

# The powerhouse among linear actuators

René Gerber, Product Application Engineer

Hydraulics are the first choice for handling large forces. But increasingly, electromechanical linear actuators from Angst+Pfister with thrust and tractive forces reaching 200 kN are successfully breaking into this domain. A linear actuator used for tilting the main mast of a motor vessel operated by the Lake Lucerne Shipping Company serves to illustrate this. Whether in rain, in snow, in hot or in cold weather, the captain can always rely on this drive to exert its high thrust forces.



The Lake Lucerne Shipping Company, with a market share of 20 percent, is the leading shipping enterprise in Switzerland. It offers its passengers unique experiences, delivering innovative services in the areas of shipping, marine technology and onboard catering. A growing enterprise with annual revenue of more than 41 million Swiss francs, the Lake Lucerne Shipping Company transports nearly 2.3 million passengers a year. Throughout the year, a fleet of five nostalgic paddle steamers and 15 elegant saloon motor ships with a total capacity of 13,000 passengers and 3,200 restaurant seats connects Lucerne to the famed holiday resorts on the lake.

## No room at the top

In 2005 and 2006, the MS Gotthard, a motor vessel 58 meters long and weighing 234 tons with a capacity of 700 passengers and a 1,200-horsepower engine, was given a complete overhaul. The ship is used for cruises into Lake Alpnach. To get there, it must pass under the Acher Bridge near Stansstad that carries the A2 motorway and the Zentralbahn railway line. In order to pass beneath the bridge, the MS Gotthard's main mast carrying lighting, navigation equipment and a radar antenna must be lowered to a horizontal position. No later than two minutes before passing under the bridge, the captain has to start lowering the mast by sending a signal from the command bridge. As the mast swings downward, the radar antenna, which is not allowed to be tilted, is kept in a vertical position with the help of a quadrant lever mechanism. Originally, a hydraulic lift cylinder with a thrust force of around 5,000 N was employed to lower the main mast and then raise it again afterwards.



Main mast is lowered



Linear actuator in "mast upright" operational position

## Convincing electric linear actuator

In the course of renovating the MS Gotthard, the Lake Lucerne Shipping Company looked for alternatives to the hydraulic drive, which needed to be overhauled. It needed an additional pump, required maintenance at regular intervals and was costly compared to an electromechanical drive. The shipping company's engineers turned to the drive specialists at Angst+Pfister. The outcome of the resulting collaboration was a technically and economically optimal solution using an Elero linear actuator from Angst+Pfister. This stainless-steel linear actuator from the Econom 01 production series provides a lifting force of 5,000 N with a maximum stroke of 300 mm. It is operated with an input voltage of 400 VAC supplied by a generator that is driven by the ship's propulsion motor. The actuator is factory-fitted with an electromechanical brake, adjustable end-switches and a twist-proof plunger. Its stainless steel material ideally suited for outdoor use, its compact design, its large thrust force and, last but not least, its maintenance-free operation were the key criteria for choosing this solution. During normal ship operations, the mast slants 10 degrees from vertical toward the ship's stern. When lowering the mast by 80 degrees to the horizontal position, the linear drive performs a

stroke of 300 mm at a rate of travel of 10 mm/s in one continuous moving sequence. The two integrated end-switches make sure that the linear actuator is deactivated correctly when it reaches its end-position.

## Distinct benefits

Electric linear actuators offer numerous advantages compared to their pneumatic and hydraulic competitors. The most important are:

- constant rate of travel;
- no oil leakage;
- mechanical self-locking;
- virtually maintenance-free operation;
- positioning capability.

## Fit for a variety of applications

Linear actuators from Angst+Pfister are used in mechanical engineering, in lifting and conveyance technology, for transport systems, for volumetric dosing equipment, and for locking and tilting systems. A+P Elero linear actuators are available in stroke lengths from 50 mm to 1,000 mm, with thrust and tractive forces from 300 N to 200 kN and motion speeds up to 100 mm/s, and for various operating voltages such as 24 VDC, 230 VAC and 400 VAC, as well as for customer-specific voltages. The actuators can optionally be fitted with position feedback systems. For outdoor, food, and medical application areas, stainless-steel IP65-protection-class versions are recommended.

Angst+Pfister would be pleased to provide you with additional information or technical advice. Please contact our drive technology specialists and take advantage of their extensive expertise.

Your contact:  
René Gerber  
Angst+Pfister AG, 8052 Zurich, Switzerland  
Telephone: +41 44 306 64 79  
E-mail: r.gerber@angst-pfister.com