

Application Report

Moving bridges with Leuze electronic

ODSL laser sensors measure distances as the Oakland Bay Bridge is moved within the scope of an extensive repair



Leuze electronic BV of Waardenburg (Netherlands) and Syrinx Industrial Electronics, also of the Netherlands, play an important role in the construction of the Bay Bridge in San Francisco in the U.S. state of California.

The Oakland Bay Bridge connects Oakland and San Francisco. Every day, 300,000 vehicles travel over this important, five-lane, double-deck toll bridge. Following the severe earthquake in San Francisco in 1989, it was decided to replace part of the link between Oakland and San Francisco with a new bridge. To realize this connection, it was necessary to temporarily move part of the old, existing bridge (expected to be completed by 2013) in order to make space for the construction of the new bridge. The final construction step in the realization of this detour was the separation of a 100 m long, 3200-ton section and the subsequent moving of this section of the bridge (Figure 1). Afterward, a new, 3600-ton bridge section was pushed into the resulting gap to

complete the detour section - all at a height of 50 m (Figure 2). This work was performed on Labor Day weekend in 2009 and had to be completed within three days. In the spring of 2009, Syrinx Industrial Electronics was contracted by Mammoet, the well-known Dutch specialist for transport and assembly solutions in the heavy-load sector, to develop a central monitoring system for this project. The system was to allow all movements to be displayed on a large, 42-inch screen as the bridge parts were moved.

Decision for laser distance sensors from Leuze electronic

A total of 31 laser distance sensors and 16 pressure sensors were used. For the monitoring of this challenging project, Syrinx Industrial Electronics chose laser distance sensors ODSL from Leuze electronic. Decisive here was their precision, robust design and the display on the ODSL 30, which allows measurement values to be read on the spot (Figure 3). As a result, it was not necessary to constantly run back to the central laptop to make adjustments during installation. Considering the large distances (Figure 4), this saved considerable time. Affixed to a mounting plate, the Leuze electronic sensors could be easily applied and positioned through the use of strong magnets (Figure 5).

Measurement of both small and large distances while moving the bridge

During the move, the bridge was pushed upward at four points approximately 30 cm and then moved laterally by means of hydraulic winches with a stroke of 1.5 m (Figure 6). The height and position of the various hydraulic winches were converted to 4 to 20 mA measurement signals with the aid of the Leuze electronic ODSL 96B laser distance sensors (Figure 7).

The horizontal movement was over a distance of approx. 30 m and was measured with Leuze ODSL 30 laser distance sensors. This model was chosen on account of its RS485 output. Syrinx Industrial Electronics constructed a converter box for this output to convert the RS485 information to an exact, 16-bit analog signal of 4 to 20 mA. In this way, it was possible to attain even greater precision over the entire measurement range up to 50 m.

In addition to the converter boxes, Syrinx Industrial Electronics also developed eight measurement boxes to which all laser distance sensors and the used pressure sensors could be connected (Figure 8). Together, all of the measurement boxes formed the complete measurement network that was connected to the laptop. The laptop was then connected to the 42-inch monitor, on which the processes could be visualized, as Syrinx Industrial Electronics also programmed a solution for the complete visualization for this project (Figure 9).

Information about

Syrinx Industrial Electronics realizes numerous projects for many different clients. Projects involve the development and production of customer-specific hardware and software. All necessary steps, even series production, take place in-house. Syrinx Industrial Electronics specializes in the area of industrial weighing technology and interfaces. The company was present on-site during the entire Bay Bridge project and constructed the measurement system together with its client Mammoet on location. This is only one of many projects that the Dutch engineering firm has realized in cooperation with Mammoet. The next projects are already in the planning stage. Here, too, Syrinx Industrial Electronics will again use Leuze electronic sensors.

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Figures and captions



Figure 1. A bridge segment is moved in the final stage of construction (Syrinx Industrial Electronics, www.syrinx.nl)



Figure 2. Construction work takes place at a height of 50 m (Syrinx Industrial Electronics, www.syrinx.nl)



Figure 3. The ODSL 30 laser distance sensor convinces with its integrated display (Leuze electronic)



Figure 4. The large operating ranges place special requirements on the application (Syrinx Industrial Electronics, www.syrinx.nl)



Figure 5. The mounting plate with the sensor is attached and aligned by means of a magnet (Syrinx Industrial Electronics, www.syrinx.nl)

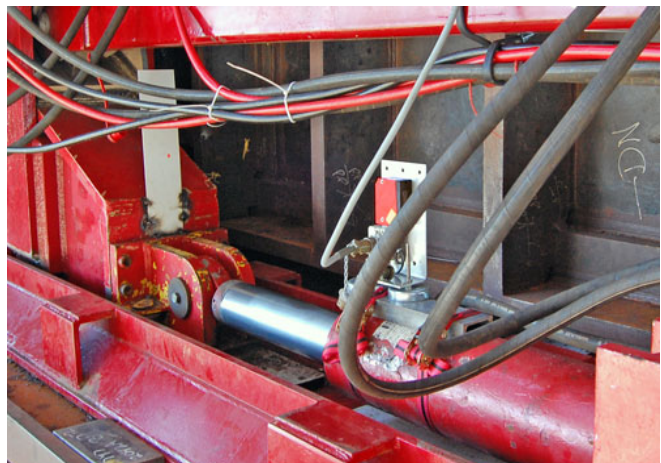


Figure 6. Hydraulic elements move the bridge sections (Syrinx Industrial Electronics, www.syrinx.nl)



Figure 7. The distances during the bridge movement are measured by the ODSL 96B (Syrinx Industrial Electronics, www.syrinx.nl)

Figure 8. Interface to the laptop: the measurement box, to which all sensors can be connected (Syrinx Industrial Electronics, www.syrinx.nl)

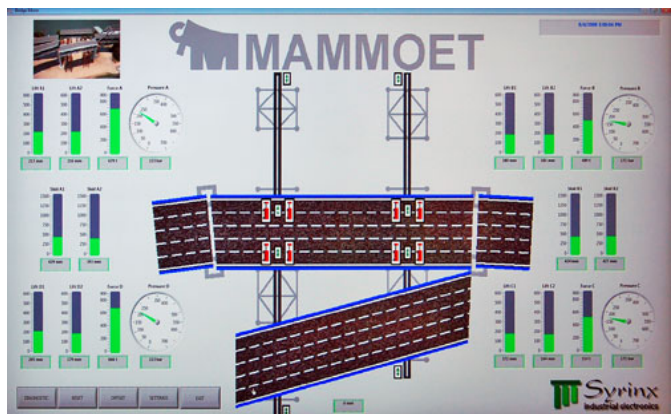


Figure 9. Syrinx Industrial Electronics handled all visualization (Syrinx Industrial Electronics, www.syrinx.nl)