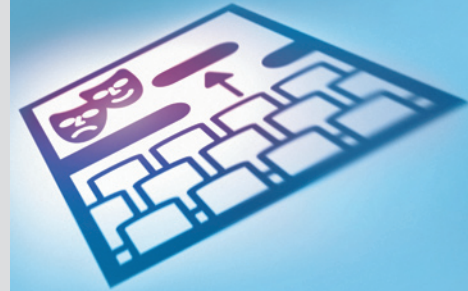


Stage Technology Hydraulic Linear Drives for Upper Stage Machinery



The Drive & Control Company

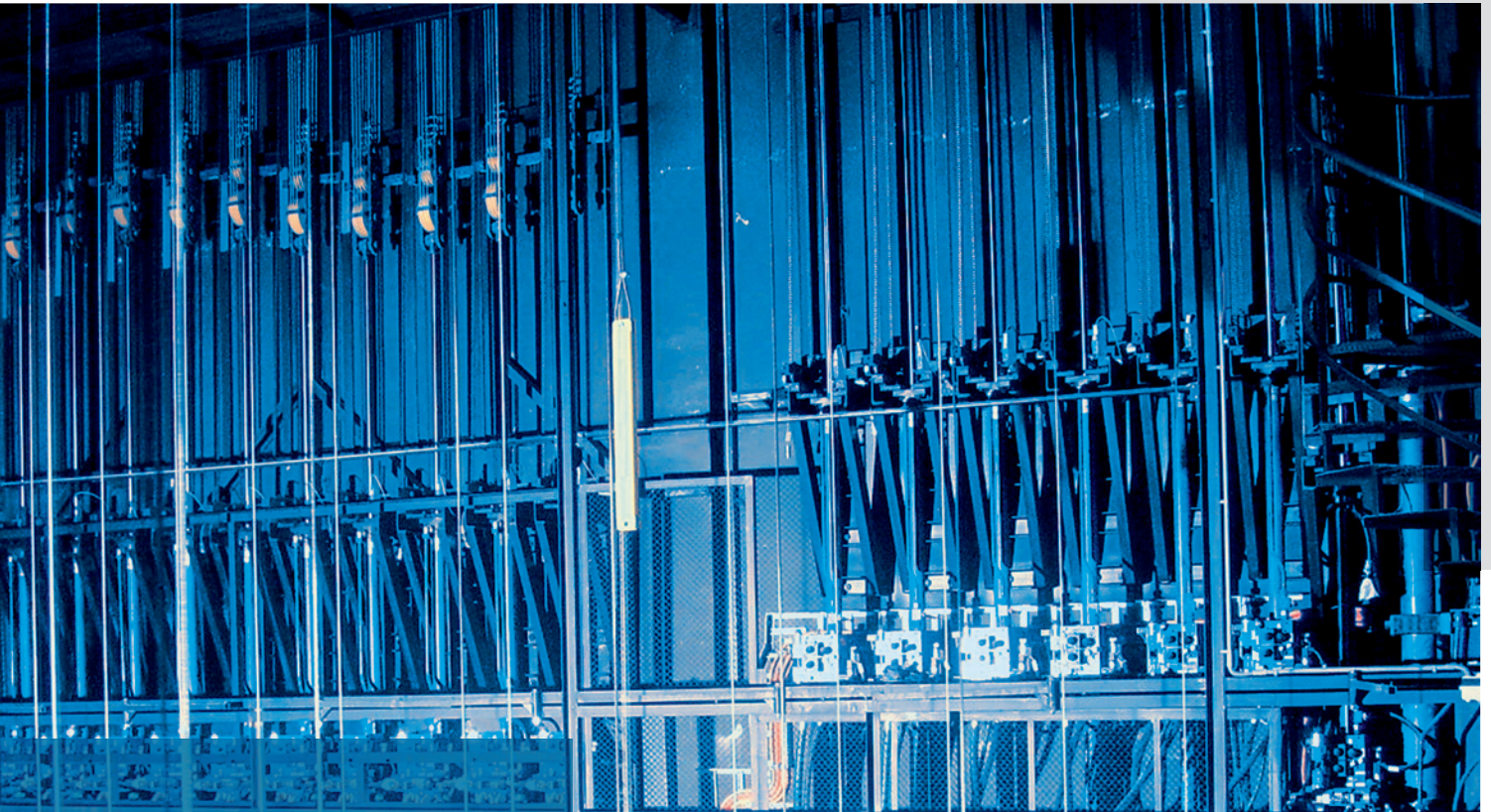


Realizing the Vision

A pearl for Beijing – Bosch Rexroth supplied the hydraulic drive technology as well as the stage control system for the stage machinery of the National Grand Theatre.

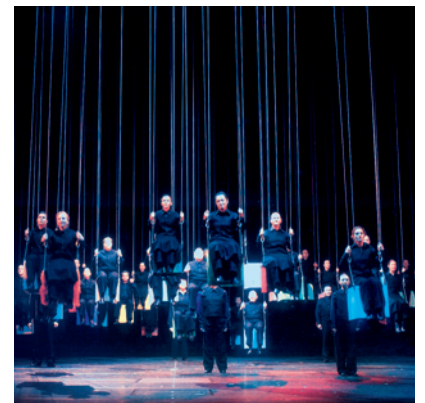


Hydraulic Linear Drives for Upper Stage Machinery



The scope of supply will depend on customer requirements and may, for example, also include the following:

- Base frame
- Guides
- Pulleys
- Load-bearing device
- Hydraulic drive technology
- Stage control system
- Engineering (inc. budgeting, project design)
- Assembly, commissioning, acceptance test
- Maintenance



Bosch Rexroth has developed a wide range of drive concepts for stage technology. Working together with the customer, electric or hydraulic drive solutions can be selected and Bosch Rexroth is able to supply both technologies.

The drive presented here is used in the upper stage machinery. If converted it can also be used in the lower stage machinery. A relevant flyer is available to this purpose. The hydraulic drive has already proved a great success in backdrop or fly hoists, point hoists, lighting hoists as well as in portal bridges. Reference systems are to be found in the State Theater, Kassel, the Regional Theater in Linz, the Geneva Opera House, the Martin Theater and the Festival Theater, Salzburg.

Mechanical Construction and Installation

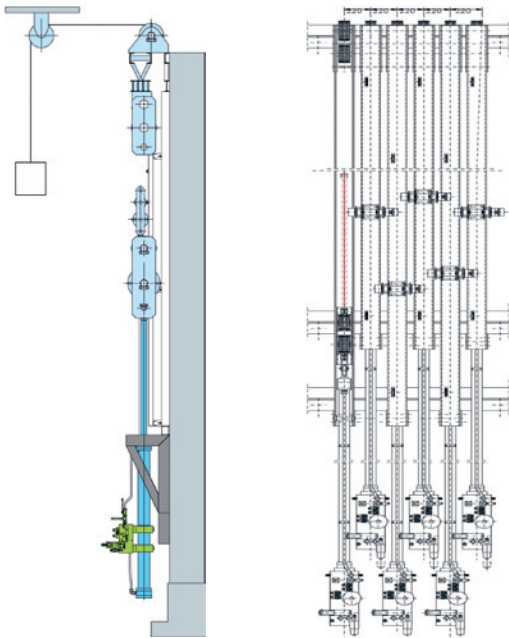
The drive can be arranged either horizontally or vertically. The hydraulic cylinder is mounted into a base frame, which may for example be located directly on a side wall of the stage or on the grid level. A pulley block is fixed to the cylinder rod, forming a block and tackle together with the stationary pulley and lifting cables. Normal transmission ratios are 1:4 or 1:5; i.e. the cylinder stroke amounts to only one quarter or one fifth of the distance to the load-bearing device (e.g. the flybar).

With vertically installed fly hoists pulleys are mounted onto the upper end of the frame. These divert the downward moving cables to a horizontal direction and guide them to further sets of pulleys, which are fixed to the grid or upper gridiron. Here the cables are diverted vertically and guided towards the load-bearing device.

Advantages of the Drive Concept

Hydraulic cylinders operate across a wide range of speeds and completely jerk-free. Load speeds of up to 1.8m/s are not uncommon. The drives are extremely compact due to the very high power density. The drives can be arranged at axis intervals of 200mm on a stage wall and are thus able to replace conventional manual counter weight system. There is no need to create additional space for winches, for example.

Galleries remain free, grids are not subjected to additional loading and auxiliary areas are not used. Virtually the whole electronics system is located on the winch, thus dispensing with the need for large electronic cabinets as required for electric drives. Drives for stages are not normally used continuously, so high power is only required for brief periods. Hydraulics offers a very easy and efficient way of storing energy.



A piston moves within a hydraulic accumulator, separating the oil side from the gas side. The gas – normally nitrogen – acts like a strong spring, pretensioning the oil in the accumulator to provide sufficient energy. This energy is also available in the event of a power cut or if the closed-loop control electronics breaks down, and even then it allows the drives to move. Scenery sections that are a potential fire hazard, for example, can be pulled into the stage tower or people can be moved back on stage. If the stage control system can no longer be used, the travel motion can easily be carried out manually by means of a simple hand-operated hydraulic valve. Between the travel motions the hydraulic accumulator is refilled via a pump. Depending on the accumulator loading time this pump may be of compact dimensions, so that the total installed electric power will generally be considerably lower than with a comparable podium system with electric drive technology. Considerable savings can be made here depending on the method applied by the energy supplier to calculate the consumption.



The Drive & Control Company

Rexroth is unique. No other brand on the world market can offer all drive and control technologies, both on a specialized and integrated basis. With approximately 28,000 employees in more than 80 countries around the world, Rexroth has an infrastructure designed with partnership and customer proximity in mind. Over 500,000 customers worldwide utilize the know-how of the technology leader.

- Electric Drives and Controls
- Hydraulics
- Linear Motion and Assembly Technologies
- Pneumatics
- Service



Intelligent Hydraulics in New Dimensions

Whether it's a case of raising or lowering loads smoothly, undertaking linear or rotational movements, achieving even acceleration or accurate positioning, maintaining preset speeds, transmitting power or linking motion sequences – in fact, wherever economical power is required, this is where hydraulics comes into its own.

Using hydraulic drive and control technology from Rexroth will help you become more competitive than ever.

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