

Success Story:

JLG Industries, Inc.

GDC Guides Successful Implementation of AMR Transportation Management



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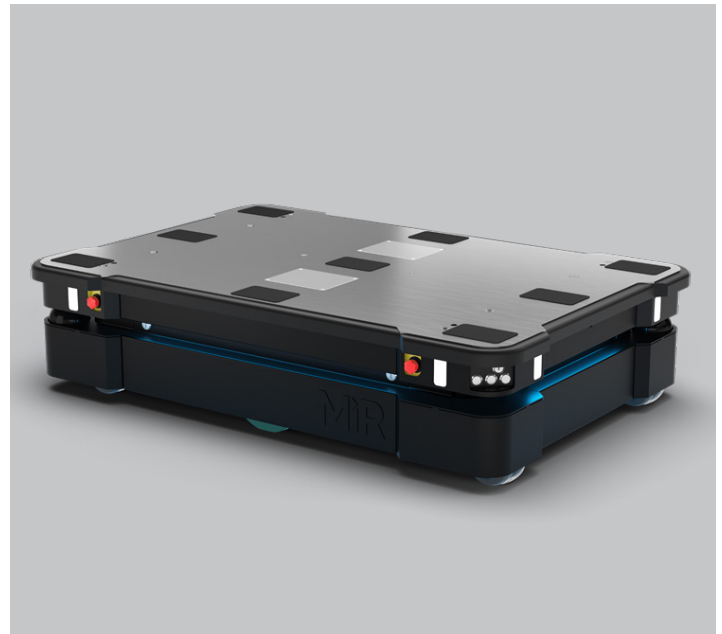
JLG Industries, Inc., an Oshkosh Corporation company, is an American designer, manufacturer and marketer of access equipment. The company's products are used in construction, fit-outs, industrial maintenance, material handling and facilities maintenance.

The Business Need

JLG sought to streamline factory floor processes through emerging technologies such as autonomous mobile robots (AMR). These AMRs would be responsible for moving materials around the factory floor without the need of workers doing this manually. JLG requested GDC's guidance in integrating AMRs at its main facility in McConnellsburg, Pennsylvania.

The main challenge JLG faced was integrating the AMR network communication with its current in-house Quality Control system. This Quality Control system is responsible for maintaining the work instructions and build out state for machines as they work their way down the manufacturing line. JLG had requested the following features for the initial integration between the Quality Control system and the AMR network:

- The Quality Control system being able to initiate AMR missions automatically from events occurring on the floor.
- A module in the Quality Control system to manage AMR missions directly from the floor, including a system for workers to seamlessly communicate through Quality Control to coordinate AMR missions and a management screen that can do a variety of things: create test/return missions, retry missions, and cancel active missions.
- Facility staff to be provided with an accessible, real-time view of active AMR mission progress as well as the results of any given historical mission.



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The Solution

A modern single page application (SPA) framework was needed to deliver the expected user experience. GDC introduced a React.js layer to run alongside the Quality Control system with minimal changes to platform itself.

React.js was selected to manage the orchestration of complex system events and user interactions while limiting the code footprint.

To provide live-streaming functionality of output data, GDC would configure subscriptions to an Internet of Things (IoT) broker that would act as middleware between the Quality Control system's microservices and the AMR control server.

The AMR would broadcast its status to the broker on the control server as it was executing a mission. The IoT subscriber would relay the mission payloads to the Quality Control microservice which would then be broadcast through a .NET Core SignalR hub.

On the client side, a Web Socket connection would be established from Quality Control user browsers, back to the hub, to receive real time updates.

That same hub would be leveraged to coordinate user events across transport management screens to make sure available inventory and transport requests were kept up to date across all user screens.

The Results

After months of coordination between JLG and GDC engineers, the first phase of the AMR integration launched late 2020. Due to pandemic restrictions, this success was even more noteworthy as the GDC development team had achieved this milestone while working 100% remote from the facility.

The AMR Transport solution was able to automate a manual operation that takes place across the large distance between the Final and Sub-Assembly locations. This would enable resources to remain within their work centers to focus on machine assembly instead of allocating time to material transport across departments.

The solution architecture efficiently managed cross system communication while providing a seamless integration experience within the Quality Control system. For months afterwards, GDC provided support while users were getting acclimated to the new robots and gathered feedback for future enhancements.

Some of the enhancements included would be cross work center messaging in order to aid mission coordination and conveyor pick up and drop off overrides.

With GDC's expertise and collaboration, JLG was able to deploy AMRs on manufacturing floors to increase efficiency, safety and quality in its facility. With this cutting-edge technical approach, JLG modernized manufacturing's future potential.

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