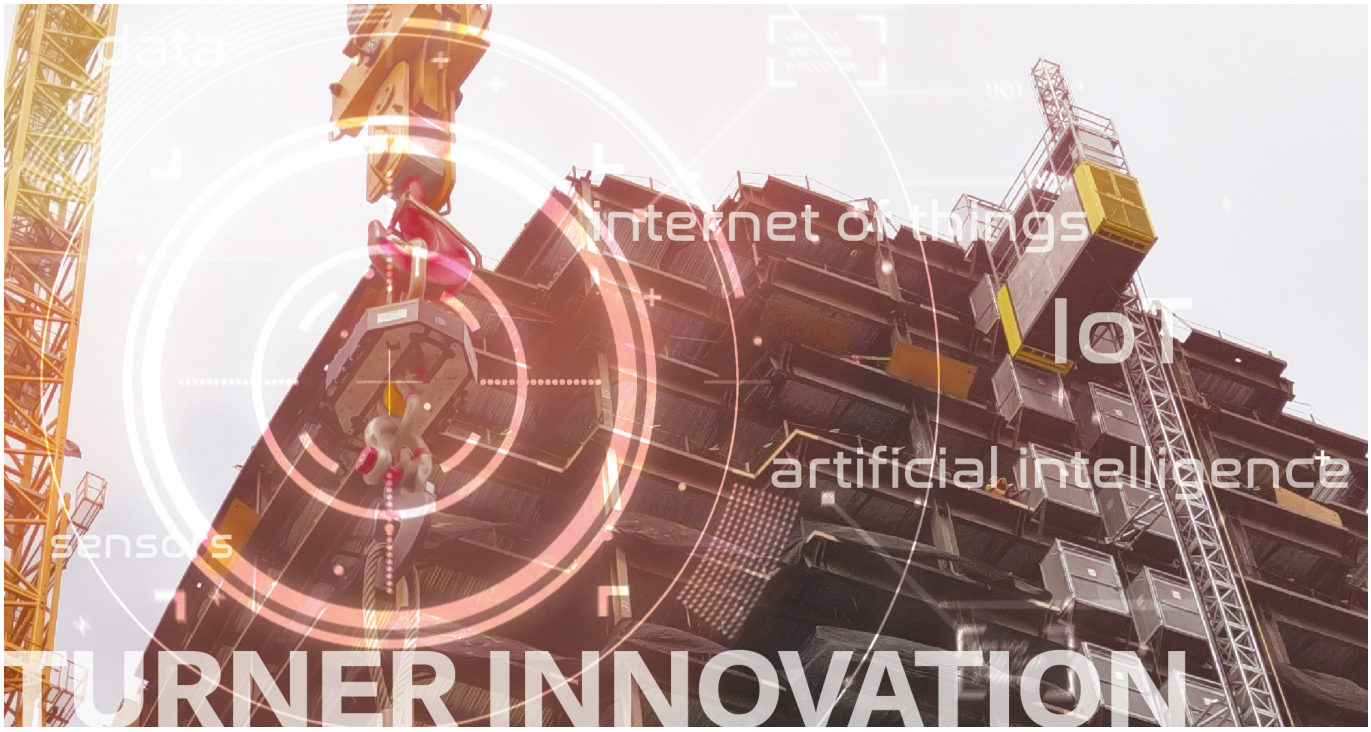

Turner Innovation

TURNING CRANES INTO SMART DEVICES WITH AI AND IOT TECHNOLOGY

On many jobsites, our cranes function as control towers – orchestrating and driving a tremendous amount of construction activity. Seeking innovative ways to leverage IoT (internet of things) and AI (artificial intelligence) technologies to optimize crane efficiency, Turner's Innovation Department engaged with Versatile, a construction technology start-up that captures crane data and turns it into actionable insights that can improve project performance.

Versatile's CraneView™ system is powered by an IoT sensor device that is mounted to the crane hook and collects and analyzes data on the flow and handling of materials, production rates, and crane utilization. A camera affixed to the device records all crane activity allowing teams to view a live feed or a lift sequence from any point in the schedule. Using AI, the device learns and classifies each item picked, captures the weight of the item, and records the cycle time of the lift so the team can understand exactly how the crane is being used. Through an online and mobile dashboard, project teams review data, set custom alerts and notifications, and view weekly reports generated by Versatile.

The IoT sensor that captures and analyzes thousands of data points on the flow and handling of site materials.

"In addition to being easy to set-up, CraneView™ connects to our existing workflows and doesn't require additional work from Turner staff to manage," explained Lindsey

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Cohen, Innovation Project Manager. “Everything is automated, and our teams need only to determine how they’re going to respond to the data they are presented with.”

The CraneView™ solution was piloted on the Manchester Pacific Gateway project in San Diego - a 17-story, 378,000 sq. ft. facility with two tower cranes. The device provided critical insights into crane utilization and productivity and the flow of materials on the jobsite that empowered the team to better plan and sequence construction activities and positively impact schedule and safety. The use of CraneView™ also resulted in early demobilization of the tower crane.

MONITORING PRODUCTION

“Data provided by the system empowered our team to enhance productivity,” said Holley Vela, Project Superintendent. “We were able to monitor and address anomalies in production rates and make adjustments to positively impact our schedule.” During spandrel panel installation for example, the team observed a nine-minute increase in the average cycle time to rig, hoist, drop, and un-rig panels from one report period to the next. The team communicated the observation to the trades, determined the root cause of the spike, and took measures to bring the cycle time back down. Ultimately this adjustment reduced panel installation by 17 days.

In another case, the team was alerted that certain precast panels were taking significantly longer to rig. The Turner team reviewed the lift sequence for these panels by watching recordings captured by the CraneView™ camera and noticed that certain panels had to be spun before rigging and as a result weren’t ready when the hook arrived. Turner communicated this finding to the trades and developed a more efficient sequence that ultimately saved five days.

ENHANCING CRANE UTILIZATION

“We used CraneView™ to avoid overtime and reduce the peaks and valleys associated with crane utilization to ensure the cranes were operating as efficiently as possible,” explained Chris Brown, Project Superintendent.

“Data provided by the system empowered our team to enhance productivity. We were able to monitor and address anomalies in production rates before they became trends that could negatively impact our schedule.”

Holley Vela, Project Superintendent

The CraneView™ solution was piloted on the Manchester Pacific Gateway project in San Diego - a 17-story, 378,000 sq. ft. facility with two tower cranes.

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"Over the course of the project we were able to make adjustments that contributed to a consistent upward trend in crane utilization." For example, they discovered that crane activities related to site organization (re-locating material loads) were distributed over the course of the day and were impacting the productivity of more important tasks. In reviewing the data, they determined that the optimal time to batch all activities related to site organization was immediately after lunch during a time of lower crane utilization.

CraneView™ also aided in resolving change order disputes. The Manchester team could always determine exactly who was using the crane and for exactly how long by reviewing the data and recorded picks. By automating crane hook monitoring, Turner superintendent time was freed up to focus on other critical tasks.

IMPROVING SAFETY AND RISK MANAGEMENT

CraneView™ helped improve safety on the Manchester project in several ways. The presence of the camera alone encouraged safe behaviors and adherence to safety policies. The AI platform identified unsafe behaviors like riggers who were overloading the crane or engaging in dangerous loading behaviors. The team observed, communicated, and corrected unsafe behaviors amongst the project's many riggers, signalmen, and operators.

The team also found value in the real-time alerts generated if cranes entered established 'no fly zones' or encountered 'near misses.' These alerts enabled the teams to perform immediate corrective measures to prevent future incidences. CraneView™ made the whole site safer by monitoring actions and conditions that could compromise the structural integrity of the crane and potentially result in crane collapse. While using CraneView™ the project team reported zero under the hook safety incidents and zero near misses over 2,113 crane picks representing 621 hours of operational time.

LOOKING FORWARD

Turner's Innovation Department sees great potential in optimizing the use of CraneView™ on future projects. On upcoming pilots, the solution will be on-boarded earlier,

"We used CraneView™ to avoid overtime and reduce the peaks and valleys associated with crane utilization to ensure the cranes were operating as efficiently as possible"

Chris Brown, Project Superintendent

Adding Value

The Manchester team saw many benefits from implementation of CraneView™ including:

IMPROVED SITE SAFETY

Cameras encouraged safe behavior. ***Zero under the hook safety incidents and zero near misses were recorded over 2,113 crane picks.***

LEAN IMPROVEMENT

Studying and reacting to real data facilitated ***continuous improvement in the planning and sequencing of construction activities.***

REDUCED OVERTIME

Reduction of crane time and increased efficiency ***significantly reduced tradepartner overtime work.***

REDUCED CYCLE TIMES

Data enabled reduction of cycle times for curtain wall panel installation - ***shaving over 24 days off of this critical path item.***

AUTOMATED CRANE MONITORING

Automated crane hook monitoring ***freed Turner superintendents to focus on other critical tasks.***

EARLY CRANE DEMOBILIZATION

A tower crane was ***demobilized 17 days early resulting in significant savings.***

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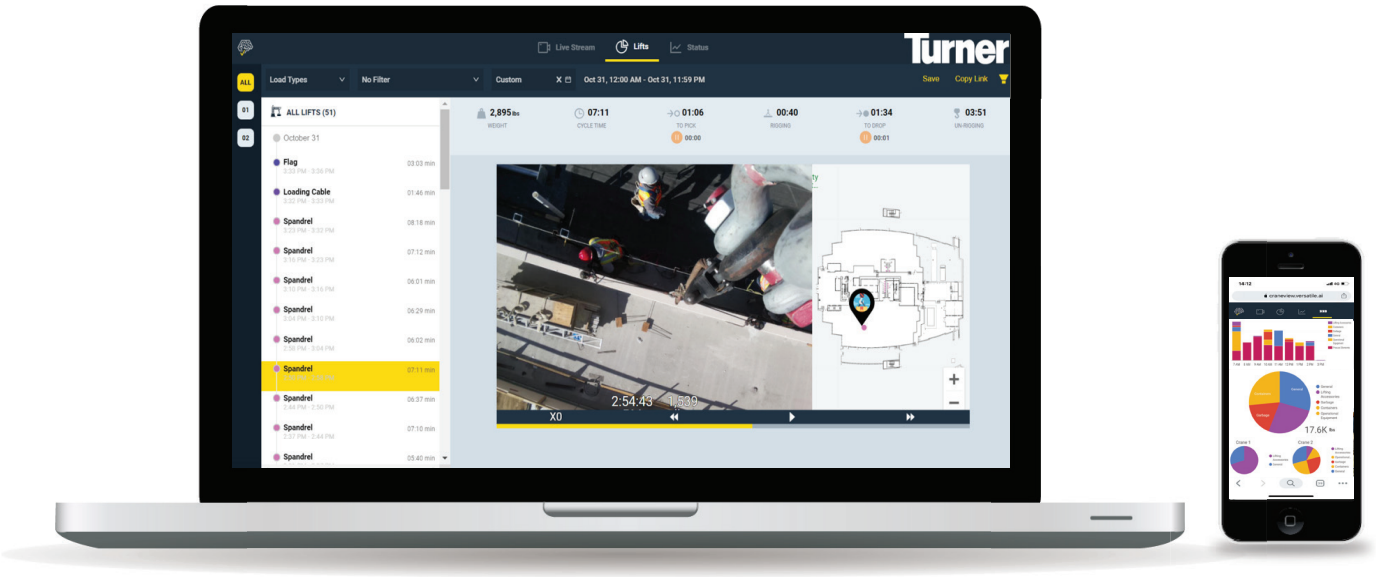

Through an online and mobile dashboard, the Manchester project team would review data, receive custom alerts and notifications, and review weekly reports generated by Versatile.

Data provided by the CraneView™ system empowered the Turner team to enhance site productivity - resulting in 24 work days saved in the project schedule.

so it can been leveraged to increase the productivity of other critical path items like steel erection for instance. Integrations with BIM workflows will allow future projects to use CraneView™ for real-time production tracking.

Versatile is compiling data from all projects utilizing CraneView™ to aid in future project budgeting and scheduling. Turner hopes to leverage this data to inform key considerations on upcoming projects like the number of cranes needed, demobilization planning, ideal batch sizing for installations like spandrel panels and curtainwall, site logistics planning, and holistic cost calculations for purchasing and estimating. Innovations like CraneView™ will continue to make Turner a better builder and increase the value the company provides to its clients and partners.

"I was initially skeptical of the value CraneView™ would be able to provide," admitted Steve Elliott, Senior Project Superintendent. "However, once the system began compiling and analyzing real data, the value became exceedingly clear, and the insights we received led us to make data-driven decisions that positively impacted our productivity."

For more information contact Innovation@tcco.com