Barton Malow uses data from Autodesk BIM 360 with AI to manage project safety risk and implement COVID-19 mitigation plan

COMPANY OVERVIEW

Barton Malow, ranked by ENR in 2019 as one of the 50 largest U.S. contractors, is a general contractor and construction management firm that has been in continuous operation for almost a century. With more than 2,000 employees in 10 states, Barton Malow serves a diverse array of markets, from education and sports to healthcare and energy, performing a full range of trades, including civil/excavation, concrete, structural steel, rigging/millwright, refractory, boilermakers, and interiors. During the past five years, it has devoted more than 18 million man hours to its wide-ranging projects.

SAFETY FIRST

Safety is fundamental to Barton Malow's mission. Testifying to that commitment, it proudly displays a logo that proclaims: "Build it Safe—No Exceptions." Both executive leadership and team members are safety advocates on all levels, and Barton Malow believes that in-depth, advanced planning is crucial to eliminating or controlling hazards. With an impressive safety record superior to the industry average, it continues to maintain an ongoing commitment to safety improvement.

VINNIE THE AI AND THE NEWMETRIX SAFETY SUITE

In January 2019, Barton Malow began deploying Newmetrix's products on six sites as part of a pilot program. These pilots were so successful, Barton Malow decided in 2020 to expand its engagement with Newmetrix to an entire business unit, and deploy the full safety suite of Safety Monitoring, Observations and Predictive Analytics.
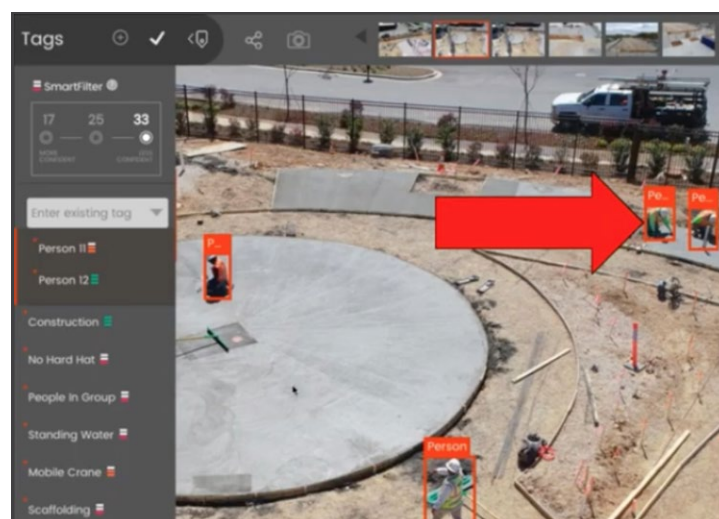

Figure 1. An example of the "people in group" tag in an image of a Barton Malow jobsite.
Note: This image pre-dates the COVID-19 guidelines.

The Newmetrix Safety Suite includes three modules. They can be deployed separately, but when used in concert, they fully enable Predictive-Based Safety:

• **Safety Observations** makes it easy for everyone across the company to create risk-scored observations (both positive and risk-based) using a mobile app and web interface to move from a Behavioral-Based Safety (BBS) program to a Predictive-Based Safety (PBS) program.

• **Safety Monitoring** helps safety managers and executives identify up-to-date risk conditions and where to focus each week. Newmetrix's AI engine, nicknamed "Vinnie," analyzes jobsite images and automatically detects safety hazards. Dashboard reporting enables cross-project benchmarking for leading risk indicators, such as PPE, housekeeping, fall hazards, and risks related to excavation and trench work.

• **Predictive Analytics** enables teams to continuously reduce risk by proactively identifying high-risk projects through an Incident Early Warning System. Trained on massive amounts of historical project data and incident reports, Vinnie analyzes data from the Safety Monitoring and Safety Observations modules, as well as additional jobsite data to predict safety incidents.

"Knowing your potential points of failure and whether the number is headed up or down is crucial to directing safety resources appropriately," says Ted Jennings, Virtual Design and Construction Manager for the company. "We particularly liked Vinnie's ability to seamlessly access and analyze our existing photography, including progress and milestone photos and video walkthroughs," he added.

USING AI TO REDUCE RISK DURING COVID-19

At the same time of this deployment, the COVID-19 pandemic hit the construction industry. Newmetrix responded by adding additional COVID-19 capabilities to help safety teams reduce the risk of infection. Now, Newmetrix's Vinnie can recognize workers' social distancing practices as well as use of new types of PPE, like face coverings.

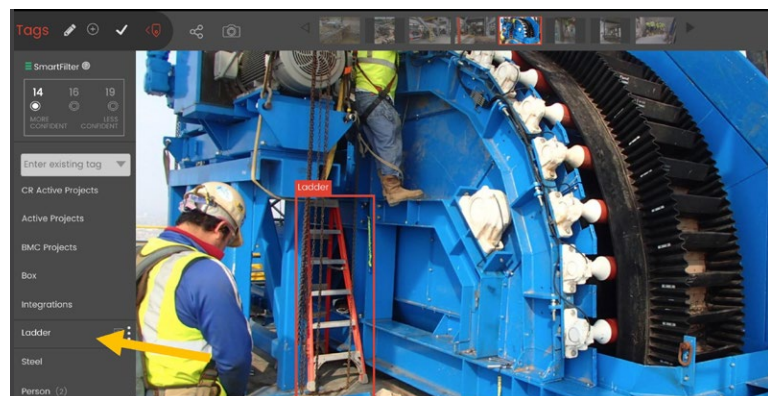To reduce the risk of COVID-19, Barton Malow is now using Newmetrix to automatically identify

Figure 2. Vinnie identifies ladder use, consistent with elevated risk.

workers who are working within six feet of one another or clustering in groups of 10 or more, per the standards for "social distancing" as established by OSHA & the CDC. The new tag, "People in Group," helps safety managers improve physical distancing (Figure 1).

But Barton Malow is most definitely not using this tag to "catch" people violating the rules. The goal of Safety Monitoring is never to punish an individual, but rather to inform the safety team of trends and issues so they can take action.

"This isn't a gotcha tool," Jennings said. "It's to help reinforce and focus our attention."

Barton Malow began its Newmetrix journey with Safety Monitoring, which analyzes photos, and later incorporated Safety Observations. With Safety Monitoring, employees on jobsites record their observations and upload photos, which gives Vinnie even more data to analyze. These observations provide Barton Malow with information on safety trends and risk for each jobsite, with the results presented in an easy-to-understand interactive dashboard (Figure 2). Sites are ranked according to their level of risk so that safety teams can focus resources and attention where they are most needed.

Information is compared with prior data to show how performance is trending, as well as with industry peer safety ratings on all parameters to provide additional benchmarking to help set targets for performance improvement.

To assist with social distancing practices, Barton Malow has turned on an option that enables Vinnie to create an observation any time the AI sees a certain tag, such as "People in Group." That way, if Vinnie is consistently tagging images with social distancing tags, safety managers will immediately be notified. Once they are aware of a social distancing issue,
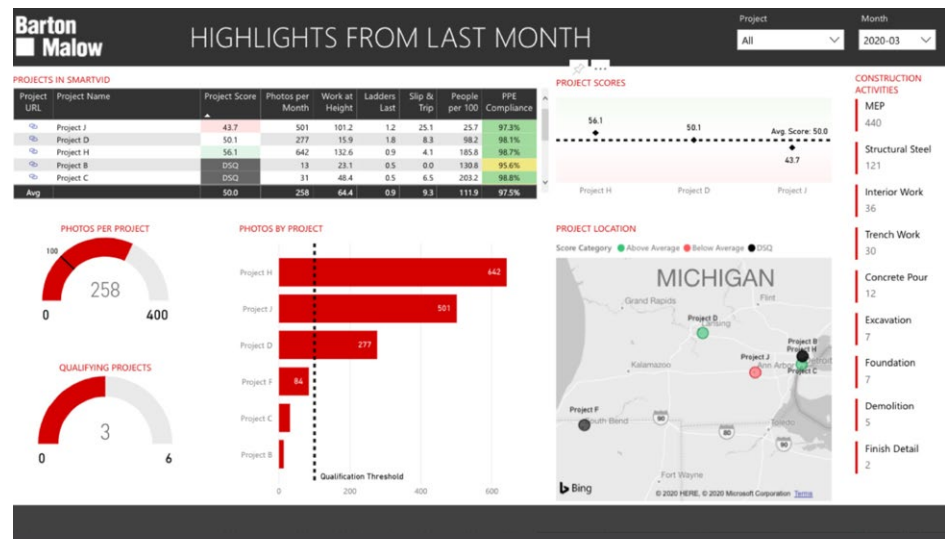

Figure 3. The Safety Suite dashboard ranks the highest risk projects and provides metrics on designated parameters. The predictive value of risk scores based on these KPIs has been borne out in retrospective analyses of prior Barton Malow project data. High risk scores (lower numbers) consistently correlated with a high rate of safety incidents, while low risk scores (high numbers) had far fewer.

managers can investigate whether a choke point is forcing people to bunch up or whether important resources aren't appropriately spaced. With trend data and images in hand, safety personnel are better prepared to mitigate the risk of spreading the virus.

Vinnie's ability to detect whether social distancing is occurring not only reduces the risk of spreading the virus, but it also makes observation, itself, a safer task, because Vinnie can leverage the images that Barton Malow is already producing daily. A number of construction organizations are starting to hire additional personnel to observe social distancing practices, which is not only expensive, but also adds to the number of people on the jobsite, increasing risk. WIth Newmetrix, Barton Malow is able to leverage images that it already has on hand to accomplish the same goal at a lower cost and at less risk.

Barton Malow's jobsites generate a large number of images, including project walks, via the StructionSite application. Project teams capture progress photos in Box.com, BIM 360, and 360 video walks in StructionSite. All of

these sources connect directly to Newmetrix where Vinnie goes to work. All data, including StructionSite information, is then transmitted to Vinnie where it is examined by AI and automatically turned into jobsite analytics. These automatically display the actionable insights on a dashboard. Newmetrix integrated easily with all of these systems, requiring nothing more than the proper credentials and a few mouse clicks.

"Vinnie helps us tap into the full value of the images we already have, with no added resource required," Jennings continued. "Reviewing the volume of photos collected at our jobs without high tech assistance would be impossible. With Vinnie, we spend less time and get a much better picture of site safety. And all of our materials are organized, located and examined."

ENABLING PREDICTIVE-BASED SAFETY

In 2020, Barton Malow decided to adopt Predictive Analytics to fully enable Predictive-Based Safety. The company's aim is for Vinnie to analyze jobsite data from Observations,
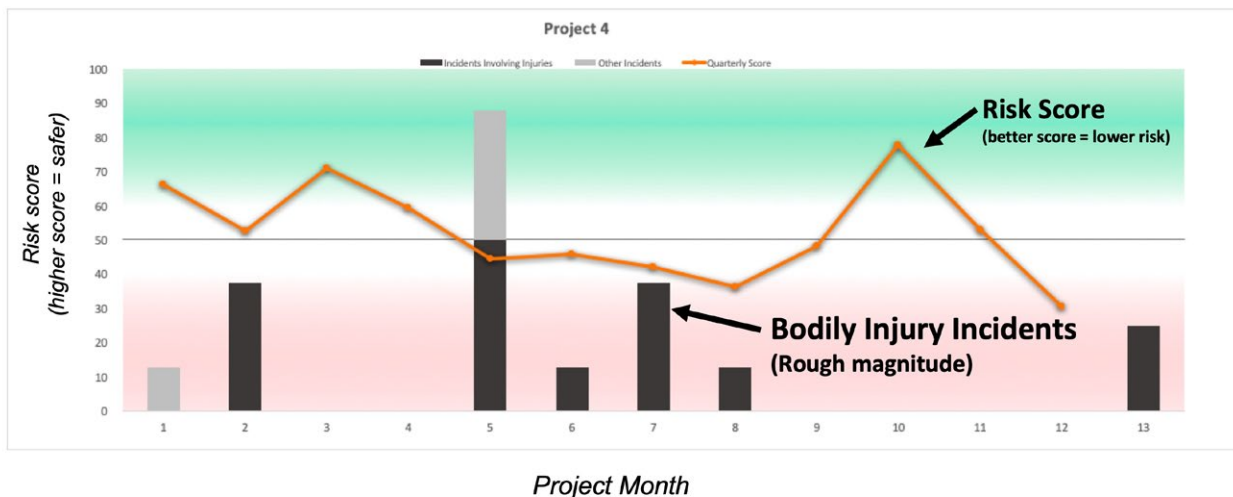

Figure 4. Graph showing correlation of analytics of historical projects with actual incidents.

Monitoring and other sources to predict incidents before they happen, as Vinnie can not only identify these risks but also provide suggested actions the safety team can take to prevent incidents from occurring.

Barton Malow uses BIM 360 within Autodesk Construction Cloud™ to manage all of its construction workflows from preconstruction through operations. It's an important source of construction data, including information from field execution, linking to site photos and observations. In BIM 360, all data is standardized and ready for Vinnie to access and analyze. With historical project data captured in BIM 360, Vinnie will be able to use that data to train its models, so they are more specific to Barton Malow, improving its accuracy.

Vinnie's analyses are directly routed to Microsoft Power BI and incorporated into BIM 360 for KPI management; safety managers do not need to access Newmetrix to review.

With all three modules working together, Barton Malow will enable true Predictive-Based Safety analyses, using AI to assess risk, forecast where and when incidents are likely to happen, and ultimately produce a list of actions that can be taken to change behaviors and sharply reduce risk before incidents occur. And with Newmetrix's COVID-19 safety capabilities, the firm can protect its workforce more efficiently without hiring additional personnel. As a result, Barton Malow is moving closer to its goal of zero incidents so it can "Build it Safe — No Exceptions."

"AI is helping us better understand and proactively manage safety risk across our jobsites," said Scott Wagner, Senior Safety Director, Barton Malow. "Newmetrix's image recognition and predictive analytics are super-powerful, yet extremely practical and easy to use AI applications that we're excited to be investing in."

Newmetrix is currently offering the use of its platform for free for 60 days while the pandemic continues. For more information, visit https://www.newmetrix/try-it.

Barton Malow

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Barton Malow Company provides construction services for a variety of delivery methods as well as capabilities to increase safety, quality and productivity through the ability to self-perform trades and technology.

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Newmetrix enables Predictive-Based Safety, helping companies identify projects at highest risk for an incident and act upon them to prevent incidents from occurring.

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