

# Eaton® Cylinders Have Weighty Role in Florida Bridge Replacement Projects



## Customer

Electro Hydraulic Machinery Company

## Market Served

Marine civil engineering

*“Eaton’s collaboration with EHM enabled us to put together a truly unique cylinder solution with exceptional performance. Eaton’s expertise, attitude, and capability have been extremely beneficial to our success.”*

*Mike Hanley, Vice President of Electro Hydraulic Machinery Company*

## To learn more, contact:

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## Background

Willingness to bridge the gap between standard product designs and exacting customer requirements has landed Eaton a plum deal supplying hydraulic cylinders for two Florida coastal bridges.

Motorists and boaters passing over and under the Treasure Island Bridge in Treasure Island and the Hollywood Boulevard Bridge in Fort Lauderdale can rest assured of smooth bridge operation, thanks to Eaton hydraulic cylinders.

The Eaton products have a weighty role in the projects, in which the former bascule bridges, deemed no longer structurally sound, are being replaced with new, hurricane-enduring bascule bridges. The Eaton cylinders provide the force and precision to raise the bridge spans for navigational clearance and to lower them down again for motorist traffic.

## Challenge

Electro Hydraulic Machinery (EHM) Company of Pembroke Park, Florida, has been contracted to supply hydraulic power systems for the bridge replacements.

Although EHM has used competitive cylinders in its work in integrating systems for moveable drawbridges, the company was looking for a more custom solution to particular problems it had encountered.

“We coupled standard Eaton cylinders with power units we supplied for the Mantoloking Bridge in Mantoloking, New Jersey, and we were happy with their performance,” says Michael Hanley, EHM’s vice president.

“Because of this good experience, we decided to return to Eaton for assistance with cylinders for the Treasure Island Bridge. This time, however,

we hoped to work with Eaton to incorporate our custom sealing and cushioning systems into its cylinder designs.

“In the past, we approached other cylinder manufacturers to incorporate our ideas into their cylinders to help eliminate hydraulic leakage and allow deceleration at full extension or retraction. Unfortunately, they were unwilling to collaborate with us to co-design cylinders.”

## Solution

EHM discussed the project parameters with Eaton’s Kevin DuPont, product sales manager—Southern region, who consulted Erwin DeBresser at Eaton’s cylinder production facility in Eindhoven, Netherlands, to lay groundwork for the collaboration project. EHM and Eaton engineers began working together to co-design and build 16 massive cylinders with EHM’s seal-

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ing and cushioning systems for the Treasure Island Bridge.

"The Eaton staff in Eindhoven was invaluable to us," Hanley says.

"The Eaton team helped us calculate the size and spacing of valves required in our four-valve cushion system and the clearance area and pressure drop needed around the angles of the cushion spear.

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In the meantime, EHM was so impressed with how easy it was to do business with Eaton, that Hanley again turned to DuPont just one month later when he needed eight similar cylinders for the Hollywood Boulevard Bridge. Production was soon under way for the additional cylinders.

### Results

After passing Eaton and EHM performance tests, the Eaton cylinders were installed on the Treasure Island Bridge and tested again prior to the bridge's commissioning. The cylinders performed flawlessly and have been doing so since their installation in May 2006. Installation of Eaton cylinders on the Hollywood Boulevard Bridge took place in November 2006, and they are currently operating exactly as intended.

Cylinder specifications for each project are as follows:



• **Treasure Island Bridge**—Eight cylinders each with 200-mm bore (7.87") x 1,969-mm stroke (77.50") x 160-mm rod diameter (6.30"). Pin-to-pin, fully closed length is 3,216 mm (10', 6"). Pin-to-pin, fully extended length is 4,912 mm (16', 1 3/8"). Eight cylinders each with 220-mm bore (8.66") x 1,969-mm stroke (77.50") x 160 mm rod diameter (6.30"). Pin-to-pin, fully closed length is 3,216 mm (10', 6"). Pin-to-pin, fully extended length is 4,912 mm (16', 1 3/8"). Rod coating for corrosion protection is Eaton Hydrowa ABC-G2 over C1045 carbon steel. The standard-range coating in Eaton's portfolio of Application-Based Coatings (ABC) is a galvanic nickel chromium/sulfamate plating for general purpose applications and provides good wear, as well as corrosion resistance. EHM custom seal designs help improve environmental safety around public waterways. In the unlikely event of out-of-control cylinder functions during raising and lowering operations, EHM four-valve adjustable cushions protect the bridge structure from damage due to sudden impact.

• **Hollywood Boulevard Bridge**—Eight cylinders each with 200-mm bore (7.87") x 2,794-mm stroke (110") x

125-mm rod diameter (4.92"). Pin-to-pin, fully closed length is 3,760 mm (12', 4"). Pin-to-pin, fully extended length is 6,554 mm (21', 6"). Rod coating for corrosion protection is Eaton Hydrowa ABC-P2 over 316 stainless steel. The mid-range coating in Eaton's ABC portfolio is a metallic oxide plasma-sprayed coating for fresh and salt water and corrosive environments and provides excellent wear, as well as corrosion resistance. EHM custom seal designs help improve environmental safety around public waterways. In the unlikely event of out-of-control cylinder functions during raising and lowering operations, EHM four-valve adjustable cushions protect the bridge structure from damage due to sudden impact.

The Hollywood Boulevard Bridge is scheduled to be fully operationally by April 2007, and the Treasure Island Bridge is slated to be fully completed by July 2007.

Hanley says Eaton's achievements in cylinder solutions will bode well for future business in bridge construction, in which electromechanical systems are being replaced more and more with hydraulic systems.