

▶ This producer is poised to benefit from a vigorous market for stairs.

**L**aura Huch Kerckhoff has taken all the right steps toward success. In the last five years, Huch Kerckhoff has repositioned a thriving family-owned precast producer from a strong local business into a nationally recognized leader.

It began with the introduction of a new process control system based on lean management. This was followed by the design of a new brown-field production facility that has been recognized as a Leadership in Energy and Environmental Design (LEED) structure.

But perhaps the most enduring portion of Castcon-Stone's transformation has been the management team's focus on risers. That's because this Saxonburg, Pa., producer has become one of the strongest leaders in one of the precast industry's fastest growing markets—stairs.

In the wake of the 1995 Oklahoma City federal building bombing and the Sept. 11, 2001, attacks, architects and designers have focused on the design of egress structures. The result has been a revitalized acceptance of concrete as a preferred building material. This interest corresponded with Castcon's redesign.

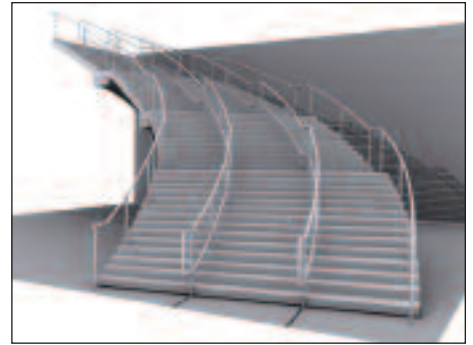
Huch Kerckhoff, company president, says her recent success was based on some well-defined research conducted as her team looked over the design options for her new production facility. "We searched for every piece of information on the use of stairs we could find, and discovered that it was going to be a strong market," she says.

While a portion of her team's strategic plan was based on a strong forecast for commercial structures needing stairs, a significant influence was the increasing number of governmental rules and stronger building codes. Building codes for commercial structures have changed significantly since the late 1990s. These include the full implementation of the Americans with Disabilities Act (ADA) into the IBC2000 building code, as well

# Stairways to Profits



Castcon-Stone uses self-designed and locally fabricated forms to cast their precast stairs.



Left: Key to the Castcon's success is the 2003 plant upgrade that enables co-owners Laura Huch Kerckhoff, president, (left) and Sandra Ussia, vice president, an opportunity to fully incorporate lean management into the operation.

Above: Part of Castcon's success is its ability to custom-design and cast stairs. The rendering shows one of six curved precast stairs that will be used in CITI Field, the New York Mets stadium under construction in New York.

as regional changes. “It’s a major part of my job to keep up-to-date on these changes,” says Huch Kerckhoff. “We are continually alerting the architects with whom we work.

“I wouldn’t say one code change over another has had the most impact, but the federally mandated ADA did provide focus and started the trend toward more universal building and fire codes,” says Huch Kerckhoff. Like the building codes that recognized the importance of concrete and masonry structures for fire protection, recent reports have emphasized concrete stairs. Other recent design guideline changes include the Federal Transport Agency requirements for blast-resistant design in mass transit, as well as public and government structures, she adds.

“I regularly remind all our employees that lives of our customers’ customers literally depend on us doing our jobs correctly every moment of every day,” says Huch Kerckhoff.

### A strong niche market

Castcon-Stone has a successful legacy for developing profitable niche markets. It began as a local supplier of quarried sandstone blocks. Soon after its founding in 1954, Huch Kerckhoff’s grandfather directed his workers to wetcast retaining wall elements

## New Building Requirements in New York City

Building Type	Requirement
<b>Scissor Stairs</b> High-rise (= 75 feet) office buildings where stairs serve a floor = 10,000 square feet.	Stairs are prohibited from sharing a common wall, floor, or ceiling.
<b>Impact Resistant Stair and Elevator Enclosures</b> High-rise (= 75 feet) buildings.	Stair and elevator enclosures serving office space must be constructed of impact-resistant materials.

to keep them working during the winter. In time, the producer entered the architectural precast business.

The family-owned business decided to take a step upward to stairs in 1962. They had bid on a very large residential complex that required hundreds of precast stairs. Castcon hasn’t looked back.

Today, the producer is primarily focused on the commercial stairway market. It offers architects eight standard stair system designs to go along with the producer’s full design capabilities. “We have a staff totally focused on stair design, which we supplement with some talented precast-design engineers,” says Huch Kerckhoff.

The company president has been satisfied to see how fast the market was developed for its exclusive Total Precast Stair Tower System. Along with the benefits of offering a model that allows the production team some standardization, customers have accepted the concept. Components can be

plant-assembled for shipment, or erectors can do it at the site. General contractors are pleased that the system includes electrical embedments and accommodation for other trades.

This feature allows the producer to compete against steel stairs. This market niche has national appeal. “We’ve received more and more inquiries from steel frame suppliers and erectors. Generally, once steel suppliers or erectors have installed one of these systems, they become devotees,” says Sandra Ussia, the vice president who directs the producer’s finances and IT. In fact, the market is so strong, Huch Kerckhoff has added more sales staff.

### An evolving product

Casting stairs is not an easy job. Tread and riser combinations, as well as overall stair tower designs, change for every job. While many job requirements appear similar, none are the same.

But one aspect of the stair casting process is the same. Stairs are often the welcoming point for the building, so they must look pleasing. Castcon takes an architectural precast approach to the finished product. Over the years, the producer has used all sorts of pigments, special stones, and finishing techniques to create a building’s focal point.

Along with colors and surface textures, architects are constantly challenging the producer with shapes. There are also regional preferences to consider. Stairs in the Northeast are generally enclosed to protect them from snow buildup. But in the Mid-Atlantic and South, they are generally outside and decorative.

### What’s About to Happen to Stairs

According to Laura Huch Kerckhoff, president of Castcon-Stone Inc., these are some of the design recommendations that will affect egress in the near future.

1. Actual, rather than theoretical fire rating tests.
2. The careful locating of stair towers farther from one another, with uniform signage so they are easy to locate. For example, New York City has introduced a bill that significantly limits using scissor-type stairs because that design entails two stairways using one shaft. If the shaft is damaged,

then both stairs may be rendered inaccessible.

3. Constructing stair towers and elevator towers out of fire-safe, impact-resistant materials such as concrete. Many drywall stair tower walls in the World Trade Center buildings collapsed due to impact from planes and flying debris. The collapsed walls blocked egress.

4. All buildings should be designed to accommodate timely full-building evacuation. Making stairways wider (at least 56 inches wide if 2000 people could be using them,

per the new NFPA rule) to accommodate both building occupants exiting and emergency personnel entering. There is a related recommendation for a separate stair designated for emergency personnel.

5. Photo luminescent painted signage and stairways if there is a power outage.

6. Commercial buildings will be evaluated and designed with wind tunnel testing to determine sway and rigidity. This would encourage designers to use concrete stairs because they provide stability.

# Being Aware of Design Obligations

Precast stairs are often the first thing on the project to provide access to workers. So the producer began offering Castcon Construction Covers for temporary cover during the construction phase. These non-slip temporary vinyl covers eliminate punch list issues.

Kerckhoff believes stair design will change dramatically in the next few years. She already has seen a highly detailed and analytical approach from architects and engineers to the stair tower design, assuring that all codes are met or exceeded. "Our products and services are constantly evolving to meet these needs," she says. This will only increase as some of the National Institute of Standards and Technology (NIST) recommendations from the post-9/11 reviews enter the new versions of NFPA 101 and 5000.

Castcon engineers have experienced this change. They have provided elements for many of the new buildings in New York City. "Stair design is to be a central part of efforts in revising New York's quirky codes to be more like international standards," says Huch Kerckhoff. "NYC is able to move at a faster pace on this than the national codes can." (See sidebar on the right.)

## Strong process

To be successful in this custom-built product market, manufacturing capabilities must be efficient. Castcon has embraced lean management, allowing it to quickly adapt to the rapidly changing specifications. "We use a lot of visual communication in both quality and production, and mobile work stations, as well as mobile forms," says Huch Kerckhoff.

Many revisions cause frequent form changes. Since the producer creates the design, they can quickly alert casting crews of formwork changes. The producer currently designs and builds all of its steel forms, allowing flexibility in stair form design and lead times.

It's all just another step in the right direction. **TCP**

The world we live and work in changed drastically on Sept. 11, 2001, and we must all adapt to these changes. In construction, engineers must recognize their increased obligation to design and construct buildings which utilize and incorporate appropriate design and technology to minimize the effects of potential terrorist attacks.

Before Sept. 11, 2001, security in design was not an overriding concern to architects, engineers, or builders. Today, security has become an absolute priority in almost every type of construction. Virtually overnight, good practices mandate that appropriate security safeguards and technology be incorporated into the design-build process at the project's initial planning stage.

The fundamental issue facing engineers is determining what design/security elements are appropriate for specific project types. The initial issue to confront is what level of security is sufficient to protect the tenants, the public, the owners, and the design-builders themselves. The answer requires a balancing act to determine the appropriate standard of care that will measure the engineer's actions on a project.

The engineer's conduct must not fall below the accepted "standard of care." If it does, such

action constitutes negligence, and liability results if someone or something is damaged. Determining whether the conduct is below the standard of care, and thus negligent, relates to foreseeability, or could harm or injury have been foreseen.

## Determining risk

Finding the appropriate standard of care can be difficult. The engineer must balance and measure the risk of the accident occurring, versus the magnitude of the harm should the risk materialize, versus the availability of alternatives that would prevent the accident.

The first prong concerns foreseeing the harm. The second prong focuses on whether the harm will be material or not. The fact that an accident is foreseeable is of minor consequence if the resulting harm is trivial. The third prong relates to whether the accident could have been avoided using economical and available alternatives.

Implicit in the standard of care is a "rule of reason" to be used in assessing the level of security and technology of a design. For example, building a high-rise residential or commercial office building in Midtown Manhattan next to a politically sensitive

consulate would require rigorously implementing existing security technology and design in construction. But building a commercial office building in the suburbs would involve less need for technological innovation and design because the terrorist threat will be less.

Engineers must note that the standard of care is kinetic and continually evolving. Events and technology affect and change the standard of care. Technological changes in the last 20 years have mandated revisions to building construction and safety. Because a building code in a particular municipality has not yet been amended to include new safety features

Before the 9/11 attack, security in design was not an overriding concern to builders, architects, or engineers. It is now.

or technological advances, does not by itself provide a safe haven from liability for damages incurred by a terrorist attack.

To the extent that an engineer fails to take steps to determine the appropriate standard of care, such an exercise will be undertaken in court by using experts to determine if a design-builder's actions were appropriate and in compliance with the standard of care.

For example, New York City is the

only major city in the United States that has enacted changes to its building code which incorporates the lessons learned from the 9/11 attack. In the absence of a statutory requirement through a building code, an engineer must investigate and determine the appropriate standard of care for incorporating security and safety features in new and renovated buildings.

### Studying reports

Important sources in determining the current standard of care are studies and reports issued by governmental agencies investigating the causes, effects, and conclusions reached from the collapse of the World Trade Center. These studies focused on various construction issues that were relevant to the

collapse. These included:

- Structural Framing Systems – Whether the building frames have redundancy for transmitting loads after the structure has been damaged.

- Fireproofing – The impact of fire and fireproofing on steel members.

- Egress Systems – Redundancy of systems and robustness in the face of an impact by a foreign object.

The National Institute of Standards and Technology (NIST) funded one of the more comprehensive studies, whose goal was to develop a road map for changes to existing building codes, standards, and designs. NIST “strongly urges” that buildings be evaluated regarding the listed recommendations, and that steps to mitigate unwarranted risks should

be taken without waiting for changes in codes, standards, and practices. A producer, particularly outside New York, providing elements to such a project ignores the report at its own peril.

New York leaders have made a determined effort to upgrade their building codes to incorporate lessons learned from the 9/11 disaster. In 2004, Mayor Michael Bloomberg signed Local Law 26 of 2004, which incorporated most of the recommendations of the World Trade Building Code Task Force. The law is not only prospective for new construction, but includes retroactive requirements for existing buildings of a certain size, usually higher than 75 feet.

The New York City Building Code, which

### Putting codes to the test

The new code has already affected new construction design. Architects substantially modified The Time Warner headquarters in Manhattan to enhance security. They increased the number of the building’s structural columns encased in concrete to improve its capability to withstand the impact of an explosion or the effects of a fire. Also in Manhattan, the CIBC Tower had additional steel plates welded to the structural columns of the building to resist lateral forces from a bomb blast.

At a minimum, engineers contemplating the construction of a major office building in any city must be aware of the safety and technological features currently being incorporated in New York structures for similar buildings under their review for construction.

Since 9/11, many architects, engineers, and other construction experts have written about this issue. A resource which is quickly becoming the standard textbook on the issue is *Building Security: Handbook for Architectural Planning & Design* by Barbara A. Nadel. It covers security through the spectrum of building types, planning and design, and construction technology, as well as building codes and legal issues.

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IPC



Precast concrete stairs will be more common in public structures such as the Covenant Medical Center. Architects used precast for the whole structure. Elements including the stairs were cast by IPC, a wholly-owned subsidiary of Cretex Corp., in Elk River, Minn. “We installed the stairs floor-by-floor in the construction process as opposed to the usual, more time-consuming steel pan method of pouring stairs,” says Mark Hasek, senior vice president of Graham Construction in Des Moines, Iowa, and contractor for the project in Waterloo, Iowa.

incorporates Local Law 26, is a baseline to measure an engineer’s actions. It has technology advances more rapidly than building codes, engineers must identify construction practices and technological advances which should be used in new construction.