

Line Shaft Hoist FAQ's

Introduction

Theatrical hoists are unusual in that they are used to hold and move loads above people. Careful, conservative engineering is required to ensure a proper level of safety.

What's a Line Shaft Hoist?

A line shaft hoist has several cable drums, supported by bearings, and a gearmotor, all interconnected by shafting.



In order to prevent the batten from “walking” side to side as the lift line wraps on and off the drums, alternating right and left hand threaded drums are used.

What are the Advantages?

Line shaft hoists are completely self contained, as the lift lines wrap onto the drums, without the need for head and loft blocks. The gearmotor is in line with the shaft, making this a very compact hoist. Since all of the lift lines run directly down to the batten the horizontal compression loads found in systems with head and loft blocks are minimized.

The combination of compactness and the minimal horizontal loads make the use of line shafts very attractive where space is an issue, or in historic buildings where horizontal loads need to be avoided.

How do you keep all the components properly aligned?

The components must be carefully aligned, to prevent a buildup of stresses that could cause a failure in a shaft, coupling, or bearing. Any of these failures could cause the load supported by the hoist to fall.

There are two sources of misalignment that affect these hoists. First, the steel supporting the hoist is unlikely to be perfectly level, or the hoist installation may not be properly aligned. Use of a laser during installation can help this problem.

However, the more difficult issue is that the loads on a building and the rigging support steel are dynamic, and will cause the rigging support steel to move. These loads can be wind loads, snow loads, and the varying loads the user applies to the hoist. Building movement can be quite significant and can easily bend the line shaft.

Can the hoist be made rigid?

One approach to solving this problem is to make the line shaft a rigid system that will attempt to withstand the loads described above. This is difficult, as most buildings are designed to flex under varying loads; expecting the rigging equipment to make the building rigid is unrealistic!

How does a flexible shaft help?

The other approach is to build a system that will flex with the building while maintaining the required alignment. The hoist shown above has universal joints at both sides of each drum, so that the system compensates for any building movement, and provides a reliable torque transmission path.

In extreme cases (such as theatres on cruise ships, which are designed to flex significantly) a combination of universal joints and splines provides a positive, reliable transmission path. By building line shafts to work with the building structure, instead of against it, greater reliability is achieved.

What type of flexible coupling should be used?

Gear and “flex” couplings provide a limited amount of flex, but will fail if over flexed. We offer properly rated universal joints, which allow for a much greater amount of flex, providing a significantly higher level of reliability and safety.

What type of shafting should be used?

Clancy line shaft hoists use power transmission shafting similar to that used in trucks and busses. Pipe and even square tubing have been used in hoists, however these are not designed or rated for torque transmission, and should not be used in overhead lifting.

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.

©J.R. Clancy 2007