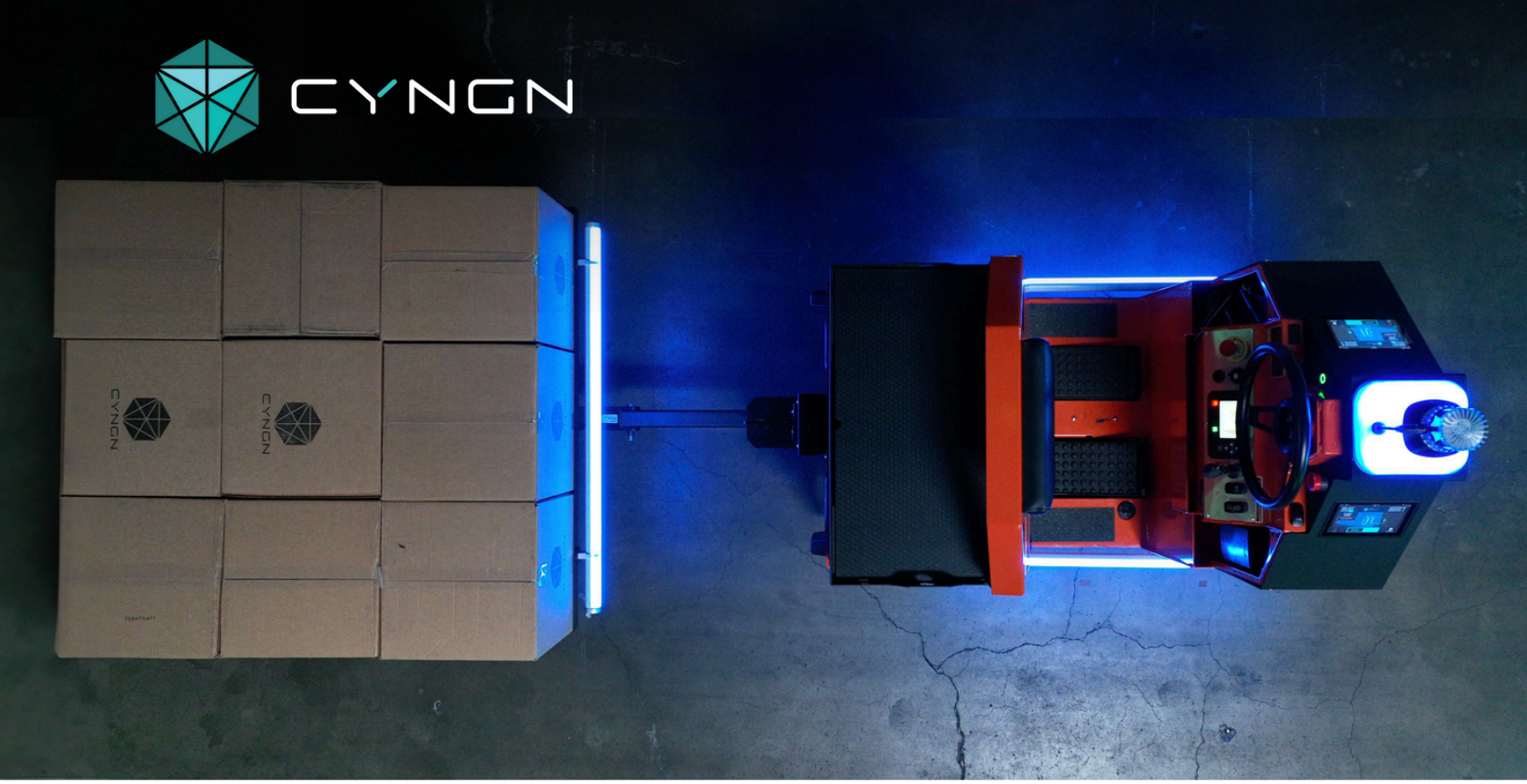

WHITE PAPER

5 SIGNS YOUR WAREHOUSE MAY NEED AUTONOMOUS VEHICLES.

As automation and autonomous vehicle technology rapidly advances, forward-thinking businesses are increasingly evaluating its potential to revolutionize their operations. In fact, according to Fortune Business Insights, the global industrial automation market is projected to grow to $395.09 billion by 2029, a 9.8% increase from 2022.

However, the decision to adopt AVs isn't just about the technology's readiness; it's about identifying whether this innovation can bring meaningful solutions and optimizations to your organization. This article will guide you through the critical considerations to determine if AV technology is not just a possibility but a necessity for your business's future success.

> **"Cyngn has found that it can be up to 50% more expensive to delay your investment in industrial automation. Failing to adopt this technology now can result in even higher costs for your organization."**

WHY AV TECHNOLOGY MATTERS:

As we will explore, adopting autonomous vehicles can significantly enhance your business operations by increasing efficiency, reducing operational costs, and improving safety standards. The relevance of AV technology is growing as businesses seek innovative ways to stay competitive, combat ongoing labor shortages, and transform their processes. In fact, according to Deloitte, 96% of industry leaders deem innovation crucial for growth and 52% of warehouse managers anticipate increased spending on automation and robotics in the coming years.

As a result, understanding your readiness for AV adoption can position your company at the forefront of industry innovation, potentially creating new competitive advantages and opening up previously unexplored business opportunities.

ACTIONS TODAY:

1 DO YOU MOVE GOODS ACROSS LONG DISTANCES?

One sign that your company may need to adopt autonomous vehicle solutions is if your team moves goods manually across large distances. Manual transportation across expansive areas can be time-consuming and labor-intensive. As distance increases, you may find your employees spending more and more of their time driving, as opposed to performing other high-value tasks like pallet creation, order fulfillment, or customer support.

Luckily, autonomous vehicles can support workers by taking on time-consuming tasks like carrying heavy goods, guiding pickers, and handling multiple orders at once across these long routes. For instance, a manufacturing plant that regularly moves raw materials from a warehouse to production lines could significantly reduce transit times and labor costs by implementing AVs.

Working hand-in-hand with AV technology, workers can complete tasks more quickly or they can even be shifted over to higher-value tasks. This shift not only enhances productivity but also ensures that your workforce is utilized in the most efficient way possible.

2 DO YOUR ROUTES INCLUDE REPETITIVE POINT-TO-POINT TRANSFERS?

We've covered how far you travel, but what about how repetitive your routes are?

Repetitive point-to-point transfers are mundane and tend to be very time-consuming for your workers. This could include anything from transporting raw materials from storage to production lines to moving finished products to shipping areas. Furthermore, boredom associated with these types of tasks can be linked to errors, safety issues, lower morale, and employee turnover.

This is where autonomous vehicles can make a significant impact. AVs excel at handling monotonous tasks without fatigue or human errors. They don't tire or lose focus, reducing the risk of accidents and errors. For example, a use case at Cyngn involves one of our autonomous DriveMod Tugger's efficiently navigating a warehouse, handling complex routes with over 30 stops each. As a result, employees can then be redeployed to more engaging and complex responsibilities that require critical thinking and decision-making skills.

Does your operations involve constantly changing routes or highly variable processes, such as facilities handling diverse seasonal goods? If so, it is time to reassess the timing of adopting AV technology and consider the type of solution that best fits your needs. For instance, your organization may want to assess whether an Automated Guided Vehicle (AGV) or an Autonomous Mobile Robot (AMR), which offers greater flexibility, would be more suitable for your dynamic environment.

Explore the differences between AGVs and AMRs here.

3 DO YOUR EMPLOYEES USE FORKLIFTS TO MOVE GOODS?

Forklifts are high-cost vehicles designed primarily for lifting and lowering goods. However, if your workers are relying on forklifts to move goods across your facility, they are essentially tapping an $80,000 tool for a much lower priced job. Beyond the costs, forklifts may not provide the flexibility or efficiency required for handling your repetitive, long-distance, or highly variable routes.

Additionally, forklifts are more expensive to maintain compared to standard tuggers and present numerous safety risks. In fact, forklifts cause more than 90,000 injuries in the workplace each year in the U.S. alone. Not to mention, each incident comes with safety inspections and expensive workers' compensation claims.

The bottom line is that workers should be using forklifts for their intended purpose. If they aren't, this is a sign that your organization should consider adopting autonomous vehicles. For example, another one of our client's use cases involves transporting heavy, forklift-loaded products across various areas of their expansive facility. This technology reduces human contact and minimizes the dangers associated with the dynamic environment of a manufacturing facility or warehouse.

4 DO YOU WANT TO IMPROVE YOUR FORKLIFT UTILIZATION RATE?

When businesses engage consultants to enhance operational efficiency, one key metric they examine is the Forklift Utilization Rate (FUR). The FUR measures how effectively you use your forklift assets. If your forklifts frequently require maintenance, it suggests your fleet is over-utilized. However, if forklifts remain idle for extended periods or if your business experiences seasonal fluctuations, this indicates underutilization.

Switching to AVs could resolve these efficiency issues. By taking over repetitive or time-consuming tasks, AVs can streamline operations and allow forklifts to be used more effectively for their intended purposes.

This approach not only ensures that forklifts are employed for tasks they are best suited for but also helps prolong the lifespan of your equipment. Additionally, AV technology doesn't just enable vehicles to drive themselves; it also provides fleet managers with valuable insights and analytics to optimize the use of their vehicle assets.

5 DO YOUR EMPLOYEES USE PALLET JACKS TO MOVE GOODS?

Like forklifts, pallet jacks that lift, pick, and identify goods, are associated with safety and efficiency limitations that constrain operations. Pallet jacks cannot easily move in tight and narrow spaces, are limited in what they can lift, and can create inefficient long routes for workers.

Therefore, if your employees use pallet jacks to move goods, you may need to shift to autonomous vehicles to improve the productivity of these assets and your overall facility. While most pallet jacks can transport multi-sized pallets weighing around 2,500 pounds across your facility, switching to AVs can increase this capacity to as much as 12,000 pounds when towing, as demonstrated by our DriveMod Tugger.

A shift further eliminates long hauls and improves lift operators' put-away efficiency. By removing the need for a human worker, safety concerns will be reduced, and a business will be able to boost its operations' productivity.

"Incorporating autonomous vehicles into your operations isn't just about keeping up with technology trends, it's about transforming the way you do business for the better."

— Lior Tal, CEO of Cyngn.

BEYOND THESE SIGNS: ADDITIONAL INDICATORS FOR AV ADOPTION

Did you answer "yes" to any of the questions above? If so, your business likely needs to invest in this advanced technology. However, beyond these signs, there are a few other important factors that may indicate your business is ready for this transformative shift.

Here are some additional indicators to consider:

1 LABOR SHORTAGES

If you are facing labor challenges, you are not alone. Finding and retaining skilled workers continues to be an ongoing challenge for warehouse and manufacturing leaders, leading to operational inefficiencies and increased labor costs. In fact, Deloitte recently projected that the U.S. manufacturing industry may require approximately 3.8 million new employees between 2024 and 2033. On top of this, around half of these jobs will likely go unfilled due to labor challenges.

Therefore, organizations can turn to new technologies, like autonomous vehicles, to keep up with this evolving landscape. By automating repetitive and physically demanding tasks, and allowing workers to focus on more fulfilling work, AVs can help your organization reduce labor costs and address labor shortages. For instance, one of our autonomous vehicles was even shown to reduce labor costs by 64%. Plus, not only do happier workers get more done, but they tend to stay longer.

2 PRODUCTIVITY LOSSES

According to the U.S. Bureau of Labor Statistics, labor productivity in the warehousing and storage industry has decreased every year since 2015, with increases in hours worked outpacing increases in output. If your business is experiencing productivity losses due to manual processes and inefficiencies, it may be time to consider AV technology. Tasks such as manual transport of goods, frequent stops and starts, and human errors can significantly hamper productivity.

Fortunately, autonomous vehicles can help companies achieve significantproductivity gains by performing routine tasks more quickly and accurately than humans. This leads to improved operation efficiency, faster order fulfillment, and reduced errors. For example, at Cyngn, our autonomous tugger has also been shown to increase productivity 4x.

3 SAFETY CONCERNS

According to the U.S. Bureau of Labor Statistics, there were a total of 5,486 fatal industrial workplace injuries in 2022. High injury rates and safety concerns, especially related to the use of forklifts and other manual equipment, pose significant challenges for businesses. Prioritizing a safe working environment is paramount for both compliance and employee well-being.

Autonomous vehicles can significantly reduce the risk of harm to both your assets and employees by automating dangerous tasks, therefore reducing both fatal and nonfatal injuries. For instance, at Cyngn, our AVs use multiple sensors and computer vision methodologies to operate with precision and adhere to safety protocols, ultimately enhancing workplace safety.

CYNGN'S CHANNEL SALES MANAGER, JOHN BUTTERY: PERSPECTIVE

I believe in the transformative power of autonomous vehicle technology. Our experience shows that integrating AV solutions not only improves operational efficiency but also enhances workplace safety and employee satisfaction. We have seen firsthand how businesses benefit from reduced operational costs, increased productivity, and a safer working environment.

However, transitioning to autonomous vehicles is a strategic decision that starts with asking the right questions and requires careful consideration and planning. At Cyngn, we are committed to helping businesses navigate this transition smoothly. By understanding your unique needs and challenges, we provide tailored AV solutions that align with your business goals and drive growth.

"Our experience shows that integrating AV solutions not only improves operational effeciency but also enhances workplace safety and employee satisfaction."

— John Buttery, Cyngn Channel Sales Manager

It's become increasingly clear to me that embracing AV technology is not just about optimizing current processes. It's about future-proofing your business against evolving market demands and positioning yourself as a leader in your industry's technological transformation.

Interested in an autonomy project of your own?

Cyngn is capable of integrating its DriveMod technology within a wide variety of environments tailored to your use case specifications. Have a project in mind? Reach out to us here.

Learn more about our autonomous vehicle solutions.