

TALENTUM ENGINEERING SERVICES
4 FEBRUARY, 2022

CUT LABOR COSTS BY 40%

THE LABOR SHORTAGE IS REAL

Manufacturers are faced with an existential problem: they can't keep their factories staffed, so they can't meet rising demand for their products. According to Fortune Magazine in October 2021, **73% of CEOs said their business strategies are being impacted by labor shortages**. The labor crunch is causing uncertainty in the supply chain, which leads to upset customers and lower profits.

Many of our colleagues and clients tell us they can't find workers. According to BioMedSA, a hub for the life science industry in Central Texas, all of the manufacturers associated with the organization are struggling to find and retain labor. By our experience, 100% of the manufacturing sector would be likely to complain about lost revenue due to labor shortages.

There are two fundamental solutions to this problem. The first is recruiting and retention, to compete for a larger share of the existing labor pool. The challenge is that most companies are already maximizing their HR and labor budgets, which further tightens the labor market, and comes at a cost of higher COGS.

The second option is to automate with machinery, robotics, and digital technology; leaving more complex tasks to humans. In our experience, most small and mid-sized manufacturers can increase their **first pass yield by up to 40%** through implementing the latest technologies in automation. This paper presents several common automation solutions that these manufacturers need to consider, to keep up with demand and the competition in spite of labor constraints.

THE HISTORICAL DOMAIN OF ROBOTICS - DULL, DIRTY, AND DANGEROUS TASKS

Repetitive tasks in dull, dirty, and dangerous areas have been among the first to be automated in American factories. Until recently, industrial robots have been dangerous and expensive solutions that need to be surrounded by safety fencing and are typically designed by experienced engineers for specific tasks, such as welding car frames together. **These constraints have led robotics companies to focus on solutions for these dull, dirty, and dangerous areas, ignoring those where humans are present such as warehouses and distribution centers.**

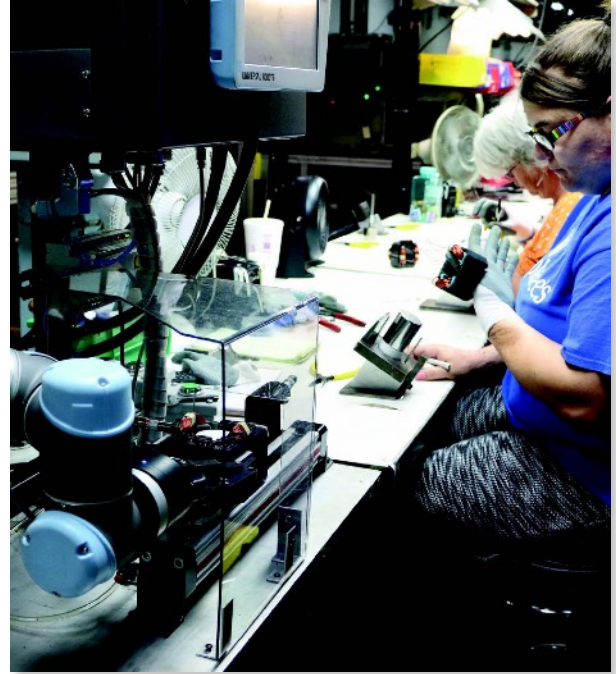
Semiconductor foundries are an example of successful automation through robotics. Wafers are processed for months with very little human intervention. To start the process, a wafer is transported between tools in overhead conveyers (AMHS - Automated Material Handling Systems) and handled by robot arms. Each tool subjects the wafer to a process - etch, deposit metal, clean, and other functions where automation is essential to conform to the "recipe". Robots eliminate human handling errors and do work inside of tools where low pressure, high temperature, and chemicals present safety hazards to humans.

With each wafer valued up to tens of thousands of dollars, any increase in yield generates significant ROI. Full automation is therefore a requirement for any modern semiconductor foundry to operate profitably. Other areas where full automation are essential for operating profitably include automotive, shipbuilding, and steel fabrication.

THE NEW DOMAIN OF ROBOTICS - ANY FACTORY OR WAREHOUSE

So where is the modern frontier for automation? Following in the footsteps of larger companies such as Amazon who acquired warehouse automation company Kiva Systems to largely automate their warehouse operations, we believe the frontier is the small to mid-sized factories, food packing plants, distribution centers, and in any business where people are needed to physically perform repeatable tasks. **Nearly all factories will need to automate at least some of their operation** to mitigate the tight labor market and compete both local and globally.

To automate existing facilities where humans work in close proximity with robots, two technologies have emerged. The first is the Cobot (Collaborative Robot), which are arms with sensors that detect collisions with people or objects to avoid causing injury to people or damaging material. Universal Robots (UR) is the current leading producer of Cobots - deploying over 50,000 in factories worldwide. TES developed a packing UR Cobot cell for manufacturers that can load cases of various size, shape, and materials into standard or custom shipping boxes. This solution is designed to **reduce the headcount in manual shipping area by over 80%**, with future opportunity to reduce by 95%.



Cobots - Doing More with Less People

Cobots are perfect tools for handling material near people - whether it's a metallic part picked from a bin to be placed in a CNC milling machine, a bag of bread to be packed in a box, a pail of discarded scrap to be placed on a cart, parts for inspection, or thousands of other use cases.

Due to the **collaborative and safe nature** of Cobots, they can be repurposed much more easily than industrial robots without the need for the experienced engineer. A line technician with introductory programming training on a Universal Robot can quickly "script" a movement procedure for the Cobot and test to pick a part out of a shelf and place it in a machine.

The largest growth area in material movement automation is **Autonomous Mobile Robots (AMR)**. AMRs are robots equipped with smart vision cameras, sensors, and software applications to determine optimal path to transport material or tools. Some applications include transporting parts, removing scrap, or



AMRs Transport Material on Optimal Paths

tending machines if equipped with robot arms. They can be easily programmed by laymen and integrated with existing factory software, with machine learning algorithms enabling more complex decision making. As AMRs become smarter and easier to program, they are able to **take over more manual material movement operations and optimize processes** with little to no human input.

These two technologies are excellent choices for most existing facilities struggling to find workers as they can be **dropped into any environment without reconfiguring the workflow**. If your facility has grown in a sprawling fashion over time, then AMRs will help **streamline your flow** through efficient routing without human involvement.

REDUCING LABOR REQUIREMENTS BY 40%

Manufacturers across the US are moving quickly to automate all parts of their factories because of staffing shortages, safety, human factors, and also to keep up with competitors who are moving quickly to automate. According to the CEO of the e-commerce company DCL, newly incorporated robotic lines area generate **200% more product using the same number of people**.

To demonstrate that a factory can **reduce staff by up to 40% while achieving the same output by incorporating Cobots and AMRs**, we developed a realistic scenario based on a fictional manufacturing company similar in structure to our clients. This example is a consumer goods manufacturer who receives and stocks piece parts, processes them using automated machinery, cleans, inspects, and ships final items to a distributor. Although automated machinery is used to machine the parts, the automation opportunities lie in other process areas - material handling, machine tending, part picking, inspection, and final shipping. A factory of 50 people per shift can typically reduce staff by the following amounts when implementing the following automation complement of AMRs, Cobots, and other automation or inspection equipment.

	Current Staff	Future Staff	AMRs	Cobots	Other Automation
Receiving	4	2	1	1	
Stockroom	6	3	2	2	1
Manufacturing	32	22	2	6	
Inspection	4	2		1	1
Shipping	4	1		2	
TOTALS	52	30	5	12	2

Final Automated State - 40% Labor Costs Saved
 From 52 people per shift to 30 people with 19 automation solutions

The total 3-year investment for these 19 automated components is \$3.3M. The end state is \$2.4M annual labor savings completely paid off in year 4, with **ROI for each solution achieved within 24 months**. The following chart demonstrates the time-phasing of investment and resultant labor savings.

	Year 1	Year 2	Year 3	Year 4	Year 5
Investment (M)	1.1	1.1	1.1	0	0
Labor Savings (M)	0.2	0.8	1.5	2.4	2.4
Annual Savings	-0.9	-0.3	0.4	2.4	2.4

Additional improvements in efficiency and quality may result from incorporating additional software and hardware technologies, such as Redzone software to increase equipment and people efficiency, conveyers, automated forklifts, automated storage and retrieval systems, and custom machinery. In our experience, an initial simulation of the current state of an operation typically uncovers opportunities to **increase efficiency through process changes alone**.

RETURN ON INVESTMENT AND AFFORDABILITY

The good news is these newer technologies **pay for themselves quickly, typically between 10 and 24 months**, especially when multiple shifts are considered. Integration costs are steadily dropping due to the simplicity and configurability of Cobots and AMRs. ROI is achieved through repurposing labor, increasing efficiency, reducing defects and errors, and eliminating stop loss.

To accommodate the smaller CapEx budgets for small and mid-tier operations, robotics vendors are beginning to offer Robotics-as-a-Service (RaaS), where users pay an **hourly usage rate or monthly fee instead of a larger upfront investment**. These offerings may cost more over time, but help maintain near-term cash flow and reduce maintenance technician workload.

GET YOUR FREE TES AUTOMATION AUDIT

TES helps small and mid-tier manufacturers and distributors plan for the future of automation. With our wide and deep experience helping factories automate, and our commitment to staying in front of the technology curve, we have the ability to **quickly identify low hanging fruit** in your operation and provide you with several options to **reduce costs and compete** in spite of the tight labor market.

TO RECEIVE A FREE AUTOMATION AUDIT, CONTACT US TODAY AT SALES@TALENTUMSERVICES.COM.

WHAT OUR CUSTOMERS SAY ABOUT US

"<TES> has been an amazing partner for us. Reliable and professional from the start. <TES> is an absolute problem solver and thought partner. I can highly recommend..."

- VP of Engineering for a \$1B+ Manufacturer

"One of the best engineering and general contracting services I have worked with. We found this organization extremely creative, flexible, efficient, and cost effective. TES seemed to have a deep reach with technology and capable resources. It has been a great experience working with TES. We will continue working with these talented and hardworking partner"

- Executive Six-Sigma Lean Black Belt for a \$1B+ Distribution and Manufacturing Company

"I have worked with Talentum Engineering Services (TES) many times. TES is extremely professional, responsive and creative with their solutions. I have been very pleased with the past experiences and will continue to use TES in the future"

- CEO of a Small Business