Automated Rigging

Why use Automated Rigging?

Recent productions from Broadway to high schools frequently include spectacular scenery movement, requiring more sophisticated control of the flying system. New rigging technology makes dramatic movement reliable, repeatable, and affordable. Today, motorized systems with sophisticated controls are the tools that permit more dramatic effects in many shows.

Convenience: The combination of new technology, a desire for more spectacular scenery movement on stage, and a desire to get away from counterweight rigging has made automated rigging more affordable and popular. The use of motorized rigging now goes far beyond traditional tasks such as moving heavy orchestra shell ceilings and lighting sets, to the control of scenery sets.

Repeatability: Automated rigging systems let you create and play back movements exactly for every performance. However, not all performances are identical, so joysticks let the operator speed up and slow down movement to accommodate variations.

Safety: A well trained operator is the key to safe operation of any rigging system. Automated rigging systems eliminate the need to keep counterweight sets properly balanced, and do not require use of loading galleries.

History

In the early 1960's the theatre consultant George Izenour developed the concept of motorized point hoists, providing tremendously flexible rigging systems. Clancy's original SceneControl system used this concept, which was installed in many US theatres in the 1960's. Clancy continued developing motorized rigging systems and controls for theatre in the US and overseas, including the Lyric Opera of Chicago, the San Francisco War Memorial Opera, and the National Theatre in Barcelona. Hoists were custom built for specific projects and high costs limited their use to the largest projects.

In 2004 J. R. Clancy introduced the PowerLift® hoist system and a new generation of the SceneControl console, based on over 40 years of experience in motorized rigging systems and controls. These hoists are built in quantity, as a standard product, leading to much lower costs. Systems are now being used in high schools, colleges, and regional theatres, where their increased safety and reliability are of paramount importance.

Why Clancy?

Theatrical rigging systems are unique, with requirements not found in other industries. Careful design, testing, manufacturing, and quality management are essential for the quality and reliability you expect.

Design: Your automated rigging equipment is designed by our full time, in house engineering department. This is the largest group of theatre equipment designers in the US, including degreed mechanical, structural, and electrical engineers. Many of the engineers, designers, and project managers who will work on your project have extensive theatre production experience, and understand the challenges you face.

Testing: Clancy's extensive testing program makes use of a 60' indoor test tower, life cycle testing and in house destructive testing, as well as work with independent test labs.

Quality Management System: J. R. Clancy is the only North American theatrical rigging manufacturer with a quality management system certified as meeting the ISO 9001:2000 standard.

Standards: The products we provide meet the requisite US standards. In addition, we're actively involved in developing new standards through the ESTA / ANSI Technical Standards Program. Clancy is a contributor to the Entertainment Technician Certification Program (ETCP),

How to select a hoist

Motorized hoists are available in a tremendous range of speeds, capacities, types, and costs. Clancy offers both custom hoists designed and built to meet our customer's specific requirements and a series of "package hoists". The following pages contain an overview of the major choices, types of hoists commonly used, features, and options.

Full design and application assistance is available from J. R. Clancy. Please contact the factory to learn how we can provide the motorized rigging system that will best meet your needs.

Fixed or Variable Speed

Fixed speed hoists are generally used for heavy loads which do not have to move dynamically in front of an audience. Examples include lighting battens, speaker clusters, and orchestra shell ceilings.

The tremendous speed range of variable speed hoists makes them ideal for use with scenery which must move in front of the audience. A hoist that performs a subtle move at rate of less than a foot per minute can suddenly operate at several hundred feet per minute in the next cue.

What Speed ?

Hoist speeds vary widely with the application. An orchestra shell ceiling or lighting bridge may fly out at a speed as low as 3 feet per minute. Lighting sets typically fly at 20 - 30 fpm. Moving any faster with a fixed speed hoist will result in stops and starts that may be too abrupt for lighting fixtures. However, a fixed speed curtain hoist could operate at 60 fpm without a problem.

Variable speed hoist performance varies with the types of controllers (drive) used. Clancy offers drives which provide full torque at zero speed, producing an effectively infinite speed range. Top speeds are dictated by the user's requirements. Scenery sets in colleges or regional theatres typically run at up to 120 fpm. Major performing arts centers and opera houses may have speeds of up to 240 fpm, while some of the newest international opera houses are using hoists with speeds of up to 360 fpm. Main curtain hoists may operate at even higher speeds.

What Capacity?

Traditionally, scenery sets were rated to carry 15 - 20 lbs per foot of batten length, while lighting sets could be rated at up to 40 lbs. per foot. Much of this is changing with the use of heavier scenery and the approach of making any set able to function as a lighting or scenery set. Once a maximum capacity is selected and the hoist is built, it is very difficult to increase the capacity - plan ahead!

Most sets are dead haul, where the hoist lifts the entire weight of the set. This is preferred for most scenery and general purpose applications. For high capacity sets the use of counterweight assisted hoists may be required, both to reduce the size of the hoist and for safety purposes.

Hoist Components

The following features are typical of the construction of J. R. Clancy hoists. As well as standard hoists, J. R. Clancy manufactures custom hoists with features to meet individual project requirements. All components are selected specifically to meet the performance requirements of theatrical applications.

Motor, brake, and gearbox

The heart of a motorized hoist is the motor, gearbox, and primary brake. In most J. R. Clancy hoists these three items are supplied as single integrated unit from a single manufacturer. The totally enclosed, fan cooled motors have a minimum AGMA service factor of 1.0 (constant operation), for dependable operation at every performance.

Gearboxes for fixed speed or low speeds are typically helical worm units, with a cast iron gear case for protection against shock damage. High speed hoists often use helical bevel or similar gearing for greater efficiency. These units require the use of load brakes. Shafts have high capacity bearings and are protected by double lip oil seals to prevent leaks. Gearboxes have a minimum service factor of 1.0 with a minimum mechanical strength service factor of 1.25, to allow for the reality of theatrical performance requirements.

Brakes are spring applied, electrically released units, providing “fail safe” operation. To meet the needs of theatrical usage, brakes are quiet units specifically designed for use in hoisting applications. In addition, they have a minimum retarding torque of 200% of the motor torque, ensuring the brake can both stop and hold the load. Finally, for increased reliability, brakes are integral to the motor, acting directly on the motor shaft, not an “add on” assembly.

Drums

Drums are helically grooved to carry the lift lines in a single layer, so that the cable is properly supported and winds on and off consistently. Drums are designed to properly support the required loads. Shafts are solid, and extend all the way through the drum for greater strength and security. All drums meet wire rope manufacturer’s drum diameter and groove design requirements to ensure long wire rope life.

Shafts and bearings

All shafting, keys and keyways are in accordance with the ANSI "Code for Design of Transmission Shafting". Self aligning flange bearings, properly rated for the speed and load, are used to support drums.

Limit Switches

Hoists are equipped with normal limits which prevent travel beyond preset end of travel points. These are backed up by ultimate, or overtravel, limits which will function in the unlikely event of a failure of the normal limits. Overtravel limits operate through a redundant control circuit, which is independent of the normal travel limits to effectively counter single mode failures. All limit switches are industrial grade direct struck or positively driven rotary limits.

Hoist Types

See the Automated Rigging section of our website for standard hoist types. Custom hoists are also available to meet special requirements.

Hoist Options

The options listed are commonly supplied devices but do not represent the full range of possibilities. Please contact J. R. Clancy for assistance with your special requirements.

Slack line detector

This device detects slack lift lines and/or lines with below minimum tension and stops the hoist. Several styles of detector are available, including mechanical and charged bar units.

Crossed groove detector

This device stops the hoist, in the event that a lift line crosses over a groove or another lift line as it winds on to the drum.

Load monitoring

Overload or underload may be detected by current monitoring or with load cells for greater sensitivity.

Zero Fleet Angle (Traveling Drum) Hoists

Zero fleet angle hoists use drums which move so that the takeoff point of the lift lines remains constant as the drum turns. This is useful when there is insufficient distance between the drum and the first block to permit a proper fleet angle. The PowerLift is a zero fleet angle winch, which allows the head block to be located next to the drum for a very compact hoist design.

Vertical drums

All J. R. Clancy hoists are available with vertical drums to save space or meet special requirements. These may be fixed or travelling drums, as described above.

Secondary brakes:

Secondary brakes are supplemental brakes which operate on the load side of the gearbox. Several models are offered:

Fully automatic overspeed brake: Directly coupled to the shaft driving the hoist drum, the overspeed brake engages automatically if a preset speed is exceeded. The unit works on centrifugal forces, bringing the hoist to a controlled stop in the event of an overspeed condition. This fully automatic brake functions without any power or control system.

Load brake: The brake is applied and released in synchronization with the motor brake. Both electrically operated and air brakes are available.

Drive through brake: The brake is spring applied and is released while the load on the hoist is being raised, but remains engaged when the load on the hoist is being lowered or is at rest. This prevents overhauling and equalizes the performance between lifting and lowering.

Weston brakes: This is a more sophisticated drive through brake that is self applied if the drum tries to rotate at a greater rate than the output of the gearbox. This is widely used crane brake was developed by Thomas Weston in 1879.

Questions and Comments

We always welcome your comments. Feel free to contact our staff to discuss any of the above topics and how they might apply to your project.