UNIVERSAL ROBOTS

Building the case for robotic automation

White paper

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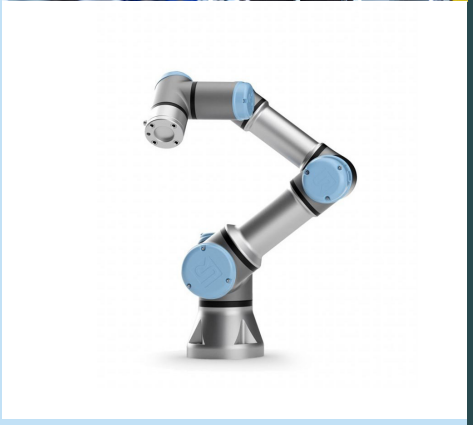
Is automation the right investment for your operation?

This paper lists the steps you'll need to analyze the benefits of collaborative automation, and how to quantify those benefits to secure funding approval within your organization.

It's critical in any justification process to capture all of the benefits, both direct and indirect. So we'll look at labor savings and capacity gains, but also less obvious and equally important benefits such as reduced insurance costs, reduced turnover and customer retention. The goal: building a clear and convincing case for your company's investment in collaborative automation.



The numbers you'll need to get started

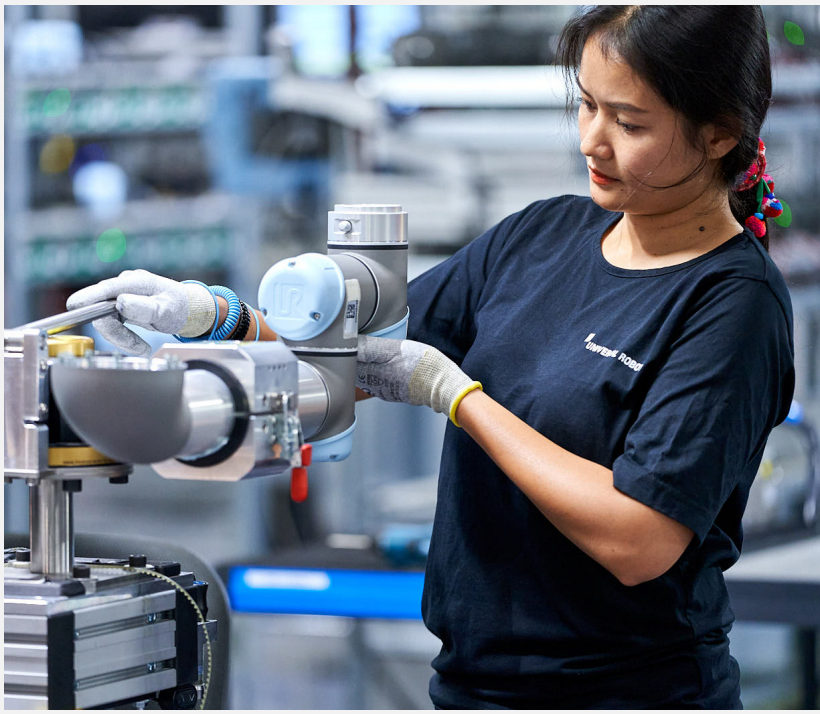
Before you work through the calculations in this paper, you'll want to first gather the basic financial data listed below.

If needed, you'll find suggestions for which department can provide this information within each calculation category.

- Annual unit production volume
- Standard unit cost
- Average unit sell price
- Standard unit labor hours
- Standard labor hour cost, burdened
- Average workers comp claim cost
- Floor operation cost per square foot
- Warranty cost: percentage of annual sales OR –
- Warranty cost: per unit
- Annual inventory carrying cost, percentage of standard costs

Creating the foundation for a successful justification

While in the past the primary drivers for investing in automation were simply reducing labor and streamlining processes, today the focus is on overall business operations, which have been quantified by 10 categories of either **decreased costs** or **increased margins.** You may not need all 10 categories to make a case for automation in your particular facility. Depending on the company or application, any or all of these measurables may apply



1. Direct labor savings

This is the simplest and most common argument for justifying automation and can be easily calculated based on annual labor savings or standard unit labor costs. This calculation should always add burden costs that include both wages and benefits. If benefit costs have not been determined, 27.5% is a typical and conservative estimate to add to wage costs.

The calculation can be made either of two ways:

a. Total annual labor hours saved x standard cost per labor hour, *or*

b. Total labor savings per unit (hours) x standard cost per labor hour x annual volume

Request data from:

- → Manufacturing
- → Human Resources
- Quality Department
- Customer Service
- Sales
- Supply Chain
- Facilities

NOTE: if you cannot acquire some of the data needed for any calculation, make a conservative assumption based on industry standards or your own logic.

For example, if figuring Employee Retention Savings, you might assume an automated material handling cell will prevent one employee turnover per year, and that it takes 60 days to train a new operator.

Then the estimated annual savings in this one category would be 60 days salary and benefits, plus hiring costs for advertising, testing and interviewing.

2. Re-work savings

These savings are the result of cost-of-quality improvements on work that requires additional manufacturing labor or other costs.

Rework savings can be calculated on a per hour basis, or a percentage reduction of overall costs:

a. Total annual rework hours saved x standard cost per labor hour, *or*

b. Current rework costs x rework percentage reduction

Request data from:

- → Manufacturing
- Human Resources
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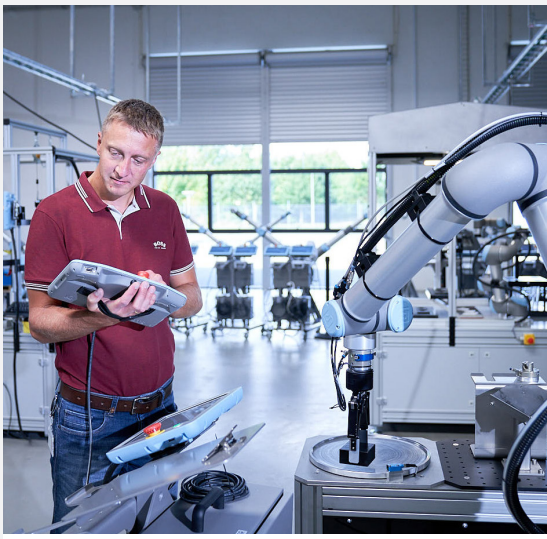
- Sales
- Supply Chain
- Facilities



3. Scrap savings

Reflects cost-of-quality improvements for issues that cannot be re-worked, where the manufacturing costs and raw materials in the process are lost.

Scrap savings is calculated on a unit cost or overall improvement basis:

a. Yield improvement percentage x annual production volume x standard unit cost, *or*

b. Annual units scrap avoidance x unit cost

Request data from:

- → Manufacturing
- Human Resources
- → Quality Department
- Customer Service
- Sales
- Supply Chain
- Facilities

4. Warranty savings

These savings represent cost-of-quality issues that result in failures after the sale.

They can be calculated on a per-unit basis or total-cost basis:

a. Total warranty failure units x warranty improvement percentage x standard unit cost, *or*

b. Current warranty costs x warranty reduction percentage

Request data from:

	Manufacturing
	Human Resources
→	Quality Department
→	Customer Service
	Sales
	Supply Chain
	Facilities

5. Inventory savings

Inventory carrying cost is the total of all expenses related to storing unsold goods, including storage floorspace, warehousing, depreciation, shrinkage, and auditing. Inventory carrying costs will generally total about 20% to 30% of the total inventory value. The calculation should also include work-in-process and finished goods if appropriate.

Inventory reduction is determined by:

a. Work-in-process reduction (units) x standard unit cost x inventory carrying cost percentage, *plus*

b. Finished-inventory reduction (units) x standard unit cost x inventory carrying cost percentage

Request data from:

→	Manufacturing
	Human Resources
	Quality Department
	Customer Service
	Sales
→	Supply Chain
	Facilities

6. Floor space savings

This calculation is useful when manufacturing floor space is expensive, as in a semiconductor clean room, or when space is very limited or is landlocked and cannot be expanded. Floor space savings is often tied to tax incentives and other business operating models.

If operations can be combined to reduce footage, you can use the square foot reduction in the annual floor space cost:

a. Floor space reduction (square feet) x annual floor space cost per square foot

Request data from:

- → Manufacturing
- Human Resources
- Quality Department
- Customer Service
- Sales
- Supply Chain
- → Facilities

7. Capacity gains

When sales to current customers or markets are constrained by manufacturing capacity, or additional business is being turned away for lack of capacity, this becomes a particularly important calculation. Additional capacity may also be required to maintain key customer relationships. Capacity gains allow a company to increase top line revenue and all the margin associated with the automation adoption.

The calculation is:

a. Capacity unit gains x average selling price per unit x standard margin percentage

Request data from:

- → Manufacturing
- Human Resources
- Quality Department
- Customer Service
- → Sales
- Supply Chain
- Facilities

8. Customer retention

It is always more expensive to acquire a new customer than to maintain a current customer. Factory automation may enable additional capacity that allows a company to maintain an important customer relationship, or to become a sole-source supplier. The sales department should have data regarding customer acquisition costs – including onboarding a new customer and ramping up their volume.

Understanding how many customers the investment will save will complete the calculation:

a. Customer acquisition cost x customers retained

Request data from:

	Manufacturing
	Human Resources
	Quality Department
	Customer Service
→	Sales
	Supply Chain
	Facilities

9. Insurance savings

This is largely associated with workers' compensation; for example, when an operation requires manually palletizing heavy loads that results in injury and incurs a workers comp claim. Automating the process virtually eliminates that risk, resulting in reduced premiums.

Insurance savings may be calculated on a cost-per-hour basis or a cost-per-claim basis:

a. Total labor hours x workers' comp cost per hour x reduction in claims percentage, *or*

b. Average cost per claim x claims avoided

Request data from:

→	Manufacturing
→	Human Resources
	Quality Department
	Customer Service
	Sales
	Supply Chain
	Facilities

10. Employee retention savings

This is a key metric that is frequently overlooked. Automation improves the work environment by making it safer and reducing injuries and repetitive tasks that can otherwise cause employee turnover. Companies considering automation should prioritize “DDD jobs” – dull, dirty, and dangerous operations that are currently performed manually. Cost-to-hire should also be part of this calculus, including advertising, recruiting, temp agencies, executive and management time for screening and interviews, and training.

a. Average hiring cost per hire x positions saved, *or*

b. Average new hire training time (hours) x standard labor cost per hour

Request data from:

- Manufacturing
- → Human Resources
- Quality Department
- Customer Service
- Sales
- Supply Chain
- Facilities

Summarizing the benefits
and reporting payback

Having determined the financial benefits that will accrue with the adoption of an automated system, you now have the tools to build a case. That justification will be made even stronger with an educated estimate of payback.

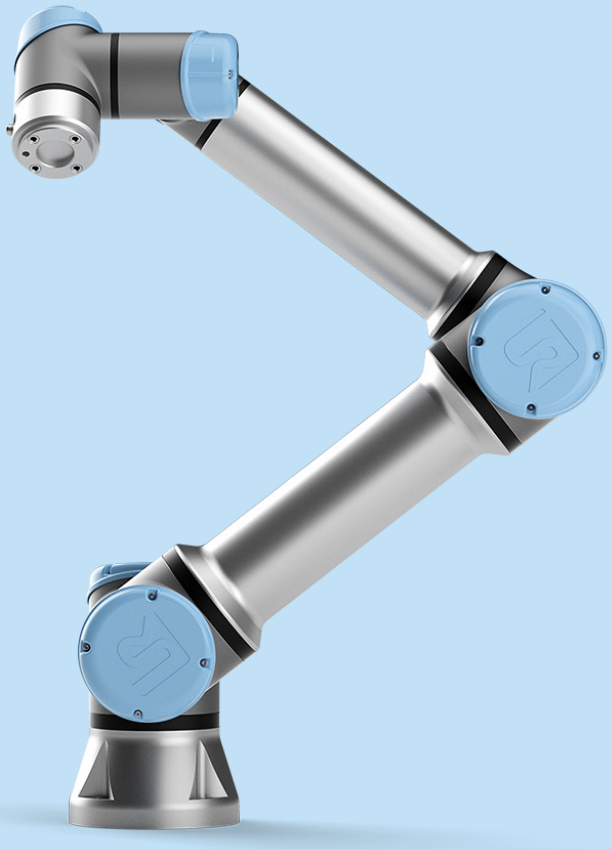
Here are the four primary measures that are used in capital investment decisions:

Simple payback: ROI
The first is the simple payback, the time needed to recoup the cost of the initial investment. This is determined as the ratio of the initial investment to the annual savings generated for the recovery period, and results in a period of days, weeks, or months. It is the most common and easiest method to understand, however it does not factor long-term cash flows or the cost of the capital, and thus is not an absolute measure of profitability.

Internal rate of return: IRR
Internal rate of return, also referred to as the dollar-weighted rate of return, calculates an "interest rate" that the project investment returns, comparing the present value of the cash flows from the project against the initial investment. For companies that are cash intensive, this is a popular calculus.

Return on assets: ROA
This metric captures how efficiently a company deploys their assets, and determines what level of after-tax earnings are generated from the investment; the higher the ratio, the better the return on assets. This approach must be balanced against risks, sustainability and other reinvestment demands. This is a sophisticated calculus that some companies prefer to use.

Equipment and labor
Effectiveness: OEE & OLE
Traditional measures rely on static, long term assumptions. OEE and OLE metrics measure the availability and utilization of manufacturing equipment and labor. These metrics are particularly suited for today's VUCA (volatile, uncertain, complex and ambiguous) environment.



Additional benefits to your organization

Apart from the financial justifications presented above, many organizations have strategic goals that can be furthered through flexible and collaborative automation. Additional benefits include:

- Flexibility to meet customer demands
- Ability to customize products for each customer
- High product variability
- Short product life cycles
- Broad product lines
- Limit staff count / hiring
- Improve quality of work life, reduce turnover
- Worker safety

For assistance in figuring the benefits of flexible automation for your company, download the free Universal Robots Justification Calculator HERE.

About Universal Robots

Universal Robots (UR) was founded in 2005 to make robot technology accessible to all by developing small, user-friendly, reasonably priced, flexible collaborative robots (cobots) that are safe to work side by side with people. Since the first cobot was launched in 2008, the company has experienced considerable growth with the user-friendly cobot now sold worldwide. The company, which is a part of Teradyne Inc., is headquartered in Odense, Denmark, and has regional offices in the United States, Germany, France, Spain, Italy, UK, Czech Republic, Poland, Hungary, Romania, Russia, Turkey, China, India, Singapore, Japan, South Korea, Taiwan and Mexico. In 2020, Universal Robots shipped its 50,000th cobot, and has a global network of over 700 distributor and integrator partners.

Find out more
Click here to learn even more about automation using cobots robots with Universal Robots.

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