SUCCESS STORY

How an Automobile Parts Producer Used Nipper AGVs to Meet its Resource Optimization Goals

Nipper intelligent · pallettruck

BLUEBOTICS
Your Vehicle Navigation Partner

GECOM Corporation

Industry: Automotive
Employees: 630
Location: Greensburg, IN (USA)
AGVs: 5x F3-Design Nipper
Navigation: BlueBotics ANT® lite+

65 Assembly lines

5 Nipper AGVs with ANT® navigation technology

Ignition SCADA software

73% Reduction in material handling resource costs

2YRS Return On Investment

CHALLENGE

How to meet resource optimization targets

The Mitsui Production Ways (Continuous Improvement) team at GECOM Corporation is tasked with optimizing efficiency across its Greensburg, Indiana production site. In 2018 this team was given a human resource optimization target to hit. The challenge? How to achieve this goal without reducing the efficiency of GECOM's operation.

Luckily, the team's head, industrial engineer Steven Lockhart, was already aware of some key material handling processes that could be improved. Namely, the moving of empty tubs (boxes) and raw materials from the warehouse to the plant's assembly lines, and the subsequent returning of full tubs of finished products.

"We had material handlers with pallet jacks walking around trying to figure out what they needed, when they needed it, but we never had a good time study to tell us if we had the right number of people or not," says Lockhart. "So, we knew we had some good opportunities to optimize our processes."

SOLUTION

Automate warehouse to production (and back) material flows with AGVs

Having been aware of the potential benefits of automated guided vehicles (AGVs) via installations at GECOM sister company sites, Lockhart decided to assess the potential of this technology to automated the site's tub-moving processes.

> "Our assembly floor is pretty tight. There's not a lot of free room. So, we realized that using larger AGVs wasn't going be feasible."

Phase one of AGV implementation was the deployment of manually-driven tugger (towing tractor) vehicles; small motorized trucks that material handlers would drive, pulling carts full of tub skids behind.

"Our thought was that we could implement the tuggers and then transition from the tuggers to AGVs. Implementing the tuggers first would allow us to establish the routes and the pick and drop points, which would be one less challenge once we started with the AGVs," Lockhart explains, adding, "We were already able to achieve some headcount optimization by running one tugger, pulling five carts at a time."

The company's initial tugger activity spanned three tasks: bringing raw components to the assembly lines, bringing skids of empty finished good tubs to these lines, and taking full skids of finished goods from the lines back to the warehouse.

Space challenges

One issue during this first analysis phase was the height of the skids on the tugger carts themselves. "Our carts are 18 inches off the ground. Then, from the bottom of the skid to the top layer of tubs, that's another 50 inches, a total of 68 inches high," Lockhart says. "That meant the top tub was physically too high for our associates to stack."

As a result, Lockhart was already sure a tugger system, whether manual or AGV, wouldn't work for moving skids of tubs between lines and warehouse. There was also another reason why these vehicles came up short, which was their size.

"Our assembly floor is pretty tight; there's just not a lot of free room," Lockhart says. "In theory the tugger driver could have done it, but we knew that wouldn't be possible if we were using AGVs and we were trying to eliminate all human interaction. For these reasons, we concluded that using larger AGVs such as tuggers wasn't going be feasible."

This learning in mind, Lockhart began to research smaller, more agile AGVs that could transport skids (pallets) full of tubs. "I was immediately able to narrow down a lot of AGVs because our aisles are only 96 inches [244 cm] wide," he says. "That proved to be the biggest challenge—finding an AGV that can operate in an eight-foot aisle."

> "Ever since I started talking with F3-Design about their Nippers, their support has been phenomenal."

His team, working with one of GECOM's existing integrators, ran several demos of a well-known brand of autonomous mobile robot (AMR) first. These AMRs had hooks at the back, tugger-style, which Lockhart imagined could pull flat deck carts loaded with GECOM skids. "But, when we analyzed the safety of those robots, backing up with no scanner at the back, and we saw the amount of time needed to hook and unhook the AGV to the carts, we decided to look elsewhere," he recalls. "As soon as I saw the Nipper though, I thought, 'That's it!'"

In addition to being compact and agile, the Nipper also offered attractive battery life, 4-5 hours of run time for a 30-minute charge, and an impressive maximum load of up to 2,200 lb. [1,000 kg]. Plus, this AGV was guided by so-called natural feature navigation—specifically, ANT® by BlueBotics—which meant Lockhart's team had minimal infrastructure changes to make on-site, just adding a few adhesive reflectors.

"I knew I didn't want a system that follows magnetic tape, as I've heard horror stories about trying to keep up the maintenance on that. The Nipper just runs off data from a 360-degree navigation scanner and uses Wi-Fi to communicate," Lockhart explains.

Proof of concept

Convinced by the Nippers' form and function, GECOM purchased two vehicles to prove the concept. "With two I could work out how many we'd need in total to achieve our optimization goals, by calculating our timings, routes and everything. Plus, we could verify how they interacted with each other, at intersections for example and in the systems' software," Lockhart says.

Before these vehicles arrived, Lockhart was already able to work out how they would run. "One of the things that really helped was using the Nipper's ANT® lab software to run a simulation before we had the AGVs on-site. So, we did a lot of work before they showed up. We had our spots on the floor, our pick and drop points, all done."

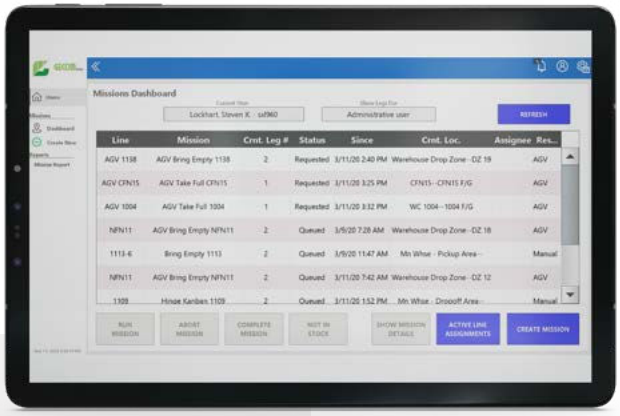
A second software package, ANT® server, was used to manage the fleet of two—and later more—Nippers. However, Lockhart's team also added an additional, more expansive interface to be built on top of ANT® server to make life even simpler for team leaders.

He explains: "We have 13 team leaders on first shift. They call the missions for the AGVs. They know what tubs they need to run that day and they know when their finished goods are done.

> "One of the big things that really helped us was the ability to use the Nipper's ANT® lab software to create missions and run a simulation before we had the vehicle on-site."

"So, we implemented tablets for these team leaders, instead of their desktop computers, partly to make them more mobile. We can also use the tablets to do other things on the line that team leaders need to do, like running lot control—scanning parts when these come into the line—so we know what batch of parts was used on what day. There are different things like that, which help the team leaders become more efficient."

When implementing these tablets, GECOM chose Ignition by Inductive Automation, a SCADA program that was connected to ANT® server's API. "We had a local company program Ignition and we made a user interface for it, like an HMI. With this I could set-up a team leader to only have access to their lines, which saved them from having to scroll through a long list of lines every time they needed to call a mission. Our end goal was that when he or she hits Start Mission, that mission would go into the ANT® server and generate the mission for the AGV," Lockhart adds.



Ignition software

Human to AGV transition

To smooth the transition to AGVs further, in the beginning Lockhart also supplied the tablets to material handlers, effectively using these staff as stand-in AGVs.

"They would also be running the same app as the team leaders, so they could see the missions the team leaders were calling for," Lockhart explains. "That way, we had the team leaders using Ignition software to generate the missions and the material handlers could see what they had coming or what they needed. Once the material handlers had completed those missions, they would just close them out on the tablet."

When the AGVs did arrive then, Lockhart continues, "We were able to slide the material handler tablet out and slide the AGV in place. We weren't trying to put in two new pieces at once."

Commissioning the first two Nippers in April 2019 took around two weeks. Nippers three and four were then installed in September 2019, followed by Nipper five in March 2020.

> "One of our biggest challenges was that everybody was walking through the fields of the AGVs' safety scanners, so we had to carefully explain how these safety scanners worked."

Commissioning times for the later AGVs were quicker, Lockhart adds. "With AGVs three to five, we knew what we wanted to set-up beforehand and we were able to make all of our lines for the AGVs interact with the API. So, we did a lot of that set-up before AGVs three to five got here. This made for a much smoother transition."

However, GECOM's AGV deployments didn't come without their challenges.

"No-one has had AGVs here before, not associates or team leaders. So, one thing was just getting them accustomed to these vehicles, getting them to understand how they work. For example, everybody kept walking through the fields of the Nippers' safety scanners, so we had to carefully explain how these scanners worked so that this didn't happen," Lockhart says.

ANT® server

RESULTS

Optimization target hit

Today at GECOM Corporation's site, five Nippers run 24 hours a day, five days a week, covering 65 assembly lines. And GECOM's team is satisfied with its investment.

"It's definitely been a successful project," Lockhart says. "We've been able to meet our target headcount reduction, of approximately 73%, and it's also led the way for us to explore other AGV possibilities."

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In terms of calculating breakeven on the company's AGVs investment, Lockhart reminds us that the project included more than just the Nippers themselves. "The whole project included the tablets, the AGVs, and the Ignition software. We looked at all that as a whole and calculated how many material handlers could be saved over all three shifts and then calculated an ROI based off of that. That's what we initially presented to management and that's how we got the go ahead to move forward."

For his CI team's projects, breakeven within a year is usually the goal. However, with the AGVs this figure was extended to 24 months. "We were okay with that, as we knew that no matter what customer it was or what assembly line we had running, this AGV deployment was more a general project that would cover pretty much anything we put on the production floor," Lockhart says.

Key to the success of company's AGV deployment, he adds, has been not only its choice of the Nipper, but the support offered by the vehicle's producer, F3-Design. "Ever since I started talking with F3-Design, their support has been phenomenal," he states. "They've always come back with answers to my questions and they've always been very responsive."

The next step for Lockhart and his team? Expanding their AGV program. This could mean procuring a high reach truck, also based on ANT® navigation technology, to run in a fleet alongside the Nippers. Plus, Lockhart is considering replacing the manual tuggers used to bring raw components to the assembly lines with AGVs too.