AUTOMATION WITHIN REACH

Robotic Automation

If you are considering automating your CNC machining operations but have questions about cost, ROI, implementation, or operational impact, this whitepaper will help you evaluate whether robotic automation is the right fit for your shop.

Why Manufacturers Invest in Automation

This whitepaper explores the operational and financial advantages of robotic automation, regardless of machine tool brand, robot model, or system configuration.

The contributors have designed, built, installed, and supported hundreds of robotic automation systems for manufacturers ranging from small job shops to Fortune 100 companies.

Key Benefits

Regardless of the size or complexity of these automation systems, users enjoy results that are much the same.

Robotic automation systems can:

Increase productivity by reducing idle time, minimizing missed cycles, and maintaining more consistent production throughput.

Lower cost-per-part by supporting unattended operation and reducing labor-intensive tasks such as part loading, unloading, handling, and inspection.

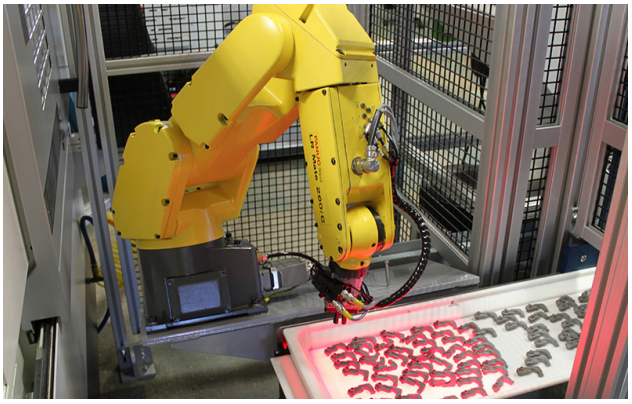
Reduce operating costs by increasing output and enabling skilled employees to produce more parts with existing equipment and resources.

Increase production flexibility by supporting a wide range of part families and adapting quickly to changing production requirements.

Expand production capacity by producing more parts in less time and creating opportunities for additional throughput without adding equipment.

Improve part quality and consistency by ensuring repeatable part handling and reducing process variation.

Today's industrial robots are proven, reliable production tools capable of operating continuously with minimal intervention. When integrated into a CNC machining process, robots help manufacturers increase machine utilization, maintain consistent throughput, and support production even when skilled labor is difficult to find. Despite widespread adoption in manufacturing, many CNC operations still have opportunities to automate repetitive machine-tending tasks and unlock additional productivity gains.



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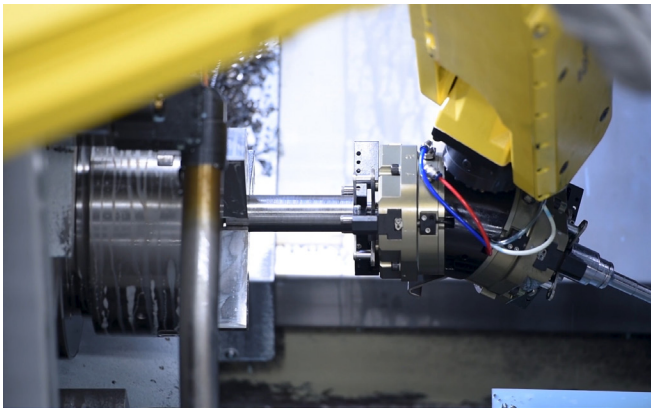
Is Your CNC Operation Ready for Automation?

Robotic automation can help businesses increase throughput, reduce production delays, and achieve more value from their existing equipment and workforce. The question is whether these benefits could create a meaningful impact on your operation.

Is your operation reaching its full production potential? The difference between current output and achievable output can reveal opportunities to increase capacity, improve throughput, and drive additional revenue.

What is preventing your operation from reaching its full production potential? Many production constraints stem from repetitive manual tasks that consume valuable time and resources. Robotic automation can help address these challenges by handling routine machine-tending activities, allowing employees to focus on work that adds greater value to the operation.

Can your operators spend every minute of every shift focused solely on loading and unloading machines? In reality, skilled employees are responsible for a variety of activities, including setup assistance, inspections, material handling, quality checks, problem-solving, and communication with team members. Robotic automation helps keep production moving while allowing workers to focus on higher-value responsibilities.



Does one or more of the following apply to your operation?

- You have CNC machines dedicated to specific parts or parts families.
- You produce similar parts that follow repeatable machining processes.
- You have recurring weekly, monthly, or ongoing production requirements.
- Your machining processes are stable or repeatable.
- Production is constrained by operator availability or labor resources.
- Equipment is not producing at its full potential throughout the shift.
- Part quality or consistency is affected by manual loading and unloading.

Are any of the following business challenges affecting your operation?

- Increasing competitive pressure
- Customer expectations for shorter lead times, higher quality, and lower costs
- Difficulty attracting and retaining skilled labor
- Rising labor and benefit costs
- Increasing material and energy expenses

For most companies, the answers to these questions make a compelling case for automating at least some aspects of their operations. As labor challenges persist and production demands continue to grow, robotic automation has become a practical way to increase output, improve consistency, and remain competitive without significantly increasing headcount.

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Measuring the Production Impact of Automation

Investing in robotic automation requires evaluating both the operational impact and long-term financial return. The following example illustrates how automation can improve overall production performance in a typical CNC machining environment.

CNC Machine Tool	2
Operators Per Shift	1
Hours Per Shift	8
Work Shifts Per Day	2
Days Per Year	250
Annual Labor Hours	4,000
Parts Per Hour @ 100% Production	10
100% Annual Production (pieces)	40,000
Labor Rate Per Hour	$12.50
Benefit Rate Per Hour	$6.25
Total Labor Rate Per Hour	$18.75

The Effects of Typical Interruptions

	Manual	Auto
Lunches, Breaks, etc	10%	0%
Tool Changes	5%	0%
Tool Offsets	5%	5%
Material Handling	5%	0%
Part Inspection	5%	0%
Total Lost Efficiency	30%	10%
Net Efficiency	70%	90%

(NOTE: In the above illustration, the 10% efficiency loss is due to machine downtime. In the computation below, the loss is 20% based on the amount of operator time involved, including material handling and inspection.)

Based on these figures, we see that:

- Operating at 100% efficiency yields 40,000 pieces annually.
- Manual operation at 70% efficiency yields 28,000 pieces annually.
- Automated operation at 90% efficiency yields 36,000 pieces annually.
- Automation creates capacity for 8,000 additional pieces without adding labor resources.

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Understanding the Financial Impact of Automation

The first area to evaluate is direct labor cost. By automating repetitive machine-tending activities, manufacturers can produce more parts while spending fewer labor dollars on each piece produced.

Direct Labor Costs

	Manual	Auto
Total Annual Direct Labor Cost	$75,000	$75,000
% of Direct Labor Applied to Production Costs	100%	20%
Direct Labor Dollars Applied to Production Costs	$75,000	$15,000
Net Annual Pieces Produced	28,000	36,000
Labor Cost Per Piece	$2.68	$0.42

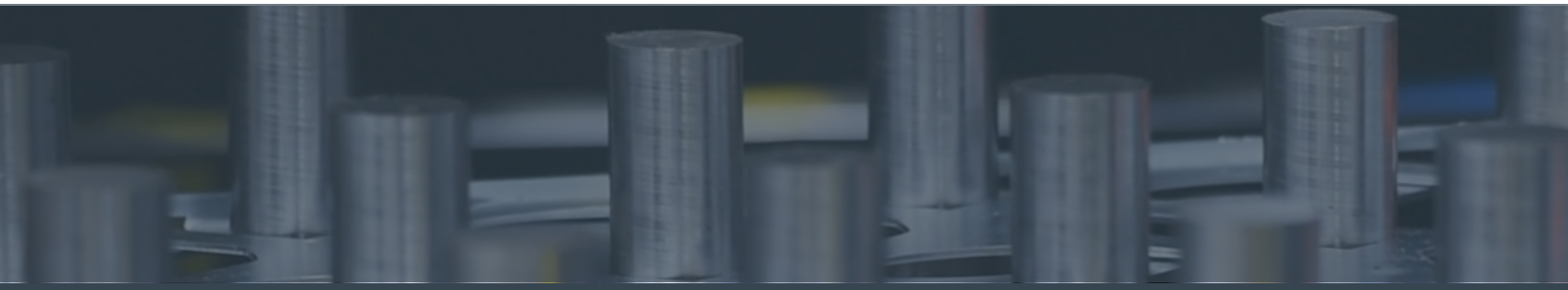
While robotic automation requires an initial capital investment, evaluating labor, production, and operating costs together provides a more complete picture of its long-term value. The following example highlights how increased productivity can offset investment costs while lowering the overall cost per part.

Next, consider the impact of capital investment. While automation increases upfront equipment costs, spreading those costs across a larger volume of production helps improve overall cost efficiency.

Capital Investment Costs

	Manual	Auto
Machine Tools (2 @ $250,000 each)	$500,000	$500,000
Inspection Equipment	$250,000	$25,000
Automation System	$0	$200,000
Total Capital Investment	$525,000	$725,000
Annual Amortized Capital Investment (5 years)	$105,000	$145,000
Net Annual Pieces Produced	28,000	36,000
Capital Cost Per Piece	$3.75	$4.03

Automation often shifts costs from labor to capital investment. However, when evaluated over time, the combination of increased output and reduced reliance on manual machine tending can significantly lower the overall cost of production.



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The following summaries illustrate how automation can reduce total production costs while creating additional manufacturing capacity. As production volume increases, the financial benefits become even more pronounced.

Cost Summary (based on two shifts)

	Manual	Auto
Labor Cost Per Piece	$2.68	$0.42
Capital Cost Per Piece	$3.75	$4.03
Total Cost Per Piece	$6.43	$4.44

In this example, automation increases annual production from 28,000 to 36,000 pieces while reducing overall cost per part. The result is meaningful cost savings combined with additional capacity that can be used to support growth, reduce lead times, or take on new projects.

Now consider what your profit would be on the additional 8,000 pieces you can now produce. And, how does this increased production absorb overhead expenses?

Cost Summary (based on three shifts)

	Manual	Auto
Labor Cost Per Piece	$2.68	$0.42
Capital Cost Per Piece	$2.50	$2.69
Total Cost Per Piece	$5.18	$3.11

The benefits become even more significant when automation supports extended hours or unattended production. In this example, operating across three shifts increases annual output to 54,000 pieces while further reducing total cost per part.

Running 3 shifts increases production to 54,000 pieces from the automated system. The $2.07 total cost savings per piece brings the overall savings on 54,000 pieces to $111,780.

What Could Automation Look Like in Your Shop?

Every manufacturing operation has unique production goals, constraints, and opportunities

The examples in this whitepaper demonstrate how robotic automation can improve productivity, increase output, and reduce cost per part when applied to the right manufacturing process. The first step is understanding where automation can have the most impact. Automation Within Reach works with manufacturers to evaluate existing operations, identify automation opportunities, and develop solutions designed around their production goals.

Automation Within Reach specializes in CNC machine tending, material handling, palletizing, automated inspection, and secondary process automation. Backed by more than 30 years of automation experience and over 100 years of machine tool expertise, AWR delivers practical automation solutions to help manufacturers improve operations and remain competitive.

Visit **www.automationwithinreach.com** for more information on CNC automation.