overhead acoustical ceiling pushes sound down to the musicians so they can hear each other.

In a sports arena, being able to clearly hear the announcer is of prime importance; yet, when you are faced with dealing with a huge volume of air it is important to remember the reverberation. A lot of reverberation is not very desirable for announcing as it distorts the clarity of what is being said by drawing out the sounds. This is not a hopeless situation, however, as we can rely on sound reinforcement equipment to help mitigate these problems.

Sound Reinforcement "Pump Up the Volume"

Sound reinforcement supports (or amplifies) the sound. Sound systems have four basic objectives.

1. Provide adequate loudness so the sound can be heard and provide uniform coverage.
2. Provide clarity and speech intelligibility. Again – remember reverberation in high air volume spaces? Too much reverberation can mask consonants so that sound is unclear or unintelligible. A sound reinforcement system can help increase the number of consonants that can be heard.
3. Provide tonal quality. A sound system can tone down "s" or add bass to someone with a high voice so they are easier to understand. It can help the sound seem natural like the source.
4. Provide correct localization to the source. If you are sitting in the balcony of a theater and watching a speaker on the stage, you should have the sense that the sound is coming from the stage - even if it is provided by a speaker in the balcony with you.

Reinforced sound can be delivered in as simple a system as a self-contained microphone, power amplifier and speaker found in a typical sound lectern or in a complex system like that found in large theaters and auditoriums where the main system in linked to a lobby system, cue communications system, stage communication system and assistive listening system. There are myriads of different components that can help shape and tweak sound. Suffice it to say, know what the facility needs are. "Are you doing Broadway? Rock 'n Roll? Lectures? Sports announcing? Tractor pulls?" "Do you need to provide a good in-house system? Or will most of your business consist of shows that will bring in their own system?" These are the questions to ask of the sound/acoustical consultant when planning a system.

The person mixing the sound for the shows will not likely want to sit in an enclosed booth to do so. Sound booths in virtually every facility are rarely used for anything other than to store equipment. Sound boards are dragged out and straddle seats in the seating area so the operator can properly hear the sound and know how it needs to be adjusted. This is frequently done in seats you would love to sell. Keep this in mind if you are ever involved in renovating or building a facility.

Try to have the best audio person possible on your house crew. Every facility has its quirks and only the house people know what they are. The audience should not have to listen to what amounts to a glorified sound check as the operator from out of town tries to figure out your building. Sound systems do require some maintenance. Mostly common-sense cleaning is in order. Visual inspections of audio cables and connectors for cracking solder can save you some headaches down the road. Another rule of thumb is to not let venue or show staff

eat and drink around audio equipment because the sugar in soft drinks can really do a number on electronics and crumbs can get into the sliders and cause a variety of problems.

The last element of sound maintenance is to read the rigging section carefully as most speakers are hung overhead. While it makes sense to have sound level maximums established and enforced to protect people as well as equipment, the real danger in sound equipment is the way it is rigged-whether it is in a permanent arena, stadium or theatre or part of a portable system being brought in for a show. Follow the maintenance and training mentioned in this section.

Lighting Basics "You Light Up My Life"

The most important consideration of lighting is visibility. It does not matter if the "performer" is an athlete, a symphony musician, or a vendor on the trade show floor. Each performer must be clearly visible by the people in attendance and the performer must have the lighting necessary to be able to perform their job. Obviously, this differs according to the needs and demands of each of the "performers".

It is important to be aware of the lighting capabilities of the facility. Bright but flattering (no shadows) overhead lighting may suit the needs of the trade show exhibitor, but more dramatic lighting may be in order on that trade show floor for the unveiling of a new product. The better the venue manager can anticipate the type of lighting needs of a particular space the better able to select a system to provide it.

Lighting objects and people in any interior or exterior space involves four basic source locations that are meaningful to how we see those subjects / people. These are (a) front light, (b) side light, (c) back light and (d) top light. The positions are indicated by those same words. Higher angles create highlights and shadows which communicate shape and size. Lower angles create good visibility but often flatten the field of view or soften those shadows.

There are a variety of lighting instruments (fixtures) and lamps (light bulbs) available to purchase or lease. Some provide sharp edged, brilliant beams. Some provide softer more diffused lighting that may be easily blended. Some create exciting visual effects for performing arts events and concerts. Some-like most instruments used in theaters and performing arts centers- require several hours of hanging, focusing, and rehearsing so that every piece of equipment is utilized to the utmost and to ensure accuracy of cues or preset 'looks'. "Moving" or "intelligent" lighting fixtures can change direction, focus and color using internal motors, control systems using various specialized software.

LED (light emitting diode) lighting is taking over the world. Its' predecessors of incandescent, tungsten and halogen all refer to the filament substance that 'burns' electrically within each light bulb. The efficiencies of LED light sources are many – but

most important are (a) cool burning temperature, (b) remarkably longer lamp life, and (c) less electrical energy required. Both lamp life and electrical demands result in significant cost savings; which at most of our venues can result in discounts or credits from our local utility companies. Also, LED lighting uses lower voltage, therefore can be dimmed and controlled without higher voltage dimmers. This saves the venue and shows time and equipment to power, control and operate the entire lighting system.

Arena and theatrical shows utilize very complex systems if they present huge complex spectaculars like opera. Multiple hanging positions, a large inventory of lighting instruments capable of a variety of light outputs, plenty of distributed power and data connections to the lights and a refined control system might be appropriate. A small arena that relies on outside events to provide their own systems may be best suited by having appropriate overhead lighting for visibility and plenty of electrical and data distribution panels to provide power, cable pathways and connectivity for the lighting that is brought in.

As in audio equipment in your venue, maintenance of conventional 'non-moving' lighting equipment is fairly straight forward. An annual cleaning of lenses and reflectors and other components as appropriate is usually adequate. Intelligent-moving-lighting is much more complex and you may consider sending one of your technical support staff to a factory supported specialized school so they will know how to properly use and maintain the equipment.

Staging "All the World's a Stage…"

There are two basic types of stages to consider: permanent and portable. Permanent stages are those found in theaters or auditoriums. The venue manager must have a clear understanding regarding the proposed use and purpose of the stages. It may be perfectly appropriate to have a blond hard wood floor if nothing but the symphony or lecturer is going to be on the stage. The hard floor has some nice resonance and the light color will reflect the light and keep it bright. This might not be appropriate, however, if the facility is a road house. Road boxes and the frequent move in/move out of equipment can really cause wear and tear on a hardwood floor and the light bounce from the blond floor could be a real headache if trying for any lighting control. In this case a dark stained softwood floor that is more forgiving of heavy weights and dragging equipment might be more appropriate.

When it comes to portable staging, know your needs and demands of the performance and the structure. How much weight does it need to hold? (A lot if it is a rock show) How heavy are the pieces? Who is going to set it up? A crew of 6? A crew of 2? How much storage space does it take up? How easy is it to set up and tear down? Does it have to move from one space to another? Can it be retrofitted to meet ADA requirements? How much use and

abuse will it have to stand up to? Is it important for it to look pretty? Once the answers these questions are clear, the correct stage for the job can be selected.

Maintenance varies according to the type stage used. Portable stages need to be inspected at least annually, more so if used frequently. Legs and braces need to be fully operational and sections need to be able to be fastened together so they don't "walk apart". Stages that are not set up properly can fall-and they do, unfortunately, way too often. Make sure that your staff is properly trained in the setup. Have plenty of extra sections so when a damaged piece has to be put out of commission, you won't hesitate to do so. Know the load limit of the stage and do not exceed it. (Put these limits in writing on the tech sheets attached to all contracts.)

This may seem such common sense. But, then, why are there stages collapsing?

Rigging Basics

To be an effective facility manager, you need to have some knowledge of rigging systems, practices and liability. Rigging systems and practices have the potential to seriously affect the facility from a safety perspective. Venue managers are not required to be professional riggers, but rather the official watchdog for the facility. The more knowledge and understanding acquired in this area, the better prepared the venue manager is to protect the building and the people in it. While the venue manager may not know all the answers, it is imperative to know the questions to ask and be better equipped to support your staff in a tough situation**.**

"Rigging is not sausage."

Jay Glerum, author
Stage Rigging Handbook

Rigging is in use in every facility type. It may be the complex counterweight fly systems found in most theaters. It may be the intricate system required for the suspension and servicing of speaker clusters, scoreboards

Rigging is a series of components that suspend object

and lighting systems frequently found in arenas or stadiums. It could be the system used in hanging trade show signage, banners and lighting in convention centers. No matter how big or how small, how simple or how complex, the same rigging standards apply and they all have the potential to create dangerous situations to the people in and around these systems. This is actually not as strange a statement to make about rigging as it appears. When it comes to sausage, many people do not know what is in it and would prefer not to know. Unfortunately, too many facility managers think about their rigging systems in the same way. They know the rigging is there, they know it performs a particular job, but beyond that they would prefer not to think about them.

There are two basic rules of rigging:

> ***Rule #1 Don't let anything fall***
>
> ***Rule #2 See Rule #1***

Unfortunately, falling equipment is becoming all too common, even though one is too many. You may have heard of the incidents involving scoreboards, or you may have personal experience with near misses in your facility type. One common problem is an assumption that rigging lasts forever.
Here are a few more rules of rigging to keep in mind:

Everything has a useful life.

It doesn't matter if the equipment is a fixed, permanent rigging system found in a theater or the portable equipment brought in for a touring show. Every component has a life expectancy that is not indefinite even if those components are just sitting there-and most of them are not. Most rigging components are constantly in use and in motion.

Everything has a load limit.

Rigging systems are about loads and everything has a load limit. All components respond to a load by stretching. If a person picks up a bucket of sand and slowly raise their arm to the side they can feel their muscles stretching as the arm responds to the weight. Likewise, if you stand on one foot and could take a microscope and look at the molecules of the floor, you would see a noticeable stretching of the floor under the weight of your foot. The same thing is happening to your rigging components - **all** components.

Note, however, that this is not just happening to every component part, but to whatever the rigging itself is attached. A chain hoist holding up a truss may be exerting a load on the

overhead beams in an arena, which in turn are exerting a load on the ceiling, which is exerting a load on the roof, etc. (The foot bone is connected to the leg bone, the leg bone is connected to the thigh bone, etc.) The point is that all of these components have a load limit and this limit diminishes over time and use. What is really scary is you cannot just look at a component and know it needs to be replaced. Chances are by the time a component begins to show stress, it is well past its prime for holding its rated load.

When rigging is going on in the facility, do you know if the weight being hung is capable of being supported by the roof? If the facility has a permanent system (like a fly system on a theater stage) do you know what it is capable of holding? I know a manager who said since the counterweight system weight arbor was capable of holding "X" amount of weight, then their maximum capacity would be the total of "X" for all the arbors. But - can their grid support that? Can the roof? What about the cable suspending the pipe? Can it support a fully loaded arbor? Don't get hung up on the terminology here if you don't understand theatrical rigging. The point is that all these different components have different load limits and if the limit is exceeded in any component, a failure may occur. Now you are breaking the #1 rule of rigging. Don't let anything fall.

Even more important to note: in some local jurisdictions, if a rigging system fails, even if it was brought in and set up by an outside entity, the facility manager might be liable. You don't have to be a rigger to know what questions to ask. Hopefully the following information will help.

"There's a whole lot of 'weightin' goin' on."

I recall hearing a story where a house stagehand asked a road manager how much weight she/he/they would be hanging for a concert. The reply was, *"A whole lotta weight."* Please note that WLW's (whole lotta weight) are not an accepted measurement of weight. Estimates are not acceptable. Would you like to stand underneath a scoreboard where the weight was estimated?

Rigging Liability

"Ignorance is not a legal defense."

Case Study #1

A well-known country artist was hired to perform a private outdoor party on a small stage. There were a few problems with the initial lighting rider. The original rider has more than 165 pars and ellipsoidal spotlights hung on a truss more than twice as wide as the stage at a trim height on 25 ft. The system exceeded the weight limit on the roof by

1000 lb. and the roof was able to accommodate only an 18ft. trim height. Moreover, because the show was in an outdoor location that was difficult to get to, truck access was limited. What should the facility manager do?

As facility managers, we tend to think in terms of liability. This is a word we are usually fairly comfortable with. In our day-to-day operations and dealings with the lessees who use our facilities we require reams of insurance in order to "protect" us. We practically have the words "additional insured" emblazoned across our foreheads. We regularly ask, "Can I be liable for that?" This same mindful thinking needs to be adopted for the rigging hanging in our facilities. Have you ever looked up at your scoreboard or speaker clusters and asked, "Can I be liable for that?" You should!

"Liable" is defined as "obligated according to the law; responsible." A liability is any **legally enforceable** obligation. There is a legal assumption that workers and patrons in your facility can work or be entertained free from harm. In liability issues, everyone involved shares the responsibility. The question is, *"How much of it is yours?"*

Do you know what the industry standard is? Do you know what are the accepted practices and rules by which our industry safely functions? Here is where we too often get in trouble. We assume we know what the standard is. We assume everything is okay. We assume people know what they are doing. We assume because something has been done a particular way in the past we can continue to keep doing it the same way in the future. We assume "Everybody does it this way." Do they?

What will catch up with you is what you really **don't** know. Ignorance is not a legal defense. Professional liability dictates that you do know or you could be found negligent.

Negligence is the failure to act or notify someone that something is wrong or that there is a danger - whether it is a dangerous situation or a defective product. It is one thing to have a liability - to have a degree of responsibility for something – it's another to be negligent and do nothing. More seriously, criminal negligence is the **intentional** failure to correct an unsafe problem or to induce or coerce someone to act unsafely. An example of this might be knowing that a piece of motorized rigging equipment has been making a horrible noise every time it is turned on and not doing anything about it. Or perhaps it is telling your rigging crew, *"We don't have enough safety belts for everyone, so you all just be careful while climbing that steel."*

This is more than an issue of liability in my opinion. Rigging issues are life and death issues and cannot be trivialized or ignored. It is the owners and manager's responsibility to see that

anyone coming on the premises is safe from harm from the structure itself, all equipment and the activities on the premises.

If there is an accident, there is an assumption of negligence. Everyone will be named in a law suit - the manufacturer, the installer, the user, the venue owner and manager, the booking agent and anyone else that can be dreamed up. Your actions will be judged by what is "reasonable and prudent." You need to know what the standards are.

21st Century Service: SOS "Saving our Skin"

Now that you may be feeling incredibly overwhelmed at the huge responsibility on your shoulders and on an issue, you are probably no expert in, **take heart!** The fact you recognize the seriousness of this issue will go a long way in your finding the help you need. Following are some resources that can be tremendously helpful.

USITT/CITT

The United States Institute for Theater Technology and the Canadian Institute of Theatre Technology have been the industry leaders in setting rigging standards for the theater. USITT's *Recommended Guidelines for Stage Rigging and Stage Machinery* detail specifications and practices that have become the industry standard for the theater and for rigging being performed outside the theater as well. They host an annual conference whose workshops focus on all aspects of stage operations.

IATSE

The International Alliance of Theatrical Stage Employees can be found in many cities. This union of stage technicians can be a good resource for industry standards. More importantly they can provide constructive feedback on problems that may be occurring in your facility. It is worth your while to chat with these folks from time to time as they can provide some real eye-opening information on what is happening in your facility.

OSHA

The Occupational Safety and Health Administration is a good resource for information as their full focus is on workplace safety. They have some of the best information on fall protection that I've ever seen.

PLASA (formerly ESTA)

In recent years the Pro Lighting and Sound Association merged with the Entertainment Services and Technology Association. PLASA represents a broad spectrum of companies who supply products and services to the entertainment industry. Working

with a number of industry partners including IAVM, PLASA developed an ANSI-accredited certification program for riggers and lighting professionals. This is the ONLY accredited certification program in our industry. You should have at least one person on your staff who is an Entertainment Technician Certification Program (ETCP) certified rigger if you are allowing any rigging in your facility-and chances are, you are!

IAVM

The International Association of Venue Managers is the acknowledged leader of public assembly facility management. Hot topics on rigging have been presented and a hoist safety task force was created to bring rigging issues and solutions to facility managers. Rigging seminars are regularly offered at chapter and region meetings.

The annual VenueConnect conference offers a backstage boot camp in conjunction with their specialty meeting each year. Our Allied Members who manufacture, install and maintain things like lighting systems, scoreboards, hoists, etc. can be a great resource.

Risk Reduction

"Tis a sharp remedy, but a sure one for all ills."

— Sir Walter Raleigh
(Feeling the edge of the axe before his execution)

The following are ways in which you can reduce your risk.

1. ***Use competent people and train them.***

The definition of a competent person is someone who is capable of identifying existing and predictable hazards in the workplace and has authorization to take prompt corrective action to eliminate them. You may have people who know how to operate equipment but do not know how to recognize a hazard. Hire competent people and make sure they are empowered to take action if the situation warrants it. You should sit down with your staff and determine in advance what type of action should go with what situations.

If you use volunteers or students, competent people ***must*** supervise them.

2. ***Clarify the scope of the employee's authority and back them if they say "No".***

Employees cannot be competent if they are not authorized to take prompt corrective action. Discuss in advance what their parameters are and be prepared to back them up. Even if that means the show must be modified significantly in order to go on!

3. ***Provide on-going training for your employees. They should be well versed in emergency training and competency training in their field as well as aware of new technology and best practices in their area.***

Does your staff have sufficient training and knowledge to do the job without injuring themselves, their fellow workers, the audience and the performers? I have been appalled at the situations I have encountered where a stage technician's last training was a college class. Knowledge gained 20 years ago is not relevant. Stage and rigging technology are changing rapidly. When *Phantom of the Opera* first toured around the country, its staging technology was so advanced from what many technicians knew, the company offered free training classes to the local crew if the facility would allow it. Do you know some facilities wouldn't do it unless the company paid for the day? What a lost opportunity. You will not be able to maintain a very high level of competency if your folk can't keep abreast of what's happening in their field. There are a number of seminars offered in rigging for your technical staff. I encourage you to send them to one.

Be aware there is only one ANSI recognized certification training in the industry for riggers at this time and that's through PLASA's ETCP program. If someone says that their riggers are certified I would seriously question where and how that "certification" was obtained. Getting a "certificate" from a seminar is not the same as being certified. Your best defense is a well-trained house crew who has a thorough understanding of safe rigging practices and sees that they are followed regardless who is doing the rigging.

4. ***Allow the employees to get help if they are asked to do something beyond the scope of their training. Listen to them.***

An employee may be an expert at theatrical counterweight rigging systems but not have a clue about arena rigging practices. Create an environment that allows employees to freely admit when they are up against something that they are not competent in. Don't push them to work beyond their area of expertise. Trust their instincts. If an employee comes to you with a concern, don't dismiss it because they are not an expert in this matter. You could possibly avoid a catastrophic failure just by looking into an employee's statement that "it just doesn't sound right."

5. ***Have equipment inspected and maintained.***

You cannot leave something hanging in the air for 30 years and just forget about it. All components will fail sooner or later. Somebody needs to know what you have, how it operates and how to inspect it. You must have regular inspections of all your rigging equipment and you must document it. Most problems can be detected by a simple visual inspection. If it sounds bad and it looks bad, it probably is bad. Cracked insulation on electrical wiring, missing hardware on portable stages can all be detected from a visual inspection. Staff must be trained in what to look for. They also need to do an inspection on a regular basis. I encourage you to send them to a class for formal training of this nature. I also recommend hiring an outside consultant to come in and do a formal inspection from time to time. Sometimes a fresh pair of eyes will see problems that have faded into the background with familiarity. Because our rigging is used so frequently, we bring in a consultant every two to three years to perform an inspection in addition to the monthly inspections of the technical staff AND, we get them to teach a class while they're here!

6. ***Maintain records of all inspections, repairs and training.***

It is important that you document all inspections, repairs and training in case any of these is ever called into question. It is also important that facility staff who are trained, document the training they individually receive (e.g., sign-in attendance sheets) and this documentation is retained in the facility training files. Document who was trained, when and what they were trained on. Have a written plan for all of the above. Document when repairs were made and how. When someone gets hurt three questions will immediately be asked:

- Do you have a written safety program?
- Do you have any training records?
- Do you have any maintenance records?

(The correct answer to these questions is YES!) You could be considered negligent if you do not have a regular maintenance and repair program.

7. ***Use only RATED components with a manufacturer's name on them and within the limits of the rating.***

Good reliable rigging hardware is *load rated.* You should require that any overhead rigging use only load rated hardware. Such components will have the manufacturers name stamped on the piece of hardware so you can call the company and find out its capacity. If a piece of load rated hardware fails within its rated limits the manufacturer could be liable. Now is not

a good time to go low bid as rated hardware costs more than the inexpensive stuff you can pick up at the local hardware store. Rated hardware has been consistently tested for its load capacities. Test results take precedence over experience.

Any alteration to the hardware or other components can significantly reduce its capacity. For example, a certain kind of rope may be rated to hold "X" amount of weight. If you tie a knot in it, you decrease the capacity by 50%! Know what you are buying or using. Will the product safely do what it is being used for? Is the product being misused? (Fishing line should only be used for fishing!) Was the product installed according to manufacturer's specifications? If the product is defective, was it installed anyway? What are the use limits of the product? Engineering departments at universities love to do stress tests, so approach them if you are unsure of the limits of your components. Never make your own components! Do not make modifications to components as you will affect their rated capacity.

8. ***Have a written operations policy. Know the capacity of the building and the rigging equipment. Send it out with the advance package.***

A written operations policy can detail how each piece of equipment is to be operated. Here is where you can spell out the "dos" and "don'ts" of operating your systems. For example, "The personnel lift is never to be operated without the outriggers fully extended." Each venue is unique and you likely use stagehands that work in a variety of different venues. We all know how to drive a car, yet when we get into a rental car we have to stop and reacquaint ourselves with the way it operates versus what we are used to. Just because you can drive a car, could you make the leap to drive a semi? What about the stagehand that has been working in a 500-seat theater and is now rigging in your 50,000-seat stadium? Your written operations policy ensures that procedures appropriate for your facility are followed. Designate who is in charge and make sure they are competent and empowered. Make sure the procedures are written. For example: "Spreader plates are always to be used." "We yell 'stand clear' before operating the fly system." State the road show modifications that you will or will not allow. Do you allow over loading? Do you allow the house rigging to be moved? If so, do you have a restoration policy? Who is in charge and who backs them up in their absence? How many chain hoists can be hung? Where? What's the load? You should have written guidelines of how to handle situations your staff thinks are unsafe. Send your operations policy out in your advance package to the touring technical 'road' crew.

Also know the weight of what is coming into your facility. I recall hearing about a big Broadway show that was touring the country that had a huge amount of rigging and scenery. The word was that no one with the company actually knew how much weight they were hanging and some of the road crew was very nervous about this. I can tell you that as a facility manager, I was very nervous about this. That show is no longer on the road but that doesn't

mean there are not others out there with the same problem. Don't be afraid to ask for - demand - the weight limits in writing. If the proposed rigging is pushing your level of expertise ask for outside help. Establishing a working relationship with a local structural engineer who inspects and regularly reports on your rigging attachment points could be very useful whenever a touring production loading question arises. Sometimes that engineer review and their fee could be just considered a part of the show cost. One theater I'm aware of painted the load limits on all the battens of their counterweight system, plus it was posted on the fly-rail to keep it uppermost in those stagehands' minds.

9. ***Have users provide liability insurance. Carry liability insurance and be aware of the coverage.***

Insurance companies can aid in your defense so it is wise to be well covered.

Summary

Rigging safety is everyone's issue. As a facility manager-now or in the near future-it is important you understand this issue enough to see that your venue operates as safely as possible.

You may think you cannot afford to train your staff or hire outside experts. The issue is - you can't afford not to. You have a moral obligation to ask, *"How can I prevent accidents from occurring?"*, and then do everything in your power to see that is done. No matter if you're talking about sound, lighting or rigging equipment, your biggest liability is a major rigging accident. Your best insurance is a well-trained and empowered work force.

Know what you don't know; keep seeking information and keep asking questions.

Acknowledgements

Author's Credit
This monograph was written and edited by Robyn Williams, CVE along with Phil Jordan, CVE.

Thank You
Special note of thanks to the legacy of Jay Glerum, Jay O. Glerum & Associates, Inc., consultants for the entertainment industry, for allowing the use of his material on stage rigging. Much of the information in this monograph came from Jay Glerum's and Harry Donovan's rigging seminar as well as several other sessions on rigging that Jay has presented for IAVM.

Thanks to Pelton Marsh Kinsella, consultants in acoustics, theater, television and audio/visual design, for their support of these materials.

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https://etcp.esta.org/

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