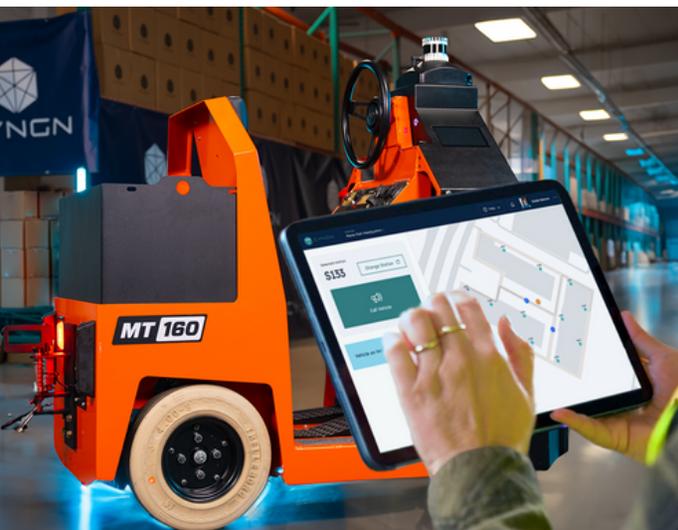




Autonomous Vehicle Solutions for Industrial Fleets



Cyngn Transforms Material Handling Vehicles Into Autonomous Fleets

Cyngn has partnered with some of the biggest OEMs in the business to transform time-tested material movers like the Motrec Tugger and the BYD Forklift into work vehicles that drive themselves.

DriveMod, our AI-powered technology, enables new or legacy worker vehicles to safely and efficiently haul goods autonomously. By getting all of your industrial vehicles humming as a single, unified autonomous fleet, you can work faster for less cost.



Safely navigate sites without the need for special infrastructure.



Autonomously haul and tow thousands of pounds of goods.



Switch between autonomous and manual modes to let a human driver take over.



Maintain existing rules of the road and safety protocols. The DriveMod Fleet follows them too.



Batch execute missions based on a variety of flexible, customizable options.



Collect real-time performance metrics to reveal opportunities for optimization.





The age of automation is here, all built on vehicles you already trust.

Cyngn serves the manufacturing, logistics, aerospace, defense, and automotive industries, customizing our autonomous vehicle capabilities for the specific needs of each deployment.

DriveMod works on several vehicle types, giving customers a range of options to address labor shortages, safety issues, and rising costs.



The DriveMod Tugger

Cyngn has partnered with Motrec, a globally recognized manufacturer of industrial electric vehicles, to transform its line of Tuggers into autonomous vehicles that can automate hauling workflows like transferring goods and delivering supplies.

DriveMod enables these Tuggers to make intelligent, real-time decisions and deliver materials to the right place at the right time – automatically.





Streamline Your Operations

Most drivers spend their days hauling goods back and forth, over and over again. From delivering supplies to transferring finished goods, the DriveMod Tugger can automate these repetitive workflows, freeing your team to focus on other responsibilities.



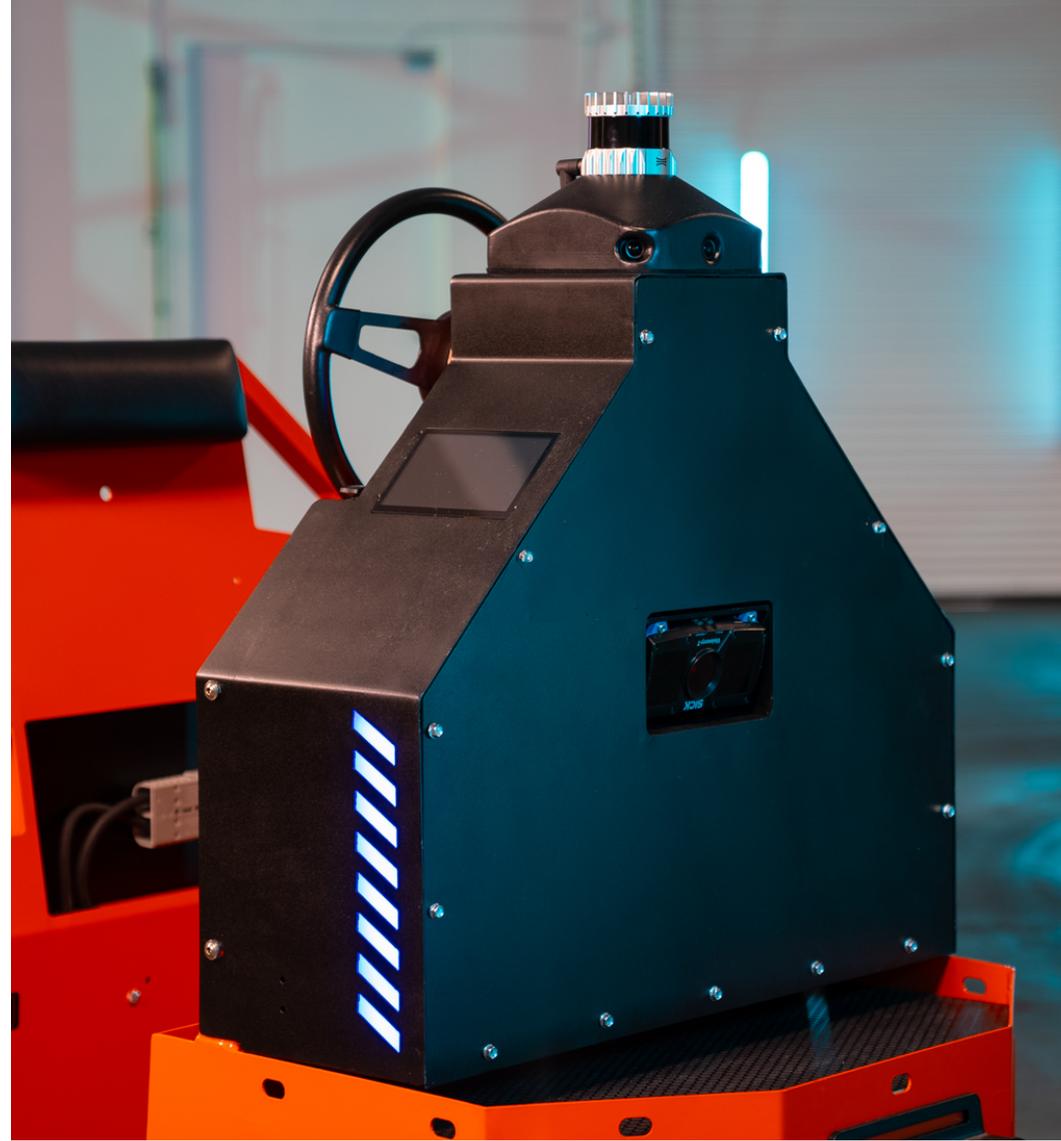
Drive Efficiency

The DriveMod Tugger can take on the most demanding industrial jobs. With a load capacity of 12,000 - 20,000+ pounds, your autonomous tugger will transform how you get work done. Plus, with our automatic unhitching feature, your organization can eliminate the need for human intervention when releasing towed carts.



Ensure Safe Handling of Loads

With its all-steel unibody construction chassis, steel body panels, and standard dual-tire front fork, it boasts ruggedness, stability, and agility. Its smooth driving and precise movements ensure efficient handling of heavy loads.



Technical Specs: Motrec MT-160

Vehicle Information		Chassis	
Dimensions	65" L x 30" W x 55" H	Body	All-steel unibody construction
Deck Dimensions	18" L x 30" W	Steering	Automotive steering wheel
Weight	1,250 ± 100 lbs depending on options	Brakes	Self-adjusting H.D. drum brake, regenerative braking, electromagnetic parking brake
		Wheels	4.8x8 LRC pneumatic tires
Performance		Energy System	
Autonomous Speed (Max)	4.5 mph	Battery Voltage	48V
Manual Speed (Max)	6 mph	Battery Runtime*	8 hours
Towing Capacity (Max)	12,000 lbs.	Charge Time (Lithium)	2.5-4 hrs.
Load Capacity (Max)	500 lbs.	Charge Time (Standard)	8-10 hrs.
Turning Radius	57"		
Minimum Aisle Width	55"		
		<i>*Runtimes are based on manufacturer recommendations. Times may vary based on speed and load weight.</i>	
Safety Features		Sensor Suite	
Emergency Stop		360° 3D LiDAR	
Virtual Bumper (collision avoidance system)		RGB Camera	
LED Visual Communication System		TOF Camera	
Audio Cues			
Automation Interface		Connectivity	
Human-Machine Interface		802.11 Wifi	
		Ethernet Port for Data Offload	
Additional Features			
Auto-Unhitch Capability		Blue Spotlight	
Lithium-Ion Battery			



Technical Specs: Motrec MT-340

Vehicle Information		Chassis	
Dimensions	65" L x 30" W x 55" H	Body	All-steel unibody construction
Deck Dimensions	18" L x 30" W	Steering	Automotive steering wheel
Weight	1,250 ± 100 lbs depending on options	Brakes	Self-adjusting H.D. drum brake, regenerative braking, electromagnetic parking brake
		Wheels	4.8x8 LRC pneumatic tires
Performance		Energy System	
Autonomous Speed (Max)	4.5 mph	Battery Voltage	48V
Manual Speed (Max)	6 mph	Battery Runtime*	8 hours
Towing Capacity (Max)	20,000 lbs.	Charge Time (Lithium)	2.5-4 hrs.
Load Capacity (Max)	500 lbs.	Charge Time (Standard)	8-10 hrs.
Turning Radius	59"		
Minimum Aisle Width	55"		
		<i>*Runtimes are based on manufacturer recommendations. Times may vary based on speed and load weight.</i>	
Safety Features		Sensor Suite	
Emergency Stop		360° 3D LiDAR	
Virtual Bumper (collision avoidance system)		RGB Camera	
LED Visual Communication System		TOF Camera	
Audio Cues			
Automation Interface		Connectivity	
Human-Machine Interface		802.11 Wifi	
		Ethernet Port for Data Offload	
Additional Features			
Auto-Unhitch Capability		Blue Spotlight	
Lithium-Ion Battery			





“Motrec’s MT-160 tow tractor, known for its robustness, durability, and maneuverability, offers an industry-leading 6,000 lbs. of stable towing power. We are excited to bring DriveMod to our tuggers, enhancing our ability to deliver long-lasting products that will take productivity to the next level.”

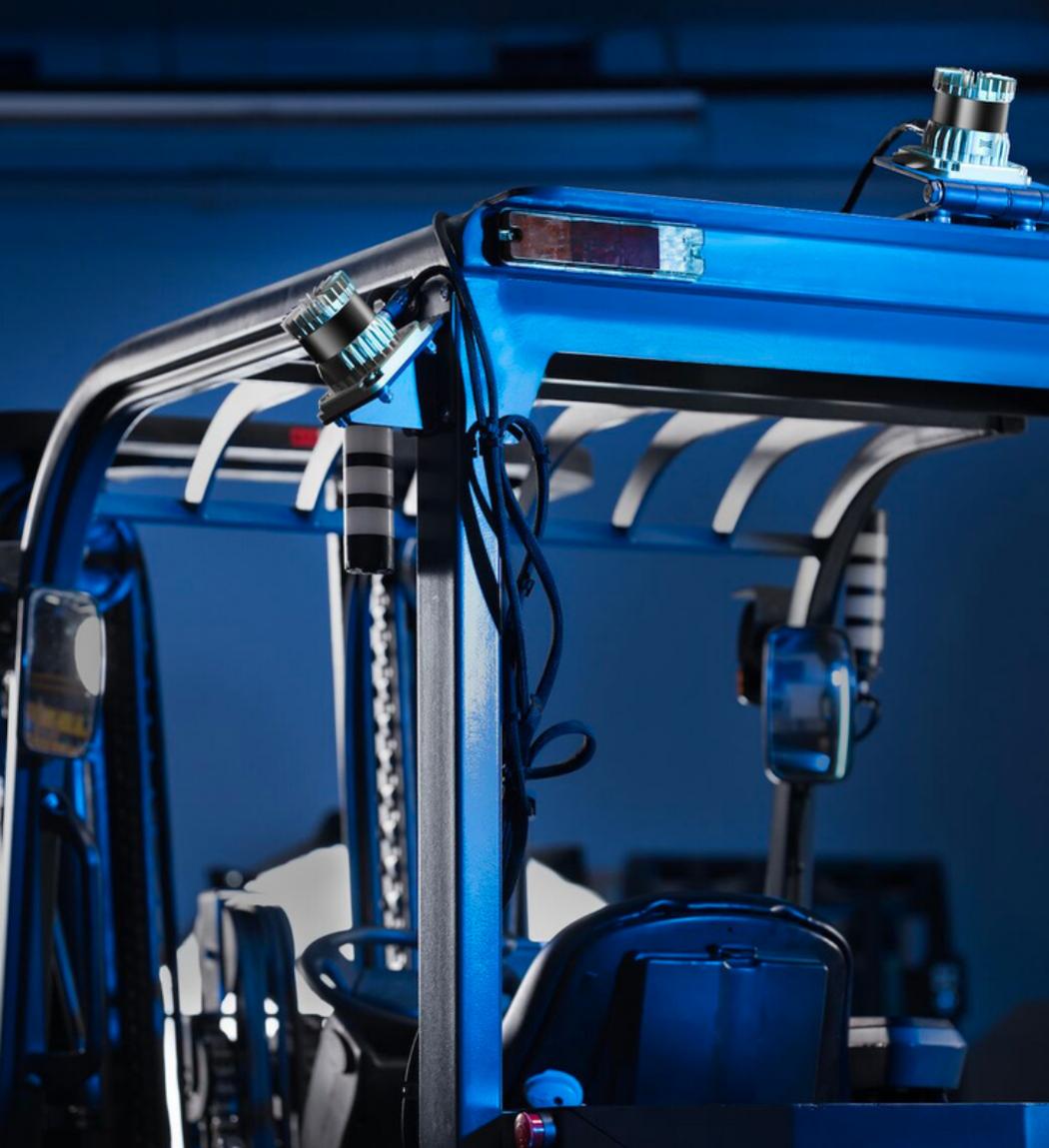
– Blair McIntosh, President and CEO of Motrec International

The DriveMod Forklift

Cyngn has partnered with BYD, a renowned global EV brand, to integrate DriveMod into their fleet of forklifts and transform them into intelligent self-driving robots.

Say goodbye to manual pallet transport workflows and hello to our enterprise-grade autonomous forklift that will literally do the heavy lifting for you.





Works with Pallets of All Sizes

Proprietary AI and computer vision detects and analyzes pallet dimensions in real-time, allowing you to handle materials of any size with ease. Whether you work with standard, non-standard, or custom pallet sizes, our forklift will streamline your operations and ensure a smooth and efficient workflow.



Sophisticated Safety & Stability

The DriveMod Forklift comes equipped with intelligent load bearing features that maintain balance and stability during operation. Smooth driving and precise movements enable it to handle heavy or asymmetrical loads safely and efficiently, without sudden jerks or movements that could disrupt its balance.



Load Capacity & Multiple Unit Stacks

Cyngn has partnered with world-class forklift manufacturers to ensure that the autonomous forklift can do the most demanding industrial jobs. With an industry-leading load capacity of 10,000 pounds, your autonomous forklift will make an incredible impact on how you get work done.



Cyngn Passes Arauco's Forklift Test.

Arauco's Forklift Test is a driving proficiency test that new employees must pass when they start working at one of Arauco's facilities.

To pass the test, drivers must unstack 12 pallets and restack them in another location in less than 15 minutes.

Cyngn's DriveMod Forklift easily passes this test, proving that our vehicles can keep up with the demanding work of modern manufacturers.

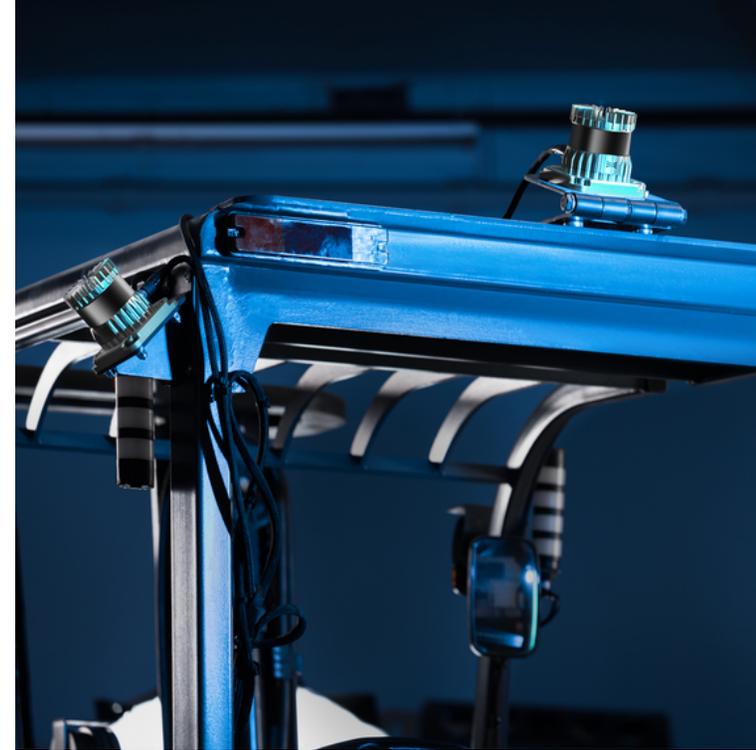
Technical Specs: BYD ECB 50 Forklift

Vehicle Information		Chassis	
Overall Width	59.7 in	Drive Motors	Dual
Length to Face of Forks	115 in	Steering	Synchronous steering
Overhead Guard Height	92.2 in	Brakes	Electric braking system
Service Weight (with battery)	16,170 lbs.	Wheels & Tires	Solid, non-marking solid, pneumatic
Tilt Range (forward/backward)	6/8 deg		
Performance		Energy System	
Autonomous Speed (Max)	4.5 mph	Operating Voltage	80 V
Manual Speed (Max)	11 mph	Battery Power	43.2/64.8 KWH
Autonomous Lift Speed	1.5 - 2 m/s	Type of Drive Control	AC
Load Capacity (Max)	11,000 lbs.	Recommended Runtime*	7-8 hrs. per charge
Turning Radius (Min)	102.4 in	Charge Time	2-4 hrs.
		<i>*Runtimes are based on manufacturer recommendations. Times may vary based on speed and load weight</i>	
Safety Features		Sensor Suite	
Emergency Stop		360° 3D LiDAR	
Virtual Bumper (collision avoidance system)		RGB Camera	
LED Visual Communication System		TOF Camera	
Audio Cues			
Automation Interface		Connectivity	
Human-Machine Interface		802.11 Wifi	
		Ethernet Port for Data Offload	



Technical Specs: BYD ECB 35 Forklift

Vehicle Information		Chassis	
Overall Width	53.5 in	Drive Motors	Dual
Length to Face of Forks	100.8 in	Steering	Synchronous steering
Overhead Guard Height	87.2 in	Brakes	Electric braking system
Service Weight (with battery)	12,320 lbs.	Wheels & Tires	Solid, non-marking solid, pneumatic
Tilt Range (forward/backward)	5/8 deg		
Performance		Energy System	
Autonomous Speed (Max)	4.5 mph	Operating Voltage	80 V
Manual Speed (Max)	9/9 mph	Battery Power	21.6/ 43.2 KWH
Autonomous Lift Speed	1.5 - 2 m/s	Type of Drive Control	AC
Load Capacity (Max)	7,500 lbs.	Recommended Runtime*	7-8 hrs. per charge
Turning Radius (Min)	89.4 in	Charge Time	2-4 hrs.
		<i>*Runtimes are based on manufacturer recommendations. Times may vary based on speed and load weight</i>	
Safety Features		Sensor Suite	
Emergency Stop		360° 3D LiDAR	
Virtual Bumper (collision avoidance system)		RGB Camera	
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Cyngn Insight: Our Autonomous Vehicle FMS

With Cyngn Insight, you can intuitively manage, monitor, and command your self-driving vehicles. Our Autonomous Fleet Management System (AFMS) has been thoughtfully designed to be simple and straightforward to operate. It's so easy to use, teams can be trained before lunch.

Our dashboards give you a complete overview of your fleet's performance and utilization – from anywhere. With this valuable data at your fingertips, you can make informed decisions to improve the efficiency of your operation.

Track key metrics such as –



Location



Battery



Network Status



Current Mission



KPIs and Other Stats



Return Home Function

DriveMod will always be ready to work, whenever you need it. With the Return Home Function, DriveMod's Artificial Intelligence will automatically route vehicles to a designated "home" location if your facility ever goes offline.



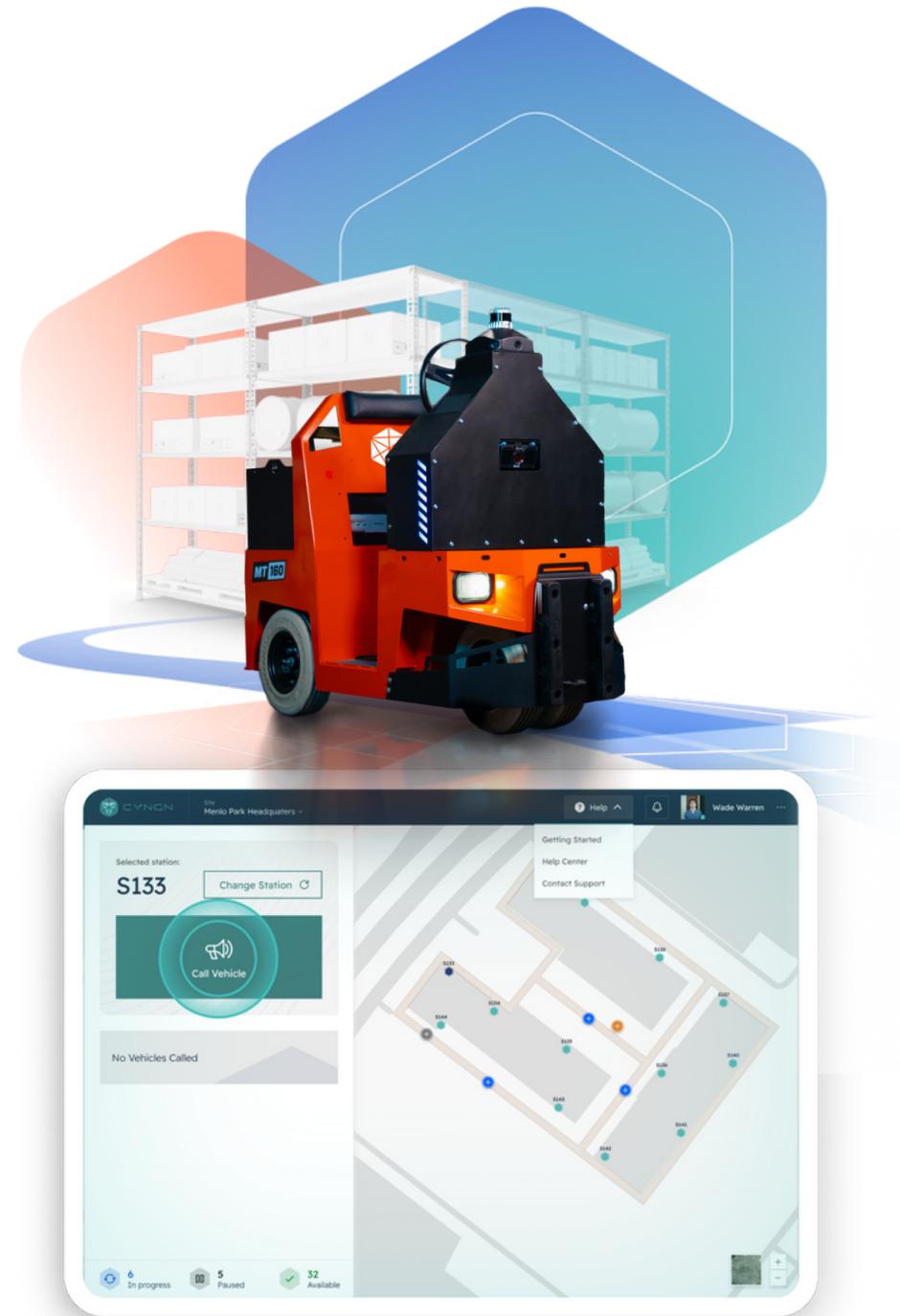
Intelligent Mission Queueing

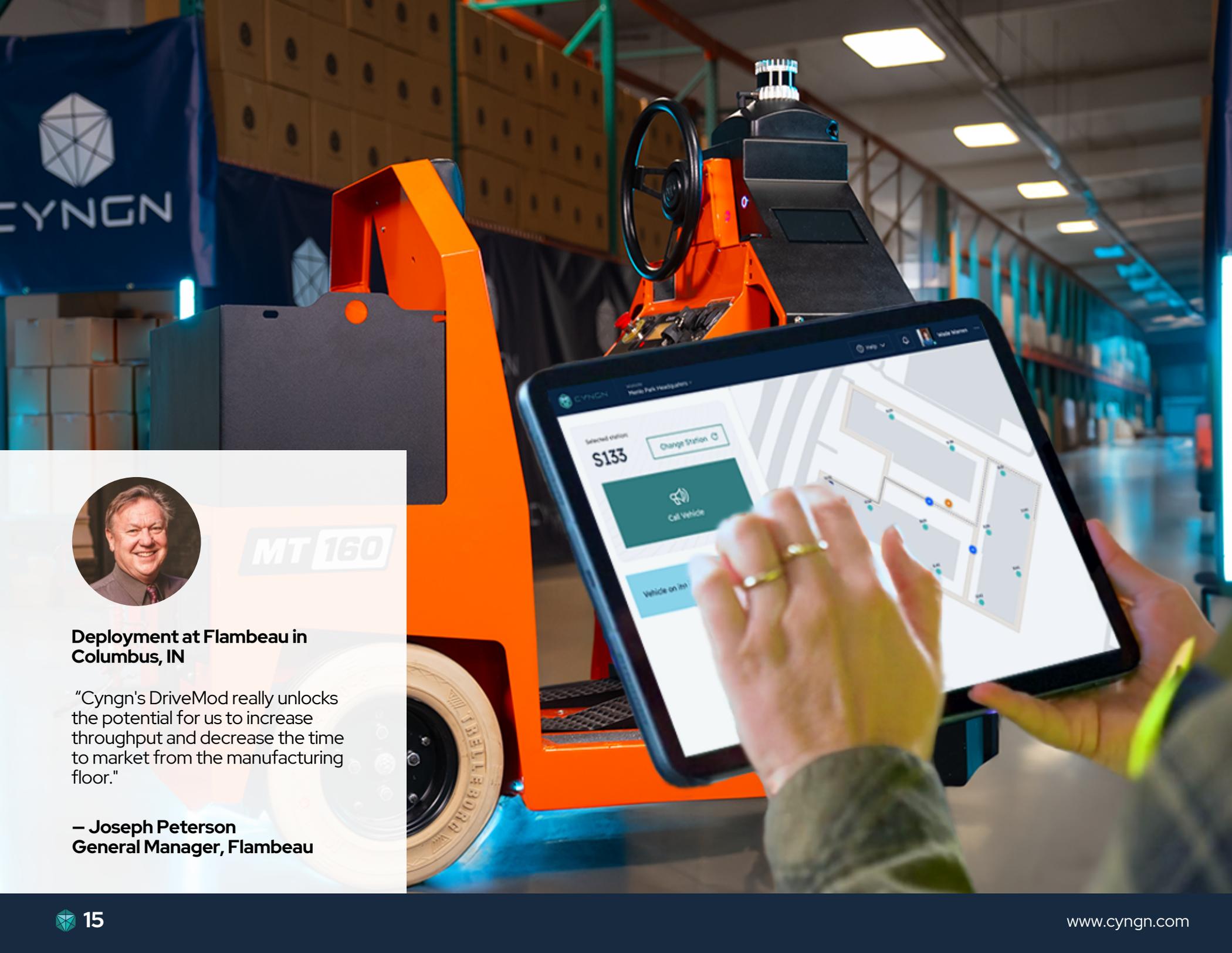
Fleet managers can plan and program an entire shift of work in a single batch. The system has been designed so that you can set it and forget it, all before you finish your first cup of coffee.



Operational Insights

Configurable dashboards track all of your fleet's performance metrics. View specific, actionable information from individual vehicles and the fleet more broadly to uncover bottlenecks and opportunities for optimization.





MT 160

Deployment at Flambeau in Columbus, IN

"CynGN's DriveMod really unlocks the potential for us to increase throughput and decrease the time to market from the manufacturing floor."

— Joseph Peterson
General Manager, Flambeau

Case Study: Autonomy in Action

According to Cyngn's research, DriveMod brings immediate efficiency gains across multiple industries, including logistics and manufacturing.

At the manufacturer U.S. Continental, a substantial human effort of 200 trips per week was required to fulfill pallet delivery between two buildings. However, after deploying our autonomous vehicle, this workload has been seamlessly absorbed. Beyond operational enhancements, the integration of our autonomous vehicles has sparked positive developments in U.S. Continental's workforce. Opportunities for employee growth within the company have emerged, leading to promotions.



"The bottom line is DriveMod has made us more productive. Instead of manually moving goods through the warehouse, our team can stay focused on picking, packing, and other high-value assignments."

– Kenn Morris | Vice President
Global Logistics and Fulfillment

4X FASTER
than a forklift driver.

64% CHEAPER
than a forklift driver.

33% MORE EFFICIENT
than a pallet jack.



Use Case: Autonomous Finished Goods Transfer



1 Worker finishes assembly job and is ready to send the finished goods to the next station.

2 Worker uses a tablet to summon the DriveMod Tugger.

3 Vehicle arrives, and goods are loaded onto the DriveMod Tugger's carts.

4 Worker sends the DriveMod Tugger to the Staging Area using the on-vehicle display.

5 After arriving at the Staging Area, the DriveMod Tugger is unloaded and ready for its next job.

Use Case: Forklift and Tow Tractor Working Together



1 Worker loads inventory onto the DriveMod Tugger's carts.

2 Worker sends the inventory to the appropriate rack, using the on-screen display.

3 The DriveMod Tugger arrives in the aisle to be unloaded by a forklift.

4 Forklift driver sends the Autonomous Tugger back to inventory.

Use Case: Autonomous Point-to-Point Transfer



1 Pack team member finishes packing orders onto the pallets and uses a tablet to call the DriveMod Tugger.

2 Vehicle arrives, and the orders are loaded onto the DriveMod Tugger's carts.

3 Worker sends the DriveMod Tugger to the Outbound Staging Area using the on-vehicle display.

4 After arriving at the Outbound Staging Area, the DriveMod Tugger is unloaded and ready for its next job.

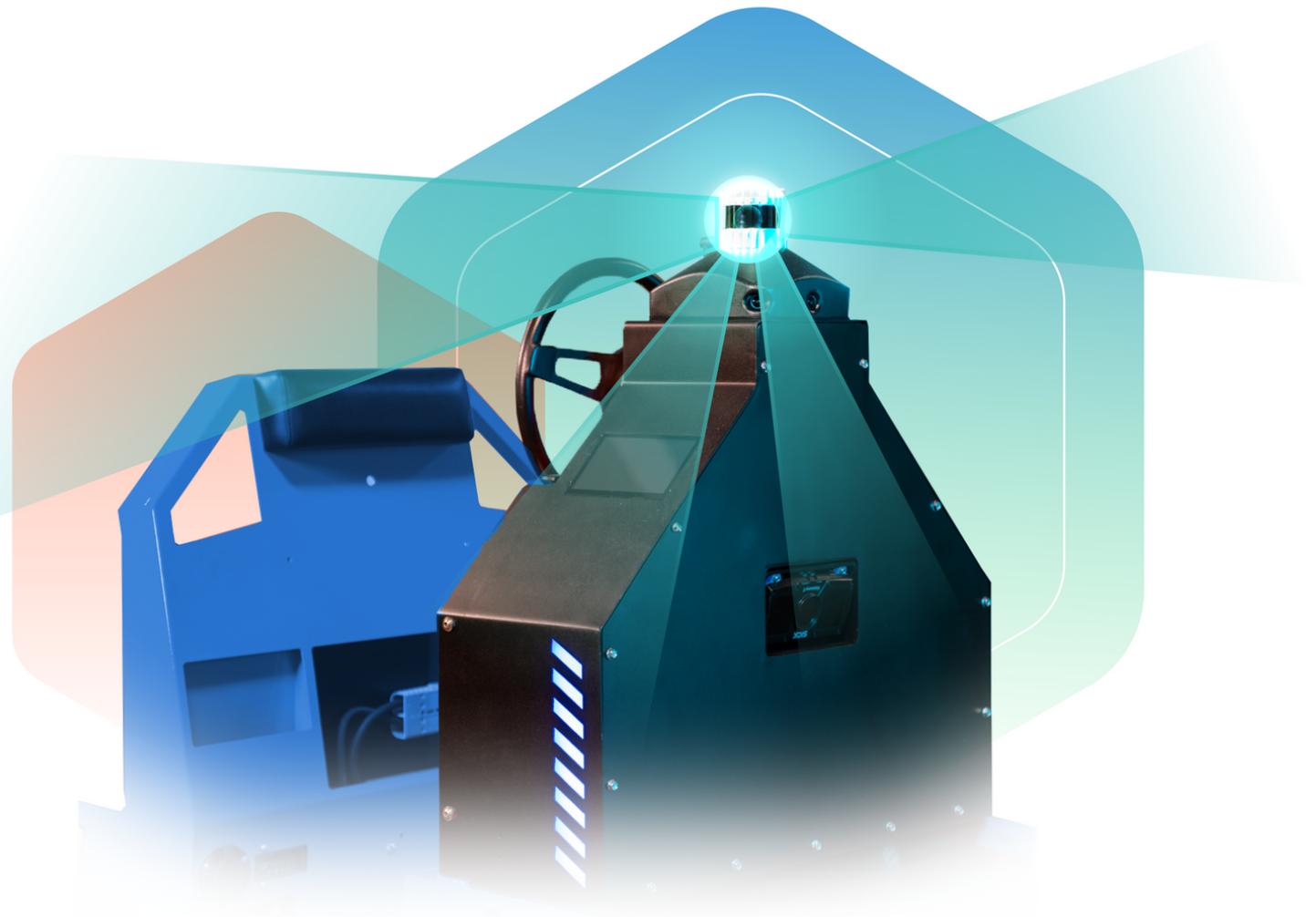
Use Case: Autonomous Work Cell Delivery



- 1 Worker depletes the supply of their materials.
- 2 The DriveMod Tugger is loaded with raw materials.
- 3 Worker calls the DriveMod Tugger using a tablet.
- 4 The DriveMod Tugger navigates to the workcell and is unloaded.
- 5 The worker sends the DriveMod Tugger back to the Raw Materials Area.

24/7, 360° Awareness to Keep Your People Safe

Cyngn's autonomous vehicles come equipped with redundant sensing and communication mechanisms to ensure greater safety. By taking manual and dangerous tasks off of your employees' hands, you can minimize injuries and keep your people safe. Automation can help companies break the cycle of costly safety incidents and create a more positive and productive work environment.



A Complete Safety Solution



See the Complete Picture

LiDARs bring complete 360° vision to the vehicle by continuously monitoring the surrounding area for obstacles and obstructions. The LiDARs we use on our vehicles can see up to 30 meters and do a full scan 10 times per second.



Makes Decisions Instantly

Our Decision Engine interprets what our LiDARs see to make decisions 3x faster than a human driver. Plus, Virtual Bumper, our collision avoidance system, offers an extra layer of safety by essentially doubling the number of systems responsible for safety.



Safety You Can See and Hear

DriveMod Vehicles come equipped with color-coded LED lighting to communicate vehicle status and intent to the workers in the area. We also use audible tones and automated horn honks to help notify your employees when a vehicle is turning, departing, or arriving at a stop.



“Safety continues to be an ongoing priority, which is reflected in the highly technical and rigorously engineered design of our autonomous technology stack.”

– Elizabeth Nelis | Cyngn, Head of Safety

