

NEW TECHNOLOGY ON A DOOR FROM THE PAST

BY BURTON LAINE

WHEN THE LOS ANGELES County (CA) Fire Department (LACoFD) approved a number of building projects, it appointed a building committee to determine the best way to construct fire stations. Engineer Jim Robinson, assigned to study fire station apparatus doors, was shocked to discover how much the department spent annually on repairs. Almost all of the repairs involved overhead sectional or rollup doors.

At one station in one year, a utility area rollup door and an emergency vehicle sec-

then, however, could not compete with the sectional/rollup door manufacturers or targeted different markets or went out of business.

Robinson researched the initial cost of the different door types and compared that with projected service life or the number of cycles that could be expected from the doors. According to his study, an overhead door would provide 50,000 cycles at an initial cost of \$6,500, while a four-fold door would provide more than one million cycles at an initial cost of \$25,000.²

Based on the above research, the LACoFD

manance of Roll-up Garage Doors in Fire Stations in Recent California Earthquakes.”³ The report covers apparatus door performance in fire stations during and after a number of earthquakes in California. The report states, “For a 12-foot-high door opening, which is typical of smaller firehouses, anticipated drift could be on the order of 1½ inches. Expected drifts can be greater for taller openings.”⁴

“Industry representatives estimate that binding can begin with ¼- to ½-inch of distortion measured over the height of the opening.”⁵



tional overhead door generated \$1,353 in repairs and required electrical work from a department electrician. Further research revealed that overhead door maintenance costs in five other fire stations during the same period totaled \$7,367.¹ However, in the same period, six four-fold doors that were also in the first fire station mentioned above were trouble-free.

In the 1930s and 1940s, most metropolitan fire station apparatus doors in the United States were four-fold doors. Since then, however, overhead-sectional and rollup apparatus doors have become popular. Several manufacturers of four-fold doors back

determined that, projected over time, the four-fold doors were the most cost-effective doors to mount in new fire stations.

Door operation in such earthquake-prone areas as California are also a concern. Robinson’s study mainly investigated the cost-effectiveness of door operation; the earthquake issue was secondary. However, he felt that the four-fold doors were such that the doors could withstand the building “drift” (the shifting that occurs to building walls during even minor earthquakes). Even minor drift can render overhead sectional/rollup doors inoperable by altering the alignment of the roller door tracks. Generally, four-fold doors can tolerate such drift and still remain operable.

Concerns about rollup doors were cited in a report entitled “Performance of Roll-up Garage Doors—Reexamining the Perfor-



Four-fold apparatus doors used around the country. (Photos courtesy of Electric Power Door.)

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POTENTIAL SECTIONAL/ROLLUP DOOR PROBLEMS

Below is a list of possible overhead sectional or rollup door problems stated in the report:⁶

- Door wheels can bind in tracks or guides, bend the tracks, or come out of the tracks.

- Door systems generate their own inertia loads.

- Door braces the opening because of a diagonal compression strut between the bottom corner that bears up against the jamb and the opposite top corner of the door.

- Door panels may crimp or buckle.

- Door retraction springs can fail.

- Door hoists may lose electrical power.

- Apparatus may hit and damage doors.

Regarding sectional overhead and rollup doors, the report stated, "Since fire stations comprise only a small part of the overall commercial door industry, a major market-driven shift to more reliable doors is unlikely."⁷

The four-fold door types that were originally installed in fire stations more than 70 years ago have been updated technologically and address many of the problems inherent in the newer overhead sectional or rollup door style.

Electric Power Door, the company cited in the LACoFD study, uses hydraulic operating systems and hinged door panels. This eliminates the chains, spring counterbalances, door rollers, and side guides that are

the source of many of the problems mentioned in the Earthquake Engineering Research Institute report.

The four-fold doors are typically two to three inches thick and are crafted of structural steel and a heavy-grade, 14-gauge sheeting, virtually eliminating the problem of panels crimping or buckling. The doors are also designed to accommodate minor drift of 1½ inches or more.

In a power failure, users can disconnect four-fold doors from the power operator and safely and easily operate the doors manually. This gives fire station personnel a preplanned way to open the doors in case of emergency.

Also, nested sliding doors can be dislodged from their rails during any earthquake, whereas four-fold doors have no floor guides to drive over or to dislodge.

The doors address the vertical clearance issue, too. According to the report, "Many firehouses have very tight vertical clearances between their trucks and the head of the door openings. As a result, some of these doors have been 'clipped' and damaged by trucks passing through and striking doors that have not been opened all the way. Some stations have installed double top tracks to increase vertical clearances and reduce door impacts."⁸

Four-fold doors are always in the view of the driver, which eliminates the prob-

lem of clipping the door with emergency vehicles. In normal operation, the doors open and close at two feet per second, further reducing the potential for clipping problems.

According to Battalion Chief Mel Hokenson of the LACoFD's Construction and Maintenance Division Services Bureau, "We have a lot of overhead doors that swing vertically instead of horizontally, and we've had a lot of those doors hitting apparatus. We've paid \$380,000 per year on maintenance, which is another reason we want to go to these. We're trying to reduce our maintenance costs." ■

Endnotes

1. Robinson, Jim. *Fire Station Door Performance—Executive Summary*. Los Angeles County Fire Department, 2000.

2. *Ibid.*

3. Turner, Fred. "Performance of Roll-Up Garage Doors—Reexamining the Performance of Roll-Up Garage Doors in Fire Stations in Recent California Earthquakes." *Lessons Learned Over Time—Learning from Earthquakes Series*. Earthquake Engineering Research Institute, 1999.

4. *Ibid.* p. 99.

5. *Ibid.* p. 103.

6. *Ibid.* p. 103 - 106.

7. *Ibid.* p.107.

8. *Ibid.* p. 101.