The next generation of innovation

Recent advancements in technology have boosted worker productivity, safety and quality in our industry — here's how Sellen is approaching it.

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ILLUSTRATIONS: EKSO BIONICS, LORETTA GRANDE

Imagine if you were asked to perform your daily job duties on a mainframe computer from 50 years ago. The concept alone seems unfathomable, much less achievable.

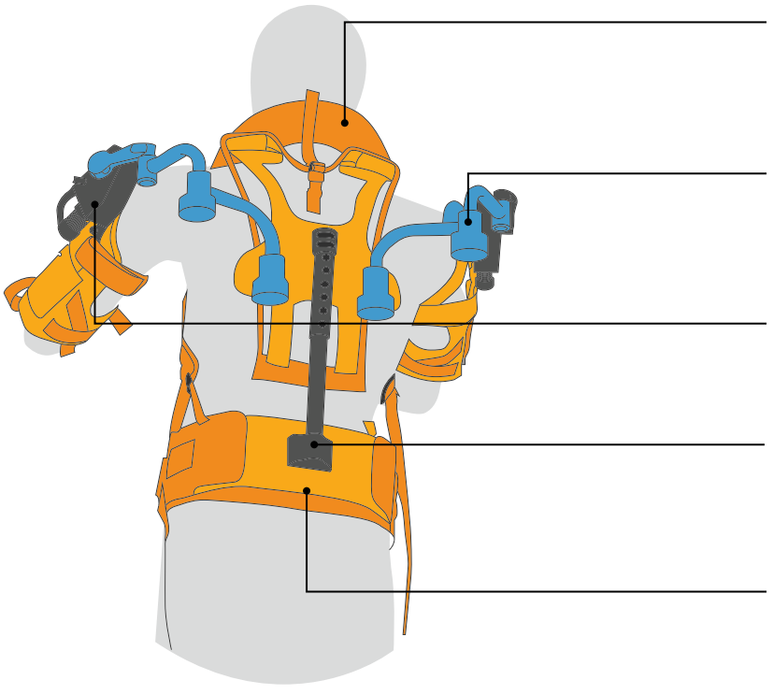
This is the reality construction workers face every day; the industry still uses the same technology and techniques as 50 years ago to pour concrete, build walls, and tie rebar, among other activities. While other industries have embraced and leveraged new technology, the construction industry has remained largely unchanged.

But the last decade has brought significant advances, and the construction industry has been flooded with new innovations. Instead of blindly jumping into the vast world of new and ever-changing technology, however, Sellen has developed a strategic approach to our tech development.

"We didn't want to simply purchase new tools; we wanted to partner with the developers creating those tools," said Bob McCleskey, Sellen's CEO. "We wanted to help make impactful improvements that will not only benefit Sellen but also the industry overall."

Through early research and strategic partnerships, it soon became clear that our tech explorations would fall into three categories of innovation: enhanced visualization, leveraged data, and increased worker safety and productivity.

To this end, Sellen has fostered partnerships with multiple technology-focused firms — from unknown start-ups to the usual suspects — as well as long-standing architect and owner partners, to help explore and develop new tools and processes to improve our shared industries. While we still have multiple projects in the works, here's a sneak peek into a few of the successes and explorations we've recently undertaken.



Exo-Skeleton Vest

Neck Roll: Provides gentle support for head and neck when tilting head backward to complete overhead work

Links: Transfers the force of the lift assistance into the device while allowing operator full range of motion

Actuator: Spring-powered mechanism provides lift assistance for operator's arms

Torso Tubes: Transfers forces to the hips and allows for height adjustment to fit different-sized operators

Hip Plate: Primary point of load support and attachment point for hip belt

1. Increasing Worker Safety & Productivity: Introducing the Next Ironman

Partner
Ekso Bionics

Description
Sellen is the first contractor in the nation to partner with Ekso Bionics, the creator of a prototype exo-skeleton vest. With the use of gas springs, the vest is designed to lessen arm fatigue and strain for workers who spend a lot of time with their hands at chest level or higher.

As part of our partnership, we provided a real-world testing environment and asked workers at the Stratus residential tower project to wear the vest and provide feedback. During the testing period, the workers stripped formwork, which required them to use their arms overhead 90 percent of the time.

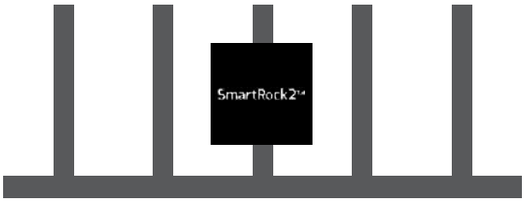
In addition to validating the vest in a construction setting, the Sellen-Ekso team identified refinements for the second prototype. The vest became much lighter and was created with more breathable materials. Ekso Bionics is also exploring swappable springs with different levels of strengths to match the diverse requirements of construction work.

Benefit
Using the exo-skeleton vest lessens arm fatigue in workers, reducing potential injuries and increasing worker efficiency.

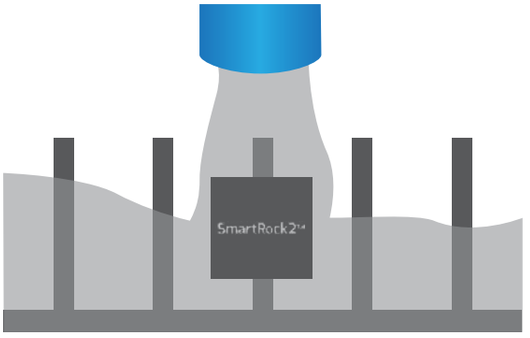
Status
The exo-skeleton vest will be commercially available by the end of the year. Ekso Bionics and Sellen are continuing to partner together to improve the product and will soon begin a long-term usage study of the new vest.

2. Leveraging Data: Watching Concrete Cure

Step 1
Install data sensor
When connected to the rebar, it turns on



Step 2
Pour concrete



Step 3
Collect temperature and maturity data as concrete sets

Partners
Stoneway Concrete; Giatec Scientific

Description
Sellen and Stoneway Concrete are partnering to collect concrete maturation data in real time using sensors that are attached to the rebar prior to pouring the concrete. Sensors will then transmit temperature and moisture data to smartphones via Bluetooth technology.

Benefit
If proven accurate, having instant, real-time access to the concrete maturation data allows the project team to be more proactive in decision-making and has the potential to decrease the schedule. For example, concrete formwork removal and post-tensioning activities can be performed earlier than traditionally, when teams have to wait for the field concrete samples to cure and then break them to check their strength before starting other activities.

Status
Currently, project teams are working together to validate the data collected from the sensors to ensure its accuracy and evaluate potential future uses.

3. Enhanced Visualization: Virtual Reality

Partners
University of Washington (UW); LMN Architects; Magnusson Klemencic Associates (MKA)

Description
For many in our industry virtual reality, or VR, is still widely recognized as a "gadget" rather than a trustworthy tool. With this in mind, Sellen, UW, LMN and MKA set out on a joint research effort to prove that VR can be used as a credible tool rather than just a toy.

The goal of the study is to measure the visual accuracy of a virtual environment versus the physical environment. The team built two spaces: a physical mock-up of a hotel room and an identical virtual space, which LMN created using the existing 3-D building model. Study participants will "walk through" and experience both rooms. Afterward, participants will be asked a set of questions to measure the closeness of their visual perception between the virtual space and physical mock-up.

Benefit
If we discover that the VR environment can be trusted as an accurate spatial experimental tool, it allows people from different backgrounds to collaborate on, identify, discuss, and solve design and construction problems faster and more conveniently through the use of VR technology.

Status
The team is preparing for the focus group study, which is planned for this fall. ■

BELOW: Rendered virtual mock-up of hotel space for users to virtually "walk" through

RENDERING: LMN ARCHITECTS