




CASE STUDY

Smart Construction

More Than a Worthy Investment

Construction companies are quickly adopting artificial intelligence, predictive analytics, and IoT networking to drive efficiencies and maximize operating margins. That's because tech companies have figured out how to make it easy.

MACHINE ™

As the engineering and construction industries continue to grow, especially in North America, an increasing number of savvy companies are implementing strategies to outpace the competition. Irrespective of capital or operational size, these firms are building stronger, more sustainable bottom lines despite the usual headwinds. Supply chain volatility, for example, remains front-of-mind for every CFO, while factors like labor costs and site safety continue to play the heaviest hand in profit-and-loss.

Still, analysts see ample reason for engineering and construction companies to be optimistic about the future of the industry and, just as importantly, the health of their business. Especially, if they're focused on their digital future.

The Future is Digital

Smart Construction, a data-enhanced operational model, is quickly becoming the norm throughout the industry. More companies – from venerable megafirms to smaller enterprises – are leveraging data and predictive analytics to improve project outcomes, create safer worksites, and streamline internal business operations.

And the reason is clear: for an industry that returns a hard-won 5 – 7% operating margin over any recent twelve-month period, even a modest increase in operational efficiency can deliver a substantial ROI. Combine this with fewer costly safety incidents, access to reduced insurance costs available exclusively to data-driven companies, and increased project-by-project/year-over-year productivity, and the direct financial impact of Smart Construction becomes immediately evident.

Accelerating the adoption of Smart Construction platforms is the recent availability of viable technology partners and solutions. When approached entirely in-house, it can take companies upwards of three to five years to effectively lead a so-called digital transformation – even with a Chief Digital Officer at the helm. In the construction industry, which is by comparison slower to adopt high tech solutions, the process can take even longer.



THE CHALLENGE

Permira Construction sought to maximize operational efficiency while creating safer job sites for their workers.



THE SOLUTION

Permira adopted a full-stack Smart Construction IT ecosystem from Kwant.AI, built on the enterprise-ready LoRa[®] wireless IoT platform developed by MachineQ.



THE OUTCOME

The Kwant.AI platform enabled by MachineQ resulted in an incremental \$1.1 million in operating income, or 10x ROI, within twelve months.

Fortunately, two parallel landscapes – solution providers and enabling technologies – have been emerging simultaneously in recent years, each with some clear front-runners. Leveraging artificial intelligence (AI) and the explosion of technologies related to the Internet of Things (IoT), Smart Construction solution providers are bringing advanced, secure, and easy-to-adopt technology platforms to an industry that needs them. As we approach 2020, the barrier to entry to scalable digitization has never been lower.

Choosing a Tech Platform

While the landscape of solution providers may appear fragmented and uncertain, there are clear signposts by which companies and CIOs can navigate. Is the provider financially sound? Are they adequately positioned for the demands of global enterprise partners? Is their technology stack robust, secure, and simple to on-board? Construction companies must weigh these factors with tremendous care as they will make or break a corporate technology strategy.

Another vital consideration is the provider's familiarity with the construction industry. While there are countless providers of data analytics and artificial intelligence for a wide range of use cases, the particulars of the construction industry are extremely specific and nuanced. Properly training the AI algorithms to understand the dynamic use cases, operational imperatives, and idiosyncrasies of this industry requires intimate, first-hand expertise in construction management.

KWANT.AI:

Data-Driven Construction

In the narrow range of Smart Construction solutions, Kwant.AI stands apart. By collecting real-time data from jobsites and evaluating it against historical data from over 400 projects worldwide, Kwant.AI provides the most comprehensive and intuitive Smart Construction solution on the market. The company's industry-specific data intelligence and sensor offering enables companies to shift from reactive to proactive decision-making.

From the beginning, Kwant.AI's mission has been clear and unchanging. "We've built a platform to help construction companies mitigate the top three risks that historically jeopardize OI in our industry," says Niran Shrestha, Co-Founder of Kwant.AI. "Specifically, we help companies to minimize risk associated with project delays, operational inefficiencies, and worker safety."



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Risk mitigation and proven technologies to support enterprise growth are precisely what Baltimore, Maryland-based Permira Construction was looking for when they adopted Kwant.AI. From 2014 to 2018, the \$40M firm had quadrupled in size, an envious trajectory that forced Permira to reconsider its operational models and address inefficiencies.

Sergii Marakhov, a Project Engineer at Permira, helped lead the company's adoption of smart tech. "The simple software and management tools we were using at the time weren't cutting it anymore," says Marakhov. "Early on, we only had to track individual projects with a relatively small number of workers on a single jobsite."

As Permira's business ramped up, it became clear that the company was not well positioned to scale. "We needed to be able to forecast and track schedules across multiple jobsites, simultaneously. We needed to be able to process and verify change orders while controlling associated costs and schedule adjustments. And above all, we needed a system that would be efficient and accurate."

Having evaluated a number of Smart Construction platforms, Permira opted for Kwant.AI's solution. Kwant.AI's Smart Construction platform enables project managers to accurately forecast the duration of a project based on historical data from similar jobs. "It was an easy decision," he admits. "Compared to everything else out there, Kwant.AI's system is the most integrated and sophisticated. Other

vendors might be able to offer separate aspects or partial solutions, but Kwant.AI gives us the ability to track the status of projects, predict overruns, monitor and secure jobsites, and protect our workers. And they unify all of this for us so that we can stay focused on completing projects and growing our business.”

An Ounce of Prevention

As a result of incorporating Kwant.AI’s technology stack, Marakhov has seen his own projects completed 15% faster, reducing his lead times from an average of 13 months to 11.



Early prediction of an overrun enables us to make timely adjustments to our production plan, whether it’s changing manpower or expediting materials, to help us stay on track. Our clients love that.

The resultant cost savings have been substantial. Labor costs, which can constitute fully 60% of a typical bill, are reduced significantly with shorter cycles. Additionally, some clients offer builders financial incentives to complete projects on-time or ahead of schedule. This is great news for companies that leverage Kwant.AI’s advanced platform. “Because we are drawing from data on more than 400 real projects, our system can very accurately predict when a production schedule is at risk, for any number of factors,” says Shrestha. For project managers like Marakhov, this has been a game-changer. “Early prediction of an overrun enables us to make timely adjustments to our production plan, whether it’s changing manpower or expediting materials, to help us stay on track. Our clients love that.”

Smarter Time Tracking

The Smart Construction platform poses real benefits to Permira’s supers and contractors as well. Kwant.AI provides smart identification tags for workers on active jobsites. The tags, which contain the worker’s name and the name of their company, are seamlessly connected as wireless devices to Kwant.AI’s local area network (LAN).

Traditionally, workers would have to manually badge-in and badge-out on a jobsite. They would report their hours to the Project Manager, who would then have to manually verify the accuracy of the timesheets before submitting them to payroll. “Our project managers were spending two to three hours per week tracking workers’ schedules and verifying their information,” says Marakhov. “We could have been using that time to complete other tasks more relevant to the actual project.”

Because Kwant.AI’s network automatically detects and logs when a worker enters or leaves a site, they’re no longer required to spend time clocking in and out, and project managers needn’t hassle with timesheet verifications. This solution also eliminates disputes over the amount of manpower associated with a particular project. “The power of the Kwant.AI system is that it provides totally accurate information related to which workers were on the jobsite, and for how long.” What’s more, this feature neatly resolves any dispute or miscommunication of man-hours between a company and its contractors, unintentional or otherwise.

Improved Safety

Knowing who is onsite and where they’re located has other advantages, not the least of which is safety. Preventive measures can include notifying workers who have wandered into an unsafe area, before they find themselves in harm’s way. Reactive capabilities are also improved with the Smart Construction platform. Kwant.AI is helping to improve outcomes in one of the most common worksite accidents: falls.

Nearly 40% of worksite fatalities are the result of a fall. Getting first responders to the injured worker quickly can be the difference between life and death. Traditionally, a worker would have to use a radio or cell phone to call for help, but

The Cost of Preventable Accidents

40%

WORKSITE FATALITIES ARE RESULTS OF A FALL

\$10 Billion

INDUSTRY LOSSES TO WORKER'S COMPENSATION

\$39,000

AVERAGE PER INJURY

4.8 Million

ANNUAL PRODUCTIVITY LOSS, IN DAYS

this isn't always an option. Cell phone reception is never a guarantee and worksites rarely have sitewide Wi-Fi to enable smart phones. And in the case of an injury or fall, the phone or radio can be damaged or thrown out of reach.

In one recent case, a professional fire-proofer was working alone in one of three multi-story buildings being renovated simultaneously. Despite his careful maneuvering, he slipped and fell from a ladder, fracturing his leg and separating his shoulder. There was no one around to help, so he simply pushed the SOS button on his Kwant.AI smart badge. Kwant.AI's system was able to triangulate his precise location and send an emergency notification to the site safety manager and project manager. The notification included the worker's name, the building in which he'd been working, and the floor he'd been working on. Emergency response was immediate because the responders knew exactly where to go.

While the human impact of worksite injuries is the greatest concern, companies cannot ignore the direct and indirect financial impact of accidents on the job. Industry-wide, the total burden of worker's compensation is approximately \$10 billion, or an average of \$39,000 per injury. The indirect cost to the industry is a sobering 4.8 million days of lost productivity, annually.

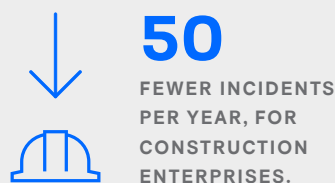
Kwant.AI's safety features have reduced worksite incidents by 25% among their ever-expanding customer base. That's 50 fewer incidents per year, on average, for construction enterprises. Permira, which typically oversees a few hundred workers across roughly 5 projects, has realized an overall reduction of 10%. The company's P & L saw an incremental \$800,000 in operating income within twelve months of adopting Kwant.AI's safety solution. Combining the revenue associated with accurate project scheduling, labor coordination, and worker safety, Permira has added \$1.1 million back to its bottom line – no less than 10x their investment.



We have focused a lot of our technical development on improving worker safety,” says Shrestha. “As a result, we have reduced emergency response time by 92% compared to traditional means. It's saving lives every year.

Kwant.AI's safety solution

Results within 12 months



Combined revenue

from accurate project scheduling,
labor coordination, and worker safety



"I'd say it's been more than a worthy investment," notes Marakhov.

The Right Technology

The central nervous system for all of this data management and intelligence is a Long-Range Wide Area Network (LoRaWAN) developed by MachineQ. Leveraging the financial and intellectual assets of parent company Comcast, MachineQ has built a robust, enterprise-grade IoT platform enabling scalable network infrastructure as a service.

Kwant.AI relies on MachineQ's infrastructure to validate and encrypt critical information collected by their sensors, and transport it seamlessly to the cloud, where Kwant.AI's backend data centers can process it. In the event that any action needs to be taken, such as emergency response or other notifications, the MachineQ infrastructure enables real-time cellular text messaging to Permira's personnel.

"We couldn't have developed our platform without MachineQ," says Shrestha. "They've developed such an amazing technical construct. It provides us with the easiest off-the-shelf LoRa® network to collect data in the field, in real time, without any obtrusive wiring or maintenance hassles. That's really important on construction sites, which tend to be harsh and chaotic environments."

Turn-Key, Redefined

Off-the-shelf is an attractive idea to solution providers and system integrators. To piece together a proprietary network using a host of various products would have taken Kwant.AI at least six months by their own estimates. "We were able to create a market-ready, full-stack Smart Construction platform within one month," says Shrestha. "That's what MachineQ provided: a fully integrated solution."

For the core of their enterprise IoT platform, MachineQ invested in LoRa® wireless technology. "The LoRa® architecture, more than any other network technology, is ideally suited for IoT applications such as Smart Construction," says John Brzozowski, Head of Engineering at MachineQ. "The two have basically grown up together. LoRa® revolutionized ultra-low-power, long-range wireless networking, enabling more devices to securely interconnect over long distances with unprecedented lifespan."



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Consumer-oriented technologies like Bluetooth® and Wi-Fi operate at an overcrowded – and license-dependent – 2.4 GHz. At this frequency, radio signals attenuate very rapidly, making it unsuitable for long-range communications. By contrast, LoRa® networks operate in the unlicensed sub-gigahertz band, a longer wavelength enabling very long-range communications between networked devices and gateways. While the advantages are many to just about every vertical, stability over long distances is a mission-critical feature for Smart Construction deployments. “With Permira, the challenge was to cover multiple project sites over an entire city block with a single secure network,” says Shrestha. “We needed the radio to pass through structures and different materials, and in monitoring the safety of the workers, we couldn’t tolerate any network downtime or maintenance issues. The simple infrastructure from MachineQ enabled us to provide secure wireless network coverage up to six miles wide with a single LoRa® gateway. Just one! And our wireless sensors, which run on batteries, are staying alive two to three times longer than the worksites themselves.”



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“It’s always gratifying to hear about these successes in the field,” says Michael Putterman, Head of Product at MachineQ. “We’ve designed the infrastructure to make it as easy as possible for our enterprise customers to create, deploy, and

scale their own IoT solutions. Especially in applications like Smart Cities and Smart Construction, where circumstances and variables are changing every day, it’s important to have flexible, secure connectivity that just works, right out of the box.”

Easy Access to the Data

MachineQ makes it easy for companies like Shrestha’s to move data securely around a physical location, and they also make accessing that data refreshingly simple. In addition, their intuitive network visualization tool, which can be used by IT managers to set up and monitor their network from a single dashboard, provides a comprehensive suite of APIs to interface with any third-party system.

Flexibility and scalability, again, are the critical factors. “We’ve covered an extensive range of use cases with our standard API suite,” says Brzozowski, “but should a client require support for a particular functionality, our engineering team here in Philadelphia can develop a custom API very quickly.”

A Smarter Platform

In the opinion of Niran Shrestha and his client, Sergii Marakhov, the scale of integration and technical sophistication offered by MachineQ is what companies should be looking for when considering Smart platforms. “Permira’s not in the business of wireless networking,” quips Marakhov. “We don’t want to think about whether the network is operating or whether the sensors need new batteries. We just want to be presented with data to make informed decisions about our business. That’s why we are so pleased with the solution from Kwant.AI and the MachineQ infrastructure it runs on.”

Go Deeper

To learn more about MachineQ’s enterprise-class IoT platform, visit MachineQ.com/platform.