WHITEPAPER

POWERFUL NEW IDEAS *In Material Handling and Movement*



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TABLE OF CONTENTS

Introduction	1
Drivers of Change in Material Handling and Movement	1
Forklift Challenges	2-3
Modern Alternatives	3-4
Reinventing the Modern Warehouse and Manufacturing Facility	5
Calculating the ROI of Vehicle Modernization	6
Preparing for the Future of Manufacturing and Material Flow Management	7

Executive Summary

The rapid rise of ecommerce—in addition to thriving plastics, automotive and tech manufacturing sectors—have created new challenges for warehouse and manufacturing facilities, leading them to look for new ways to drive operational efficiency in order to meet growing demand on labor and resources. Using right-sized, task-matched vehicles across operations can help optimize the entire warehouse or manufacturing process.

Differentiating between horizontal and vertical material handling can help inform vehicle allocation—reducing reliance on expensive, accident-prone forklifts where they are unnecessary and replacing them with tow tractors and trailers for faster, safer, more efficient horizontal material movement. Tow tractors are already a leading solution in many other industries and settings, such as airports, and can deliver similar value to manufacturing and warehousing applications.



Introduction

Rising Demand Exposes Operational Flaws

Rapid growth in ecommerce over the last decade has increased demand on facility workflows and heavy-duty industrial vehicles to record highs. In the U.S. alone, retail ecommerce rose from \$298 billion in 2014 to \$452 billion in 2017—driving labor shortages and leading facility managers to look for new ways to improve performance in order to meet the dual demands of rising volume and tight delivery windows.¹

Developing more efficient workflows starts with careful evaluation of current industrial vehicle utilization. Production and warehouse operations are only as efficient as their employees and vehicles.

According to one analysis measuring overall equipment effectiveness (OEE), the average warehouse operates at just 60% of its theoretical capacity, while even the most cutting-edge facilities only reach 85% efficiency.² Leading warehouse and distribution operators say the two biggest challenges inhibiting efficiency are insufficient space and inability to attract qualified employees.³

However, both of these challenges are symptoms of fundamentally outdated handling processes that—if properly addressed—can help alleviate the strain on manufacturing facilities and drive them toward more sustainable workflows.

One way to achieve this objective is through redesigned material handling and movement throughout the facility. Current facility best practices rely heavily on forklifts for both vertical and horizontal movement, but development of new vehicles and vehicle capabilities such as tow tractors and tug systems offer new alternatives with high ROI potential. Using right-sized and task-matched industrial work vehicles at each stage of the operation can minimize the challenges—and risks—created by inefficient, outdated processes, while also infusing new cost efficiencies that can stimulate operational growth.

Drivers of Change in Material Handling and Movement

The traditional approach to keeping pace with rising demand in warehouse and manufacturing operations is to expand footprint. Unfortunately, while this does expand capacity, it also brings additional real estate costs, labor requirements and other new expenses. Forward-thinking operations are taking a new approach to improving productivity and capacity: integrating workflow innovations that emphasize productivity and safety without sacrificing cost efficiency.

Adaptations in material movement processes represent one of the simplest approaches to increasing facility performance and time and cost savings—in addition to other valuable benefits such as labor reallocation and increased workplace safety.



1 https://www.statista.com/statistics/272391/us-retail-e-commerce-sales-forecast/

2 https://www.cbinsights.com/research/future-factory-manufacturing-tech-trends/

3 http://www.supplychain247.com/article/2015_warehouse_dc_operations_survey_results

Forklift Challenges

Forklifts have long dominated vertical material movement in warehouses and manufacturing facilities.

Over time, forklift usage has been adopted in many other scenarios that offer limited benefits and, in many cases, have created new challenges and risks to the operator, the product and the entire warehouse operation.

For one, forklifts require a high level of training to operate safely. Only experience can help minimize the risk of costly, and sometimes fatal, injuries on the job. Yet a growing skills gap makes acquiring a highly trained and experienced labor force expensive and time consuming. According to one study, it takes, on average, more than two months to fill positions for skilled production workers.9 When unskilled workers are used to plug the gaps, facility risks go up. According to OSHA, an estimated 70% of forklift-related accidents could have been avoided with proper training.¹⁰

Common Warehouse Footprint.

Heavy reliance on inefficient forklifts for horizontal material handling creates congested workflows.

The Forklift Cost Efficiency Fallacy

Despite their association with warehouse and manufacturing best practices, forklifts have limitations that minimize their cost efficiency. Here are three reasons to think twice about where and when you utilize forklifts in your operation:



Accidents: Frequent and Costly.

Each year, 1 in 10 forklifts in the U.S. will be involved in an accident, costing businesses as much as \$135 million in injuries, lost work and equipment damage.4 The average cost per forklift accident is \$188K.5





Significant Operating Expenses.

Forklift trucks and drivers account for nearly 80 percent of operating expenses.⁶ A \$10,000 forklift might cost as much as \$145,000 to operate each year.7

Labor Waste and Resource Allocation.

By 2025, two million manufacturing jobs will remain unfilled due to a skills gap.8 Rising demand for skilled workers has contributed to higher operational costs.



5 National Safety Council

6 http://info.totaltraxinc.com/blog/fleet-right-sizing-the-costly-mistake-of-using-too-many-lift-trucks

7 http://info.totaltraxinc.com/blog/fleet-right-sizing-the-costly-mistake-of-using-too-many-lift-trucks 8 Deloitte/The Manufacturing Institute https://www2.deloitte.com/us/en/pages/manufacturing/articles/future-of-manufactur

ing-skills-gap-study.html 9 Deloitte/The Manufacturing Institute

10 https://www.manufacturing.net/blog/2017/01/infographic-10-rules-forklift-safety

OSHA estimates that forklift accidents injure 20,000 workers every year, resulting in an average of 85 deaths.¹¹ These workplace injuries create more than \$100 million in additional costs to businesses annually.

Beyond their inherent safety risks, forklift usage also includes additional costs that limit effectiveness and increase operating expenses year-over-year. Frequent maintenance intervals, combined with fuel costs and many other additional costs, can quickly drain vehicle budgets. As a result, understanding where forklifts benefit the operation and where less expensive, more effective alternatives would be better suited for the job can help drive new productivity-at a fraction of the cost.

Modern Alternatives

Modern manufacturing facilities and warehouses can capture cost savings by focusing on matching task to vehicle. For example, simply by differentiating between vertical and horizontal material handling and movement, facilities can begin to uncover horizontal movement facility processes where forklifts do not offer efficiency advantages over other industrial vehicles.

In these cases, tow tractors and trailers provide facility managers with a simple vehicle modernization strategy that optimizes costs and productivity.

Common Forklift Safety Risks Include:

- Hydraulic Systems
- Frequent trips on Congested Pathways
- Unconventional Travel Requirements
- Limited Visibility
- Vehicle Instability

Fork Strikes

Redesigned Warehouse Footprint.

Utilizing tow tractors for horizontal material handling reduces



11 https://www.manufacturing.net/blog/2017/01/infographic-10-rules-forklift-safety

Work Faster

Increased productivity represents one of the primary benefits realized by replacing forklifts with tow tractors and tug systems for specific horizontal material movement tasks in the warehouse and manufacturing facility. Tow tractors and tug systems reduce material delivery time by up to 50% by moving higher load volumes in fewer trips.

"By implementing tow tractors, I was able to reduce my material delivery time by over 50% and workforce needs by 10%." – Manufacturing Engineer

Work Safer

Compared to forklifts, tow tractors are much easier to operate. They eliminate the risks created by limited visibility, load instability, fork strikes, hydraulic systems and unconventional travel requirements. Since 2002, there have only been eight total OSHA-reported tow tractor incidents, while there are nearly 35,000 OSHA-reportable forklift accidents every year.¹²

"By implementing tug systems, we reduced forklift accidents by 100% in our highest traffic area." Environmental Health and Safety Manager

Work More Efficiently

Tow tractors are up to four times more efficient for moving materials horizontally than a forklift.¹³ Fewer trips decreases congestion throughout high-traffic areas and allows employees to be re-utilized in other production areas to further enhance operational efficiency.

"Tug systems helped us achieve 4X greater horizontal movement efficiency by increased load volumes and decreasing trip frequency." – Warehouse Manager

12 https://commercial.polaris.com/en-us/material-handling/#increased-labor-efficiency 13 https://commercial.polaris.com/en-us/material-handling/#increased-labor-efficiency















Reinventing the Modern Warehouse and Manufacturing Facility

Innovative manufacturing and warehouse ecosystems will soon begin to tip the balance against more conservative processes that are holding many facilities back from achieving elevated productivity and maximizing their operational potential.

A Global Manufacturing Competitiveness Index (GMCI) study found nations who actively invest in exponential manufacturing technologies and innovative ecosystems are more competitive than those facilities that choose to compete on price alone.¹⁴ Processes that can improve product quality and deliver longlasting margin improvement are the key goals driving many of these innovations across industries and workflows.

"Warehouses are changing because business is changing." – Matthew Butler, Director of the Industry Strategies team at JDA¹⁵

Reimagining warehouse and manufacturing workflows offers a good place to start—while simultaneously creating additional flexibility for future advancements in workflow design.

Using a combination of tow tractors and forklifts enables facilities to scale up to meet rising demand on resources by achieving new efficiencies in outdated workflows. Across the average manufacturing operation tow tractors and forklifts can increase operational speed while reducing overall vehicle requirements and cost. Picture this: A smaller fleet of forklifts loads and unloads received materials and ships finished goods. Tow tractors—equipped with trailers—manage additional material movement needs, transporting more material per trip from the receiving dock to the assembly line and back to the trucks for shipping to the final destination.

Create a Closed-Loop Work Flow



Forklifts — Travel 10 Miles Daily

Requires multiple trips and more workers



Tow Tractor — Travels 3 Miles Daily

- · Minimizes trips and workers needed
- · Lowers costs and carbon emissions

Closed-Loop Tasks for Tow Tractors

- · Drive loaded trailers to assembly line
- · Pick up empty pallets and trailers from assembly line
- · Return to racking with empty carts to reload

14 https://www.forbes.com/sites/louiscolumbus/2018/04/15/the-future-of-manufacturing-technologies-2018/#d056cfb29955 15 https://www.supplychaindive.com/news/how-modern-warehouses-are-different/545432/

Calculating the ROI of Vehicle Modernization

Reengineering warehouse and manufacturing facility processes to utilize tow tractors requires minimal upfront costs, but has the potential to deliver significant total cost of ownership and labor savings over the life of the vehicle.

Acquiring new forklifts can be prohibitively expensive—often costing 2-3x more than a new tow tractor. By replacing unnecessary forklifts with tow tractors and trailers year-over-year, facilities can achieve cost-effective adoption while immediately beginning to capture efficiencies and long-term cost savings.

For example, one facility operating 32 forklifts was able to reduce its fleet needs to only eight forklifts by acquiring six tow tractors and additional trailers over a five-year period. Despite initial tow tractor acquisition costs, reduced total cost of ownership generated **millions** in total savings.

Even at the 1-to-1 level, for every forklift that can be replaced with a tow tractor and trailers, warehouse and manufacturing facilities can realize an average of \$22,200 in total cost of ownership savings over five years. These ownership savings are supplemented by additional safety and labor savings due to more strategic labor allocation and minimized opportunities for forklift accidents. Workflow efficiencies and increased productivity also have the potential to generate revenue growth as a direct result of tow tractor adoption.

Small Forklift Fleet = Big Savings

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Case Study: Fleet Total Cost of Ownership

By reducing its forklift fleet from 32 to 8 and adding 6 tow tractors with trailers, Company A cut its vehicle costs in half. In just 5 years, Company A will save millions in vehicle costs, safety savings and labor efficiencies.

Vehicle Type	Avg. Annual Operating Cost*	Total Op. Cost	Acquisition Cost	Residual Value	TCO per Vehicle**	Fleet TCO***	
Total Forklift	\$19,092	\$83,747	\$147,600	\$72,833	\$164,498	\$1,517,736	
Total Order Picker	\$12,365	\$54,900	\$165,205	\$81,520	\$138,585	\$233,284	
Current Fleet Total	\$19,092	\$193,547	\$478,010	\$235,874	\$441,667	\$1,984,304	÷
Total SC-100	\$2,130	\$9,570	\$35,730	\$17,631	\$27,669	\$53,188	
Total TT-316	\$12,365	\$54,900	\$165,205	\$29,977	58,193	\$408,601	
Total Trailers	\$300	\$1,920	\$20,000	\$2,000	\$13,070	\$61,923	
Updated Fleet Total	\$14,130	\$68,250	\$197,230	\$81,585	\$170,195	\$994,236	÷

Additional Savings Include

Safety Savings	\$135,135
Labor Efficiency	\$1,937,071

Vehicle Savings \$990,068

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Preparing for the Future of Manufacturing and Material Flow Management

Reimagining warehouse manufacturing processes through industrial vehicle utilization and material flow management is only the tip of the iceberg. Future facility advancements promise to build on these new efficiencies to create even more productive, cost-effective workflows. And they may be coming sooner than you think.

The logistics automation market is projected to grow to \$80.64 billion by 2023, at a CAGR of 11.8%."¹⁷

- Research and Markets

As the widespread adoption of autonomous vehicles in the warehouse draws nearer, the simplified operability of tow tractors and tug systems offers a unique advantage for operations seeking to harness additional time and cost advantages over manual material movement processes.

Innovative warehouses and production lines have already begun to adopt forward-thinking manufacturing practices that lay the groundwork for fully integrated automation and IoT technologies in the future. Combined with the simplified material movement processes provided by tow tractors and the evolving capabilities of predictive analytics, facilities will be empowered to identify and solve transportation inefficiencies across the entire operation. Soon, these predictive capabilities will allow manufacturers to virtually eliminate unscheduled vehicle downtime and maintenance bringing facilities ever closer to levels of productivity and efficiency once considered unachievable.

Taylor-Dunn Delivers Proven Vehicle Solutions for the Modern Warehouse

Converting forklifts to Taylor-Dunn tug systems in horizontal material flow areas can help alleviate current operational challenges that affect safety, labor efficiency and productivity. These rightsized, task-matched tug systems fit seamlessly into existing material flow processes and can help optimize vehicle usage and deliver productivity and operational speed improvements. By differentiating between horizontal and vertical material handling and movement functions, facility managers can achieve improved vehicle allocation—reducing reliance on expensive, accident-prone forklifts where they are unnecessary and replacing them with tow tractors and trailers for optimized horizontal material movement.



Schedule a **FREE** MATERIAL FLOW COST ANALYSIS to improve your material handling strategy

763-847-8412 https://commercial.polaris.com/en-us/ material-handling/

17https://www.prnewswire.com/news-releases/global-logistics-automation-market-to-2023-300654375.html

