Weighing Elevator Modernization?

From determining appropriate scope to coordinating with many building systems, there is much to consider when upgrading elevators.

BY PATRICK J. WELCH

There are many factors to consider when determining whether to upgrade an elevator, and many strategic decisions that need to be weighed carefully when evaluating options. Because elevators interact with so many other building services, each decision can have an impact on other aspects of a facility. Front-end planning is the best way to reduce potentially costly mistakes or consequences.

But how can facility managers tell whether they should opt for a simple repair or a full-scale modernization? This is a common question for many facility managers. Before any elevator modernization, consider why exactly a modernization might be necessary or whether the elevators may need only partial upgrades and repairs.

One resource is the National Elevator Code: American Society of Mechanical Engineers, A17.1 (ASME A17.1). This code, published every three years and updated annually with changes as new requirements or modifications are made, is used by many states and most major cities in the United States as the backbone of elevator and escalator codes.

There are two vital facts to keep in mind in regards to the code. First, determine which version of the code is in effect. Some jurisdictions operate under code editions that may be 10 or more years old. This can have a dramatic effect on the modernization design. Most elevator manufacturers build to the latest version of the code. In some instances, these may be significant cost impacts if the incorrect edition is used in the design.

Secondly, consider what exactly modernization means. The common industry term “modernization” is defined as an “alteration” in the code. Most alterations will require that the rest of the elevator system be brought up to the current code edition. It is critical to evaluate your elevator system needs to determine if a simple repair will provide you with the improved operation, or if a complete modernization will be required.

It is important to understand how ASME defines different issues related to elevator work. The first thing to understand is that there is no definition of an elevator “modernization.” ASME refers to an alteration as any change to equipment, including its parts, components, or subsystems, other than maintenance, repair, or replacement.

To understand modernization, therefore, requires a clear understanding of maintenance, repair and replacement. For elevators, maintenance means a routine examination, lubrication, cleaning, and adjustment of parts, components, or
subsystems for the purpose of ensuring performance in accordance with the applicable code requirements. Repair refers to reconditioning or renewal of parts, components, or subsystems necessary to keep equipment in compliance with applicable code requirements. And replacement means the substitution of a device, component or subsystem, in its entirety, with a unit that is basically the same as the original for the purpose of ensuring performance in accordance with applicable code requirements. For example, a rewound host motor is a repair, a new host motor with the same characteristics is a replacement, and a new host motor with new controls, features or functions is a modernization.

Unlike a new construction project, elevator modernizations are rarely designed by the architect or engineer designing the whole building. This means that an elevator modernization often causes problems for owners during the project and, at times, after the elevator portion of the project is completed. This is due in part to the fact that the elevator code requires more work (HVAC, electrical, structural work) than a typical elevator contractor is trained to do.

Another potential problem comes when an elevator contractor claims that equipment is obsolete. Facility managers should be cautious about accepting such claims. Most of the time replacement parts can be purchased from many reputable sources, including the original equipment manufacturer.

A third possible source of trouble is that up to half the value of a contractor’s repair or modernization proposal may include work already covered in the existing maintenance agreement. A careful review of the maintenance agreement should verify what is and is not included.

**Choices, Choices, Choices**

Many facility managers are now replacing hydraulic elevators with new machine-room-less (MRL) elevators. This is a dramatic change to the building system and hoistway and pit envelopes. If facility managers choose this approach, it’s strongly recommended that they understand the impact this will have on the building such as:

- Hoistway pit depth
- Hoistway overhead
- Hoistway width and depth
- Structural modifications for MRL machine.

Owners with traction (cabled) elevators also have choices that can dramatically affect the cost and facility services depending on the choices made in design, whether 12 pulse silicon controlled rectified (SCR) drive, 6 pulse SCR drive with a filter, non-regenerative variable frequency drives or regenerative variable frequency drives.

These drives have a significant impact on the power supply and emergency power. Traction elevators create regenerative power. In current SCR drive applications, care must be taken to monitor harmonic distortion that may be increased following modern-
Areas of Concern During An Elevator Modernization

Facility managers should keep other building systems in mind during an elevator modernization. Regardless of who designs the modernization, these items should always be considered in the plans:

1. Main line upgrades: rating, amperage, composition, sensors.
2. Fire and smoke alarm system integration.
3. Emergency power changes (modern elevator drives may not work well on some generators).
4. HVAC in elevator machine rooms (often increased cooling is required).
5. Grounding for performance vs. code.
6. Pit ladders, sump pumps, drains, lighting and electrical code upgrades.

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ization. In variable frequency drives, most systems are not regenerative. That regenerative power is typically dumped into a resistor bank in the controller, significantly increasing the BTU output over systems that can send the regenerative power back to the main line power supply. Regenerative variable frequency drives are becoming more popular, but they are more expensive and careful coordination with the electrical system is critical for reliable operation when the elevator is completed.

Once facility managers resolve the scope of work and the goals for the elevator modernization, there are still code issues that must be carefully addressed. Some of those include:

- Is this elevator on emergency power now?
- How will it operate after the modernization?
- Does the machine room now require air conditioning?
- Is the present electrical system adequate for the new elevator drive system?
- Is there any non-elevator equipment in the elevator machine rooms that must be removed?
- Are there any changes to the hoistway, pit or machine room construction?
- How is the elevator connected to the fire alarm system?

The acceptance test is a vital phase of the project that helps ensure that the project complies with code and is ready to improve facility operations. Also, remember that when an elevator is taken out of service for modernization, the balance of the elevators will have to take that load. This means that they will probably break down more than they did before modernization began. Problems may get worse before they get better when modernizing a bank of elevators. This makes the maintenance program a vital part of preparing for the modernization.

Getting Help

There are many competent and reliable elevator companies in the United States. However, it must be understood that their interests may not be the same as a building owner’s. They are in business to sell their equipment and their service agreements. The simple fact is that most elevator controllers have some level of proprietary properties that will affect maintenance costs and flexibility for many years. It is possible to end up with an elevator system that can only be maintained effectively by the original installer. This essentially allows them to charge more for maintenance and can leave a building owner zero options to change service contractors to save money, or if they are dissatisfied with the performance of the incumbent elevator service contractor.

Elevator companies are not responsible for building systems. An elevator modernization can affect other building systems, like electrical or HVAC. If an elevator modernization is designed by the elevator company, the impact on the facility can be significant. Most elevator companies will provide a facility manager with a “work by others” list. This puts the burden on the facility manager to determine if any additional work will be required due to the new elevator system.

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