





WEEKLY ASSIGNMENT
DIGITECH OASIS
ROBOTICS ENGINEER

The ROI of Autonomous Mobile Robots

The table below summarizes AMR costs for a goods-to-person or robot-to-goods picking solution with 10 workers.

AMR: Picker Ratio		
Number of AMRs For 10 Workers	 x30	 x40
AMR Capital Cost <i>(\$30k per robot)</i>	\$900,000	\$1,200,000
Annual AMR Maintenance <i>(20% of Capital Cost)</i>	\$180,000	\$240,000
5 Year Cost <i>(Maintenance x5 + Capital Cost)</i>	\$1,800,000	\$2,400,000
Annual Labor Savings at 2x Productivity <i>(ROI Horizon)</i>	\$350,000 <i>(5+ years)</i>	\$350,000 <i>(8 years)</i>

1. We are assuming a ratio of 3 or 4 robots per human picker. That is the robot: worker ratio suggested by robotics companies to achieve maximum productivity and throughput.
2. Based on published reports, the [cost per AMR](#) is approximately \$30,000, plus [20 percent](#) annual maintenance. (Note that these cost and ROI figures do not include implementation costs for [WMS integration](#), development, on-site testing and deployment, and training.)
3. For purposes of our ROI calculations, we compared the costs for installing AMRs to the labor costs saved by using robots.
4. We estimated average annual labor costs per worker of \$35,000 (roughly \$17.50/hour including benefits).
5. We used these costs to estimate the time to achieve a 100% return on investment (ROI Horizon, in the chart) in DCs achieving 2X and 3X greater productivity with robots than without.

6. Our ROI calculations for 2X productivity (a 100% increase in pick rates/hour compared to picking without robots) assumes the same level of production with 20 full time pickers and no robots compared to 10 workers with robots.
7. *In that scenario it would take more than five years for a DC to earn a 100 percent ROI.*
8. The 3X productivity figures (a 200% increase) are based on 30 full time pickers with no robots compared to 10 workers with robots. *In this case, a DC that triples productivity would see a total return on its investment in 1.5-3 years, depending on the number of robots per picker.*

Note: these figures assume there are no other costs associated with deploying AMRs, including new staff to maintain the new equipment.

How to Increase the Return on Investment of AMRs?

A recent research report [performed by ABI Research](#) concluded there will be more than 4 million commercial robots installed in 50,000 warehouses by 2025. Ecommerce orders will continue to put [stress on warehouse operators](#), causing them to invest in both extra labor and automation.

To increase the ROI of autonomous mobile robots, [DCs can implement AI-based software solutions that can optimize processes and direct the activities of robots and people](#), while providing flexibility, scalability, and efficiency.

These solutions meld work execution for manual activities with robot control systems. Most importantly, these solutions will strike a balance across a number of operational objectives, not just reduced labor costs.

And the link for the mentioned website purely focusing on AI approach for warehouse robots and solutions for AMRs is mentioned below.

<https://www.lucasware.com/>

And the below whitepaper discusses about the optimal time for investing in the AMRs

[../././Downloads/Whitepaper-The-Optimal-Time-for-Investing-in-AMRs-v01.06.pdf](#)

These are some of the methodologies and research I have worked on this week, I would like to have a discussion and want to hear your opinion on the various methodologies

Thanking you