



Collaborative Robot Buyer's Guide

7 Factors to Consider When Evaluating Collaborative Robots

Due to advances in technology, collaborative robots (cobots) have become the solution of choice for manufacturers looking to boost productivity and improve quality in their operations.

Today's cobots are safe to work around, require a much smaller footprint than traditional automation, and are inexpensive enough to provide a rapid return on investment – even for smaller manufacturers with changing product lines.

If you're in the market for a cobot, there are a number of important questions to consider before making a decision. This guide lists the seven most crucial elements to consider when evaluating cobots.

1. Value

Look beyond the price tag

Consider what the entire solution looks like. When making a comparison of price, be mindful of the 3rd party components required, integration, and programming costs that often increase the project costs more than the price tag of the robot itself.

Before beginning the research process, make a list of the tasks that have potential for cobots in your factory, then make a checklist of the features and specifications that would be required. Examples of checklist items include:

- Maximum reach of the arm and the degrees of freedom movement
- End of arm tooling requirements
- Force control
- Embedded vision for part locating and inspecting
- Task repeatability / precision
- Frequency of line changeovers
- Payload
- Importance of ease of use
- Cost of maintenance or software license fees
- Customer support

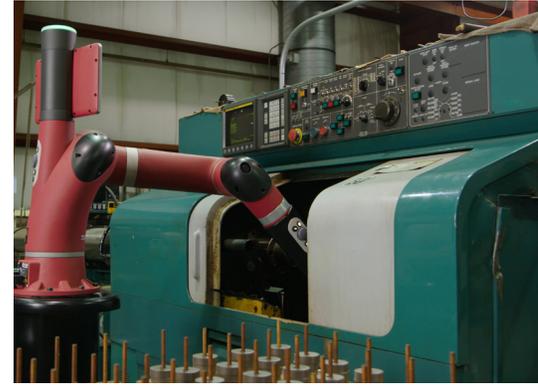
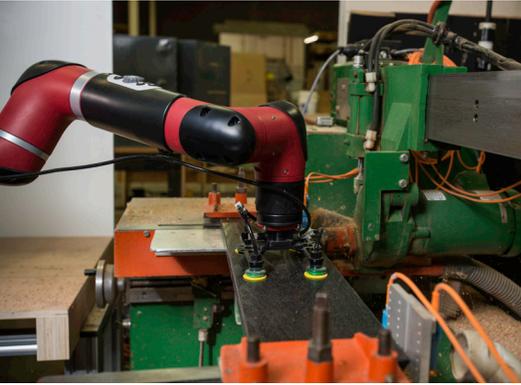
When calculating an ROI, you'll want to consider hardware and software cost, work cell integrations, vision systems, employee training, cobot usage (hours), end-of-arm tooling, and other expected customization costs. The Robotics Industry Association provides this handy [ROI calculator](#), as an example, to get started.

2. Software

Plugging into and changing the automated factory

The manufacturing world is nearing an inflection point, and technologies are reshaping how factories operate, learn and connect. The cobot you ultimately choose should come complete with a powerful combination of hardware and software that incorporates:

- An intuitive user interface that anyone can understand
- The ability to control other devices interacting with the robot
- Designed-in capability to control (both measure and apply) the amount of force required for a specific task or part insertion
- Connecting into and coordination of the work cell; the ability to recognize the gripper attached to the arm
- Ability to visualize its environment and proactively or reactively adapt to changes that may occur in the work cell if something changes, like getting bumped or when moving the robot to another station for re-deployment
- Constant updates that increase the value of the hardware as well as adding new features



3. Speed to Deployment

Days versus weeks

The advantage of today's cobots is the speed that you can get a system into production at your factory. This is true for new and existing work cells – especially if they don't require safety cages or extensive programming. When evaluating cobots for your factory, keep in mind the following:

- How quickly the cobot can be up and running "out of the box"
- Availability of pre-programmed tasks such as logic templates
- If it comes complete with everything you need to get started
- Already integrated – the hardware, software, vision system, force control end-of-arm tooling
- How easy it is for the cobot's co-workers to train it

4. Flexibility

Adapting to any work cell or task assignment

You may have an application in mind that you want the cobot to perform, but customer demands and changes to your manufacturing lines will present new challenges over time. Cobots can be flexible to meet new challenges without significant investment in changes requiring specialized and time-consuming reprogramming and re-tooling.

When researching potential cobot systems, it is beneficial to watch videos of cobots doing real work on the factory floor. Customer case studies provide great insight into the possibilities with cobots. When viewing cobots work, pay close attention to the following items:

- The types of applications the cobot performs: machine tending, inspection, testing, loading/unloading, kit packing, etc.
- Whether the cobot is easily programmed to perform other tasks
- If the cobot includes an embedded positioning system that allows it to dynamically reposition itself in a work cell if something gets moved, or perform vision-based tasks such as part location or inspection
- How long a production line will be down while the cobot is being "trained"
- If the cobot is easily moved around the factory for short run operations

5. Simplicity

Designed for workers versus engineers

User interfaces are everywhere. They are on screens in our cars, mobile devices in our pockets, and in our homes coffee makers and thermostats, just to name a few. User interfaces should be designed for people, simple and intuitive to use with minimal training required. This is true for cobots too. They should be easy to train by anyone on the production floor with no special technical skills or programming required. Other factors to consider:

- The cobot is a complete system – meaning no additional hardware or software is needed
- Software that has a graphical user interface that leverages symbols/icons that is easy to understand
- Easy integration into existing work cells or production lines
- Plugs into standard wall power outlet

6. Safety

No cages required

Ultimately, the cobot you choose should have safety in its DNA. Inherently designed for safe, collaborative operation with people from the ground up. Ideally, the best cobots incorporate passive and active safety mechanisms that:

- Use force sensitivity feedback, not just collision detection
- Immediately alert co-workers when a problem occurs
- Allow them to handle delicate or fragile parts without damaging them
- Safely and smartly interact with machinery and fixtures and reduce risk of damaging expensive equipment

7. Customer Experience

A vendor dedicated to your success

To get the most from your cobot and keep costs low, look for a vendor that offers a complete solution rather than pieces from many vendors that require integration. Also look for a vendor that offers a wide range of training options that promote the exchange of ideas and best practices such as:

- Online user guides
- Instructor led training
- User forums
- Free online training portal (learning management system)
- Wikis

Rethink Robotics: Redefining Collaborative Robotics

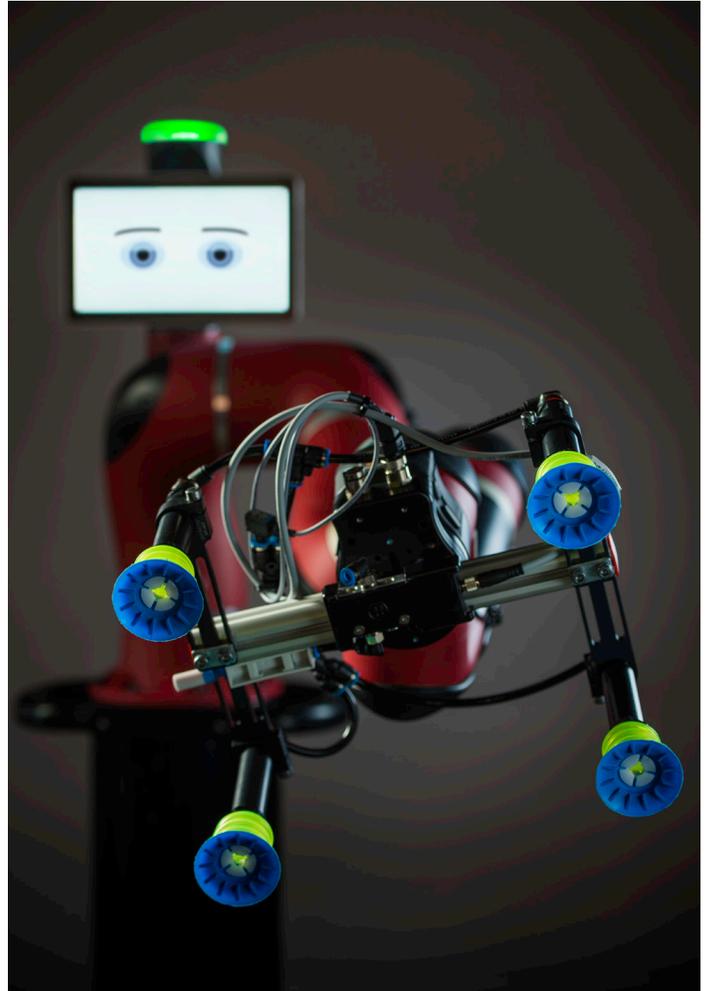
At Rethink Robotics, we didn't build our first robot based on old ideas and assumptions. Instead, we went to factories and watched people work. We saw the challenges they faced day in and day out. We came back and asked, "What if . . . ?" and kept refining things until we figured out how to make a robot solve these challenges. It's this collaborative process that makes our cobots smarter and thus our customers innovative and competitive.

To learn more about how Rethink Robotics' new breed of automation cobots can help you extend your workforce, increase innovation, and meet new production demands, visit our website at www.rethinkrobotics.com. Here you'll find a wealth of resources, including videos showing our cobots in action where it counts – on the production floor.

About Rethink Robotics

Founded in 2008 by iRobot co-founder Rodney Brooks, Rethink Robotics is redefining manufacturing automation the way PCs changed how people used computers. Based in Boston, Massachusetts, the company is funded by Bezos Expeditions, Charles River Ventures, Highland Capital Partners, Sigma Partners, Draper Fisher Jurvetson, and Two Sigma Ventures.

For more information about Rethink Robotics, please visit www.rethinkrobotics.com.



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