

Venice, with its ornate palaces along miles of gondola-traveled canals, has drawn visitors for centuries. Threatened by rising tides, the historic city has embarked on an engineering project to preserve its treasures for future generations.

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# PROTECTING VENICE

**T**he term MOSE, recalling Moses and the parting of the Red Sea, is a particularly apt name for the project aimed at saving Venice and the Venetian Lagoon from the threat of ever-high tides. Concerns that the flooding is getting worse because of global warming mean that the massive infrastructure project is one of the most important in the city's history.

The MOSE, constructed by the Ministero delle Infrastrutture e dei Trasporti – Magistrato alle Acque di Venezia (Ministry of Infrastructure and Transport – Venice Water Authority) through the Consorzio Venezia Nuova, is part of a major systemic program of measures combining physical defense with restoration of the morphological equilibrium of the entire lagoon ecosystem. The final and most important element in the planned intervention to safeguard the lagoon area, the MOSE construction, is now about 80 percent complete. It was preceded by a work program unequalled anywhere in the world for the size of the area involved, the nature of the problems tackled and the scale and characteristics of the measures implemented.

Scheduled to be completed in 2016 at an estimated cost of 5.5 billion EUR, the MOSE project requires 78 mobile barriers to be installed at the Lido, Malamocco and Chioggia inlets, the gaps through which the tide enters the lagoon and that separate it from the Adriatic.

The barriers consist of steel gates installed end-to-end and are used only when there is the danger of flooding. The gates are normally completely invisible, resting in special housings in the bed of the lagoon inlets. When high water is forecast, they are temporarily raised to isolate the lagoon from the Adriatic Sea. When the tide goes down, the gates are returned to their housing in



Basilica San Marco, Mark's Square, Venice, Italy



Apprehension that the flooding of the Venetian Lagoon will grow worse was the origin of one of the most important infrastructure projects in Venice's history.

the seabed. Trelleborg has been very involved in the MOSE project with contracts to supply the project with tailor-made sealing solutions and multiple fender systems.

**TRELLEBORG** worked closely with the consultant engineer, Technital, during the design phase as well as with one of the project's main contractors, Clodia SpA. "For such a large-scale infrastructure project, it was vital that we source a reliable solution that would stand the test of time," says Diego Zandolin from Clodia. "Trelleborg promised a hassle-free installation process and proven functionality. Its fender systems and bespoke sealing systems provide an ideal solution. "Trelleborg supplied its state-of-the-art Super Cone and Arch fenders after overcoming the challenge of



supplying a large quantity of fenders in a particularly short turnaround time,” Zandolin explains. “It also provided the sealing system solutions while meeting some extremely demanding guidelines. Although we knew the Trelleborg system was already proven globally, Trelleborg was able to tailor it to deliver a custom-solution that would precisely meet the project’s needs. The ease of installation for the system was also a major factor in choosing Trelleborg.”

Zandolin explains what his company was looking for: “We needed multiple made-to-order sealing system solutions, and Trelleborg was able to meet our requirements with a

combination of highly resilient natural rubber Seismic Gina gaskets, a

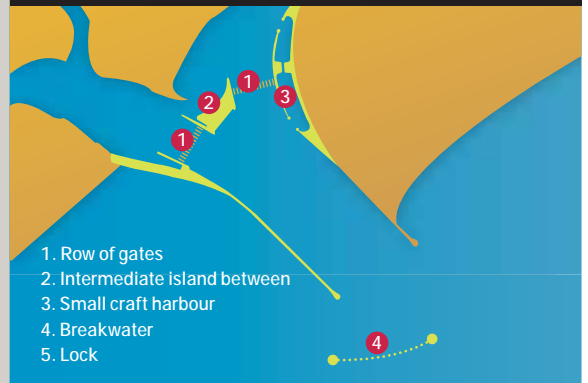
molded and handmade seal manufactured to the highest tolerances, as well as Omega seals.”

The closed Gina gasket will be attached to the barriers and act as a dynamic seal, ensuring watertight protection, while the Omega seal will act as a secondary seal between the sectional elements of the mobile barriers.

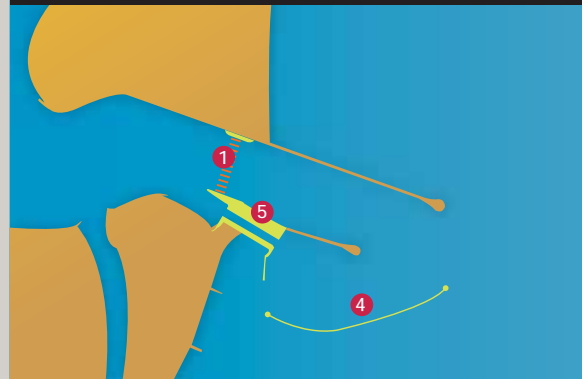
**RICHARD HEPWORTH**, President of Trelleborg’s marine operation within Trelleborg Offshore & Construction, comments: “We’re delighted we could develop effective solutions for such a significant project, one that will undoubtedly help safeguard the future of Venice.” He points to Trelleborg’s industry-leading range of products, technical expertise and end-to-end support as key factors in the project’s success. ■

FOR MORE  
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#### Lido inlet



#### Malamocco inlet



#### Chioggia inlet



## THE SYSTEM

The MOSE system is being constructed in the Venetian Lagoon inlets, the spaces between the barrier island through which the tides enter and exit the lagoon. There are three lagoon inlets, Lido, Malamocco and Chioggia (800 m, 400 m and 380 m wide, respectively). The inlets are delimited by long jetties built between 1800 and 1900. These were consolidated in the 1990s and thus serve as support to the high water defence system.

Above: The configurations of the lagoon inlets with the defence structures