



Who Left-out the Steel?

A new endangered species:

Gridirons & Loading Galleries

As both a facility designer and a rigging systems inspector I have come to notice a disturbing trend in Theatre Stage House designs: No walk-on gridiron deck. This disease generally takes two forms: The rigging is all attached directly to the stage house roof beams, or the loft beams have been installed at an elevation below the roof deck but with no infill between them to walk-upon. Either incarnation is troubling for many reasons:

Initial Construction: All of the contractors that are involved in the construction of a theatre stage house will charge more to do their work from man-lifts or scaffolding than they would to perform the same work while standing on a gridiron deck. This alone can offset a significant portion of the cost of installing the gridiron deck.

Day-to-day Operations: In the mounting and striking of many shows it can be very helpful to drop a rope from the gridiron deck to stabilize a piece of tall scenery, to drop a spot line to hang the moon, or a chandelier, or even to drop balloons, confetti, snow, or other props that ‘fall from the sky’ (hopefully, with careful blocking of the actors below).

Teaching Rigging: As students learn about technical theatre (be they techies or actors), it is vital that they understand the theatre production plant. Going up to the gridiron deck shouldn’t be a terrifying experience, but instead an interesting trip to see how all the machinery above a stage works. Understanding the tools with which one plies their trade makes for a better performer, regardless of their job description. A trip to the grid also makes for good safety training as it helps everyone better grasp the safety issues of secure attachments, good work lighting, and hazard recognition skills.

Service Calls: If you have a lift line jump free from a loft block, something squeaky, creaky, or ‘just not right’ in the fly system; it can really help to get a set of eyes on the problem. And it’s not just the rigging that needs attention: Smoke Vents are here, this is where roof leaks make themselves known, and sometimes this is where the roof access hatch is located. There are sprinkler pipes and sprinkler heads, air ducts, work lights, and fire detection devices (smoke detectors and rate-of-rise heat detectors), too. In some systems, the Motor Control Center (MCC) is located at the grid deck level, too, so something as simple as resetting a tripped circuit breaker or blown fuse requires a trip to the top.

In a stage house without a gridiron deck, should something break or jam-up right before a show, it may be necessary to cancel or postpone the show for several weeks so that a service call can be scheduled, equipment rented, and the service call performed. It will typically require that the stage be completely cleared of scenery and props just to get the lift onto the stage, too. If there is a walk-on service gridiron deck, then this same service call can be performed in hours, maybe even minutes.



Inspecting the Rigging: Most of the elements described above require quarterly, annual, or semi-annual inspections. All of the fire protective systems inspection schedules are defined in the NFPA code books (or similar definitions in other countries), and there are very few jurisdictions where this is not in effect. Although annual inspection of the stage rigging system may not be explicitly required by OSHA, other industry organizations fully endorse and encourage them. They are a really good idea. In other countries this type of inspection is mandatory. A thorough rigging system inspection requires access to the loft blocks to see that they are secure, aligned, running freely, and don't have any signs of abnormal wear.

With a walk-on gridiron deck, this can be done in less than a day for most facilities, and only requires one inspector and an assistant. However, if the loft blocks are 40-65 feet (12-20 meters) above the stage, with no simple access to them, then this means that a boom-arm lift or scaffolding must be brought-in, typically at **great expense**. You have to figure-out what equipment will fit into the building through the available passageways, figure-out if the floor structure can handle that much concentrated load (lifts like this can weigh 8-11,000 pounds), schedule and rent the equipment, have it delivered, get it into the building, onto the stage, and set-up. You may have to put-down a layer of protective decking to keep the lift or scaffolding from damaging the performance flooring, too.

One must then work themselves around between the fly battens, curtains, lights, power cables, and other obstacles like sprinkler pipes, electrical conduits, and air ducts to get eyes-on for each piece of the rigging. This can be very slow going, and can take as much as a week to accomplish. You'll need at least one other person to be a ground spotter, and maybe more people depending upon the scaffolding or lift arrangement you are using.

Accessing a fly loft via a lift or scaffolding can *triple or quadruple* your annual inspection costs.

Imagine the same scenario for any of the other systems to be inspected or serviced. If a lift line gets fouled at five minutes before show-time, with a walk-on grid there is a good chance that the problem can be resolved before the curtain rises. *Kiss that hope good-bye if you can't get to the rigging.*

Safety: Without a walk-on service deck your facility designer and owner are inviting 'make-do' solutions to everyday tasks. Will your staff try to climb out on that beam or ride a batten to the loft? Will they have proper fall protection equipment? Will they know how to use it? Will they have an emergency rescue plan should the worker end-up suspended in a fall protection harness? Are there proper load-rated fall protection anchorage points? We see tell-tale signs of personnel climbing out on beams all the time. Scary. *Very Scary. Is your crew doing this?*

Whatever little bit of money someone thought that they were saving by not designing-in a walk-on gridiron deck is 'penny-wise and pound foolish.' Yet we see them all the time.

Weight, Weight . . . Don't tell me – You don't have a Loading Gallery

Counterweighted rigging is fairly medieval. You balance the weight of the scenery with the weight of steel bricks. It seems simple enough, but when both the load (on the batten) and the counter-load (counterweight) are at the same level it can be difficult and very dangerous to manage. For some misguided reason, there are many theatres that have been built without any Loading Galleries. In this type of facility, each time you load or unload a batten you have to do it with the counterweight carriage



either under-weighted or over-weighted until you can juggle the system back and forth and get everything balanced again. It's not easy, it takes a crew of four or five trained riggers, *and it's not very safe*, so be sure you know what you are doing before you attempt this. Learn how to do this safely so you can minimize the risks involved.

If a line set gets away from either the stage crew or the weight loading crew it can result in a **runaway** that can cause extreme damage to the equipment and possibly injure those near the event.

“Gimmie a ‘one’, gimmie a ‘two’ . . .” *What?* You say we need *more than one* Loading Gallery? Yes we do. One Loading Gallery level means you only have one batten elevation where you can both change the load on the batten *and* simultaneously change the load on the counterweight carriage. Typically, albeit not always, the Upper Loading Gallery is position so the stage technician can load and unload the counterweights when the scenery or lighting batten is about 4 feet above the stage floor.



If you are attaching a taller piece of scenery, or using the battens to lift a heavy piece up and set it on top of another piece of scenery, then you are in a situation where the counterweight carriage is lower than the Upper Loading Gallery. How do you safely get to the counterweight carriage? **You can't.** This creates a situation where the weights can't be removed as the scenery is disconnected from the batten. If you remove the scenery, then the counterweight carriage is too heavy and can fall towards the stage in a scenario called a 'runaway'. If the carriage runs freely towards the stage it gains speed and momentum, all the while the unloaded batten is racing towards the ceiling of the stage.

When the counterweight carriage reaches the bottom of the track or guide wires it encounters the end of its defined travel range and 'crashes' through the travel stops. This can bend and destroy the equipment almost beyond recognition. If the counterweights spill out of the counterweight carriage, then the line-set can suddenly become stage heavy (the batten weighs more than the empty counterweight carriage) and the cycle reverses with the batten crashing towards the floor and the counterweight carriage rushing towards the head beams. The falling batten can severely injure or kill anyone in its path.

In a stage with a taller proscenium, additional Loading Galleries may be necessary – some larger theatres have four levels of Loading Galleries.

What are we saving in the construction cost? Loading Galleries are 3-4 feet wide by 30-40 feet long, so the total square-footage is minimal in the scope of a new building.



If we include the additional Fly Galleries then what are we providing in operational safety? Safe access to the counterweight carriages and a reduced likelihood of runaways. *Priceless.*

Understand this: It is not “extra steel” you are saving by leaving out Gridiron Decks and Loading Galleries. It is fewer ambulance calls and possibly funerals you are saving by putting them in. And in the long-term operation of the building, you are saving money on the operational costs year-to-year.

Proper Planning

So, how does this happen? Misguided design decisions early in the project development cycle. Saying “well, the last theatre we did doesn’t have one . . .” doesn’t justify the omission of fundamental equipment. Whose theatre are they designing? Yours (the end-user), or theirs (for the suspender-popping glory of saying “I did that! *And we saved money by not putting in all that 'extra' steel.*” It is vital that you be engaged with the Architect’s design team (one that should include a Theatre Consultant) to see that a safe stage house structure is being designed. Budget concern? Would you buy a car and consider the tires an ‘option’? I didn’t think so.

Resources:

The Stage Rigging Handbook, 3rd edition, by Jay Glerum

Entertainment Rigging, by Harry Donovan

Entertainment Rigging for the 21st Century, various authors

Rigging Math Made Simple, by Delbert Hall

Rigging for Entertainment: Regulations and Practice, by Chris Higgs



How much force did it take to break this steel counterweight?

It could have been dropped on your head. *Think about it!*