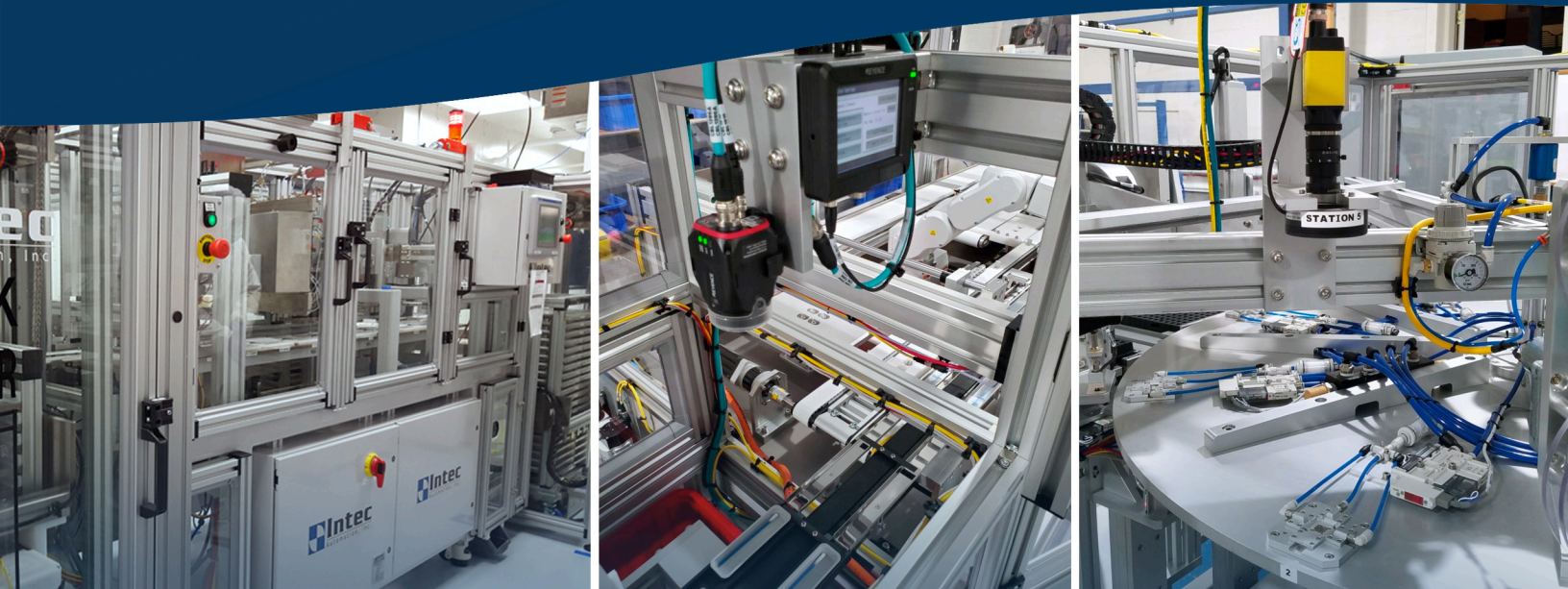




ROI ON AUTOMATION UPGRADES FOR A COMPLEX MACHINE CELL

EVALUATING YOUR CURRENT MACHINE CELL
VS. AN INTEC AUTOMATED MACHINE CELL



Assessing the potential that automation has to offer requires a detailed evaluation of your current processes against the latest integrated technologies. To assist our customers, Intec Automation developed an ROI calculator to compare your current manual operation against a fully automated manufacturing process.

This eBook will describe how to use the ROI calculator by inputting your current manual process parameters. You can then see the ROI available along with a recommended investment amount. These values will help you justify switching from a manual machine cell to an automated solution from Intec Automation. Factors used in the ROI calculator include human operator costs, production speed, and considerations about your improved Overall Equipment Effectiveness (OEE) to maintain profitability.

Because almost 20% of time spent in US workplaces involves predictable physical activities, manufacturers have a higher potential of benefiting from automation.

Source: McKinsey Global Institute

Reasons to Use the Intec Automation's ROI Calculator for Your Application

Any decision to upgrade your manufacturing operations to **fully automated processes** requires justification that comes with concrete numbers. Manual operations are putting manufacturers at risk when you consider the dwindling talent pool, rise in labor costs, supply chain constraints and liability concerns that come with inexperienced operators.

If you are responsible for optimizing operations to ensure profitability over the coming years, using this ROI calculator is the first step to convincing the rest of your stakeholders to commit to automation. Investing in an automated system with a dedicated systems integrator can help you overcome three of the biggest challenges facing manufacturers.

These Are:

1 Recruitment and Retention of Skilled Operators

An aging workforce with a limited amount of skilled resources available means retaining the operators you need is the biggest business challenge today. If you need to ramp up volume and recruit 10-20 more operators, you are looking at a lengthy process and an expensive wage bill that could limit your actual performance for years.

2 Across the Board Inflation

Material and labor costs keep rising, causing product margins to shrink. Smaller profits translate into less capital available to expand operations. Ramping up performance and producing more widgets per shift is the quickest way to increase profitability and deal with rising inflation.

3 Increased Competition

A failure to invest in applied proof-of-concept research, measurement technologies, and quality standards creates a “valley of death” for manufacturers between the stages of scientific discovery and commercial production.

Source: Market Watch

According to the [Government Accountability Office](#), the US imports more advanced technology products than it exports. Bringing advanced products to market requires manufacturers to capture additional value from their commercial production techniques. While the US remains a leader in research and development, it lags behind Germany and China when it comes to making new products commercially viable and bringing them to market. This may be due to the lack of labor or other constraints. However, this is changing as the government is prioritizing the development of advanced manufacturing processes by establishing innovation centers, as part of the [Manufacturing USA](#) network.

Factors That Determine the ROI of your Automation Investment

The calculator uses three main categories to determine the available ROI, along with a recommended investment amount. These categories break down the aspects of your current, manual process and provide you with the expected ROI available from a completely automated machine cell.

In the examples below, we use a complex assembly process for a medical device widget. With these manual manufacturing processes, the product liability risks are high and require experienced operators to maintain the level of quality demanded in the life sciences industry.

Daily Output and Process Assumptions

We start with two 8-hour shifts per day, producing 60 widgets per hour with six manual operators. The full burden cost of the operators is \$40 p/h without needing a technician on site. You can change these values in the interactive ROI calculator to match your current assembly process.

CURRENT ASSEMBLY PROCESS	CURRENT	AFTER INVESTMENT	NOTES
DAILY OUTPUT & ASSUMPTIONS			
Shifts	2	1	
# of Operators Per Shift	6.0	1.0	11.0 Reduction in Operators
# of Technicians Per Shift	0.0	0.25	
Production Speed (pieces/hour)	60.0	120.0	
Widget value (piece)	\$100.00	\$100.00	
Widget Material Cost Per Piece	\$30.00	\$30.00	
All-In Hourly Operator Cost (Full Burden)	\$40.00	\$40.00	
All-In Annual Employee Cost: Technician	\$85.00	\$85.00	

The all-in hourly costs for technicians and operators should include:

- Wages and benefits (including paid time off and other contributions)
- Payroll taxes and workers' compensation insurance
- Employee training and personal protective equipment

After the investment into automation, you can run your assembly process continuously and reduce the operators required to one. You'll also require a technician when deploying advanced manufacturing technologies (if you don't already have one on-site) to maintain the required uptime.

Efficiency Calculated by Overall Equipment Effectiveness

Next, we factor in the OEE you can expect from an automation project. Manual processes have lower OEE because operators take breaks, call in for sick days, or get fatigued and produce lower-quality widgets (increasing scrap rates).

When calculating OEE, you should look at:

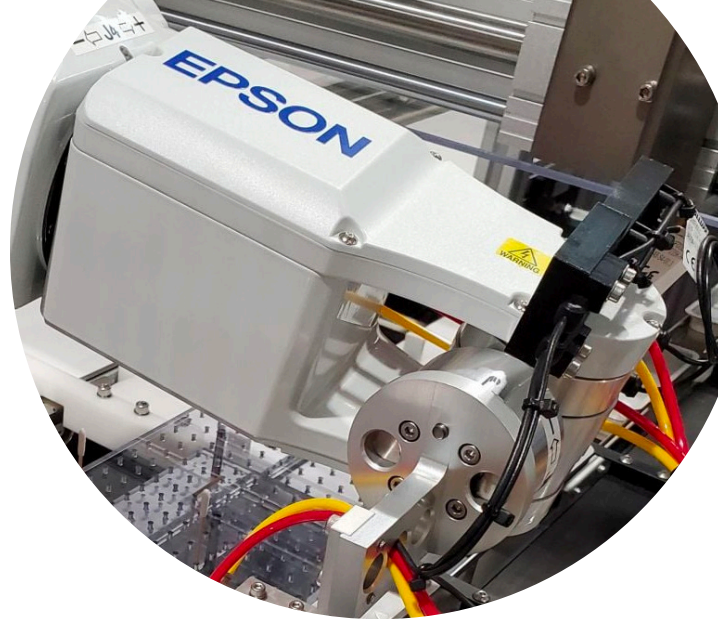
- **Availability** – The total time you can run the assembly process productively taking into account breaks, unplanned downtimes, preventative maintenance, cleaning, and organizing tasks
- **Performance** – The number of widgets you can theoretically produce during every shift compared to your current actual production speed measured per hour
- **Quality** – The average percentage of bad widgets (rejected or scrapped) coming off the assembly cell for each shift that failed your quality validation processes

With manual operations, we generally see a production effectiveness of 40% to 70% (although reaching 70% is rare in manufacturing). There tends to be inconsistent output day to day and inconsistent quality part to part. In automated operations, manufacturers often achieve 85% to 99.9% depending on the automated assembly cell's design and system integration.

EFFICIENCY CALCULATED BY OVERALL EQUIPMENT EFFECTIVENESS (OEE)

Manual and semi-automated production facilities typically see 40%-70% OEE, while automated processes can reach 85%-99.9%.

Overall Equipment Effectiveness (OEE)	60.0%	85.0%
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If you don't know the exact OEE percentage of your current manual operation, you can reach out to Intec Automation to assist with the calculation.

Because you can include quality validation systems like leak detection and vision inspection, we can conservatively assume an OEE increase of 25% in this example. You also gain greater availability that doubles your hourly performance from 60 widgets per hour to 120.

Pro Forma & Production Parameters

Based on the values above, we can now calculate the difference between the pro forma results of a manual versus automated assembly process per shift.

PRO FORMA			
Maximum Daily Output (pieces)	960	960	
Efficiency Adjusted Daily Output (pieces)	576	816	
Annual Revenue	\$14,976,000	\$21,216,000	
Annual Material Costs	\$4,492,800	\$6,364,800	
Annual Labor Costs	\$998,400	\$127,400	\$871,000 Labor Cost Available Reallocation
Labor Cost % of Revenue	6.7%	0.6%	
Annual Contribution Margin	\$9,484,800	\$14,723,800	
Contribution Profit Margin	63.3%	69.4%	

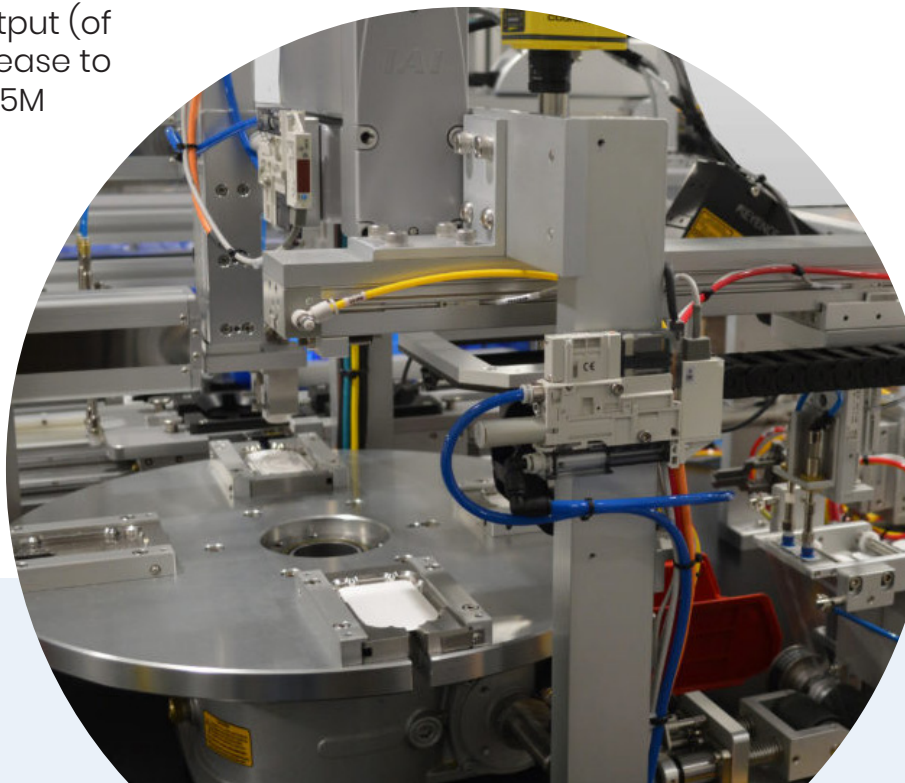
Once we calculate the pro forma results based on our daily output assumptions, we can see that you can reduce labor costs by \$871,000. The annual contribution margin goes up by \$5,111,600 with an 8.6% improvement in year one.

The days it takes to break even after the investment is only 38, with an OEE improvement of 41.7%.

RETURN ON INVESTMENT			
OVERALL EQUIPMENT EFFECTIVENESS IMPROVEMENT	41.7%		
CONTRIBUTION MARGIN IMPROVEMENT	9.6%	\$5,239,000	Contribution Margin Improvement
BREAK-EVEN (DAYS)	43		
	Years	ROI %	ROI \$
	1	501.49%	\$4,368,000
	2	1102.99%	\$9,607,000
	5	2907.46%	\$25,324,000

With the efficiency-adjusted daily output (of 816 pieces per shift), revenue will increase to over \$21M compared to the almost \$15M available from manual processes.

We should also consider the labor cost percentage of revenue, which improves by 6.1%. This means profitability no longer depends heavily on your human resources, providing you with a more resilient manufacturing process.





Justify Your Investment in Automation with Concrete Numbers and Intec Automation

We can use these calculations above to recommend an initial investment amount along with the CAPEX savings available after 1 and 2 years of using an automated machine cell.

INVESTMENT RECOMMENDATIONS

Recommended Investment in Automation	\$871,000
Capital budget available based on 1 Year ROI	\$5,239,000
Capital budget available based on 2 Year ROI	\$10,478,000

With your improved OEE and reduced labor costs, you'll be able to remain profitable while having the capital to maintain and expand a resilient manufacturing operation.

Intec Automation can assist with complete system integration and machine cell automation that remains flexible and grows along with your production demand. We provide complete design and engineering support during the project, along with system integration and process optimization.

To discuss your automation requirements and available ROI with one of our experts, [talk to Intec Automation](#) today.

