Get Started with COBOTS

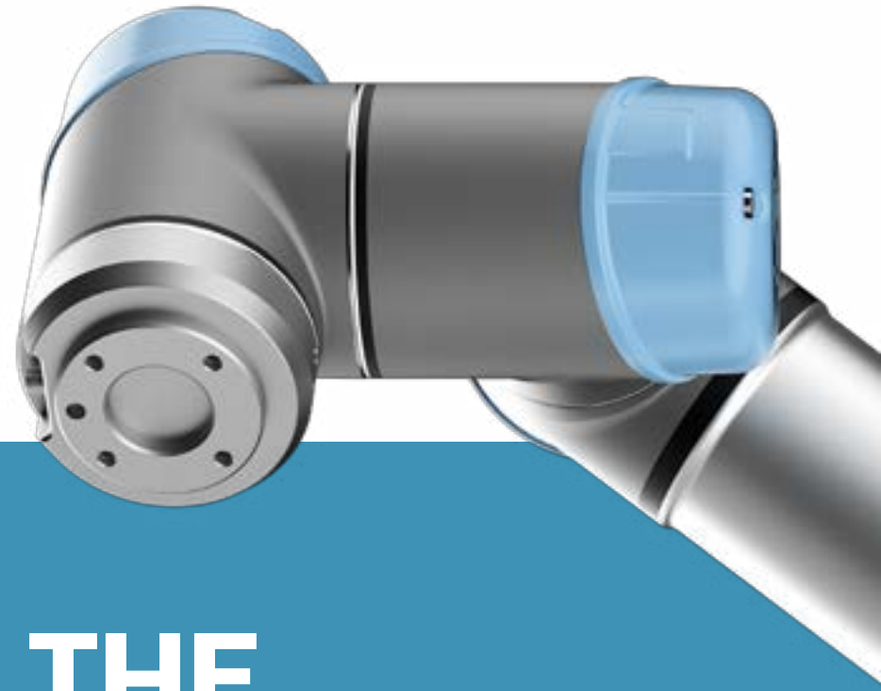
10

EASY STEPS

UNIVERSAL ROBOTS

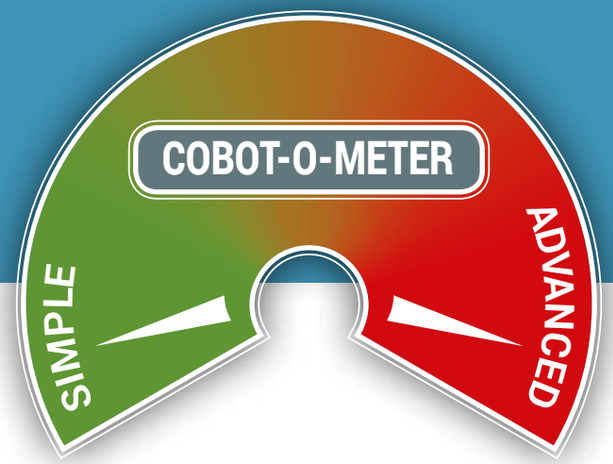
Get Started with Cobots

Cost-effective, safe, and flexible collaborative robots, or *cobots,* are making automation easier than ever, even for small and mid-sized companies. But while cobots can take on an amazing range of operations, some jobs make more sense to automate than others. That's especially true if you're just getting started — and that's why we created this easy 10-step guide.



CHECK THE COBOT-O-METER

Is this your first time implementing cobots? Look for processes that land mostly at the simple end of the scale. A few complex elements are fine, but if most of your responses put you at the advanced end, it's something to think about. A cobot can certainly still automate your process, but you may need additional help from a system integrator or other resource.

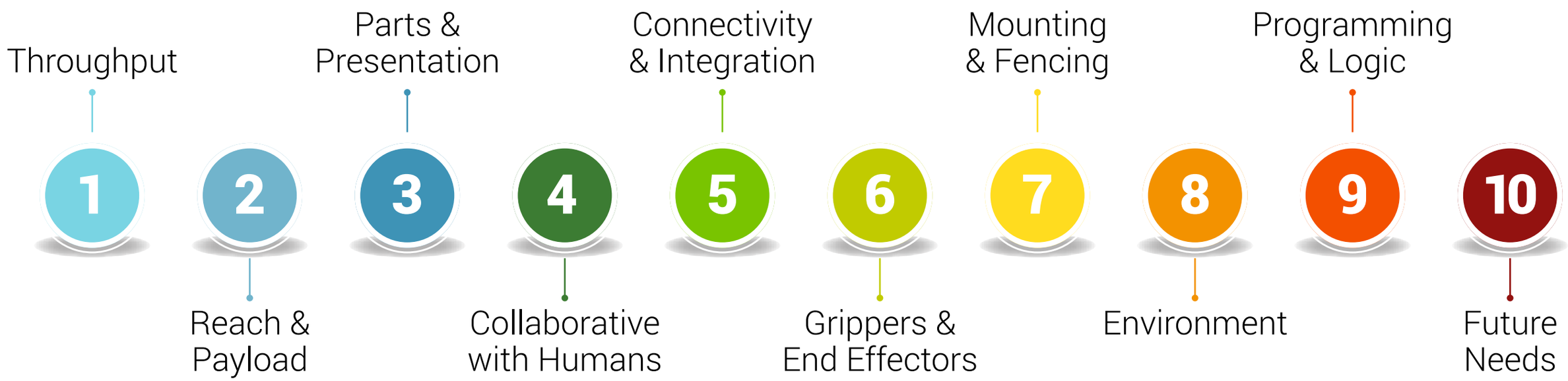


The "simple" range covers tasks you should be able to easily do on your own

The "advanced" range covers tasks that might require outside assistance

WHAT CAN YOU AUTOMATE?

Find out in 10 easy steps.

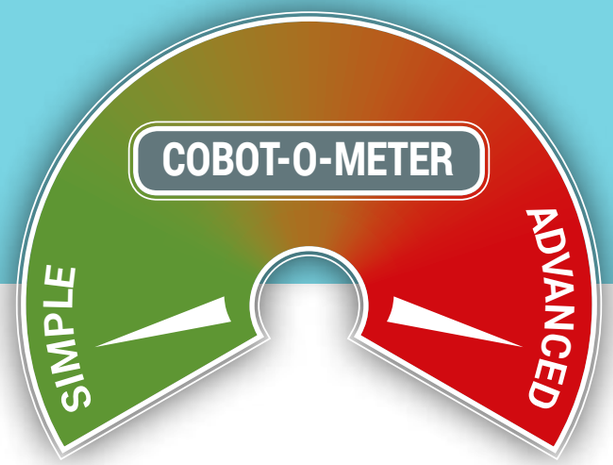


Ideal applications for cobots are repetitive, manual processes that take place around human workers but don't require human dexterity, critical thinking, or on-the-spot decisions. Machine tending and pick-and-place operations are a great place to start, especially those jobs that can cause ergonomic injuries or require human workers to interact with dangerous machinery.

1 Throughput

Cobots typically perform a simple process at about the same pace as a human worker, so consider automating operations where you're already comfortable with the throughput you're achieving manually. Of course, a cobot can continue the process non-stop — even around the clock — so you will likely see an increase in productivity. But cobots also offer consistent, dependable output that frees human workers from low-skill jobs so they can work on higher-value activities.

Planning to run your cobot at higher-than-human speeds? You may need other systems to assure the safety of human workers. You may also need to teach the robot reasonable paths and pay attention to payloads.



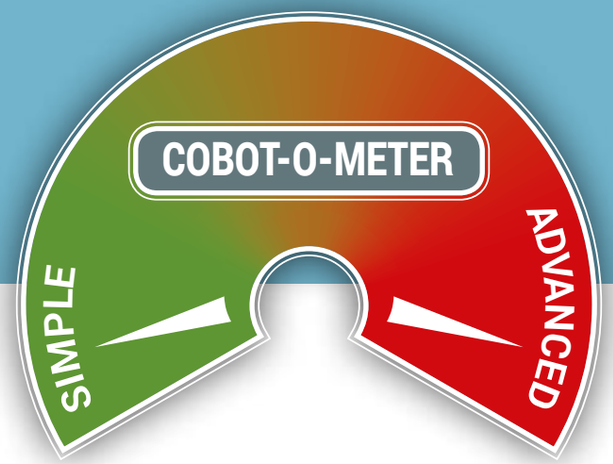
Similar throughput speed as human workers

Higher speed adds complexity to risk assessment

2 Reach & Payload

Cobots come in different sizes, but are generally ideal for applications with a reach of less than 50 inches (1300 mm), and moving parts that weigh under 20 pounds (10 kg). Don't forget to include the weight of the end-of-arm tooling in the total payload. If you have multiple processes, look for a family of cobots with a range of sizes and specifications. Other than large jobs such as palletizing, look at automating jobs a human can reach from a single position.

For bigger jobs with longer reach, you may need multiple cobots or changes to your production layout to bring the process within the reach of one cobot.



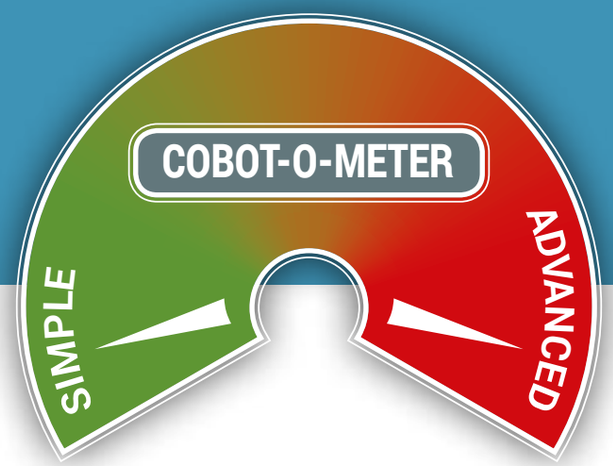
Moving parts under 20 lbs (10 kg) and reach less than 50 ins (1,300mm)

Multiple cobots or production layout change to accommodate reach

3 Parts & Presentation

Ideal cobot jobs involve moving parts that are consistent in size and shape, which makes it easier to specify an end effector to pick them up. For easier programming, present parts in the same position on a table or tray so the robot can repeat the same process over and over. Or put parts in an ordered matrix (in a tray or bin) so the robot just needs to be taught the first position, end position, and the number of parts in each row and column. Some cobots even have pre-programmed palletizing capabilities.

If possible, avoid the need for vision systems or sensors to identify and pick up parts. Handling parts with divergent properties (size and shape) or unstructured presentation (jumbled in a bin) can definitely be done, but is more complex.



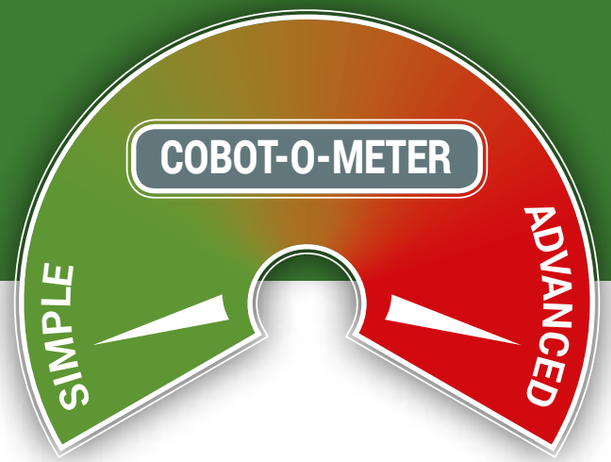
Consistent size and shape in ordered presentation

Unstructured presentation and divergent parts

4 Collaborative with Humans

Collaborative robots are designed to work safely side-by-side with human workers, but a risk assessment will help define the appropriate human-cobot interaction for your situation. Just as with humans working together, safety concerns include moving parts with sharp edges, or using a cutting tool, welding torch, or grinding wheel. An ideal collaborative environment is where people do what they're good at — such as overseeing operations — while the cobot does the repetitive, manual, and possibly dangerous work of handling parts and machines.

If the cobot needs to move at high speeds or the job raises other safety concerns, you may need a light curtain or safety scanner to slow or stop the arm when a human enters its work space.



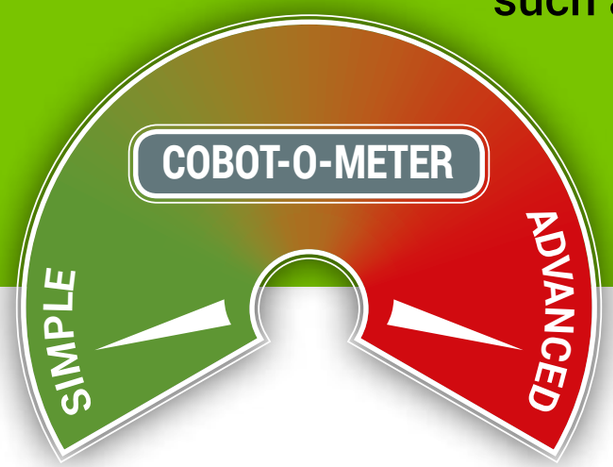
Workers and cobot have defined spaces and interaction

Cobot speed, parts, or end effectors that require additional safety measures

5 Connectivity & Integration

Think about what machines you need your cobot to interact with, and what that interaction will look like. Will the cobot simply replace a human interaction such as opening a door, loading or unloading parts, or pressing a button? Or do you need tighter integration between the robot and the machine, with direct handshaking between them? The more tightly your cobot is connected to a machine, the more complex the process will be to automate.

Tighter cobot-machine integration is easier with built-in digital I/O controllers or Ethernet-based communication protocols such as EthernetIP. To keep complexity at a minimum, limit machine interaction to basic commands such as cycle-start and cycle-complete.



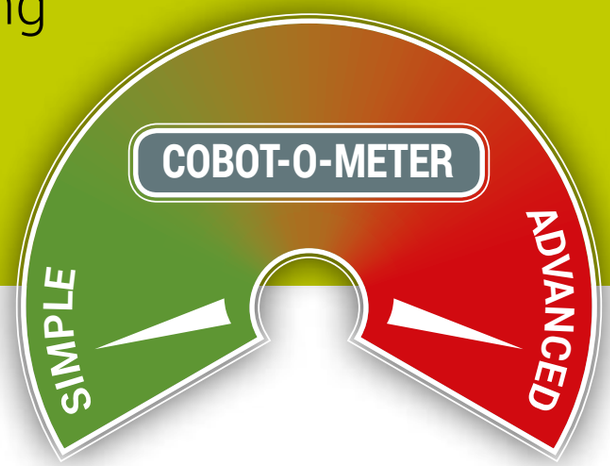
Cobot mimics human interaction with machines

Cobot integrates directly to machine's I/O beyond basic cycle commands

6 Grippers & End Effectors

An end effector is mounted on the robot arm to interact with parts and machines. It can be a suction cup or two-fingered gripper to pick up parts, a spot-welding tool or paint sprayer, or almost anything else you can imagine to meet your application needs. A range of suction cups and grippers are widely available for cobot arms, and for specific applications you may be able to create custom tools using 3D printers or specialized suppliers.

Can you use a single, flexible end effector for multiple processes, or do you need individual tools for each job? Off-the-shelf tools can be simple and cost-effective, but a custom tool might be just what you need — even though it may add complexity.



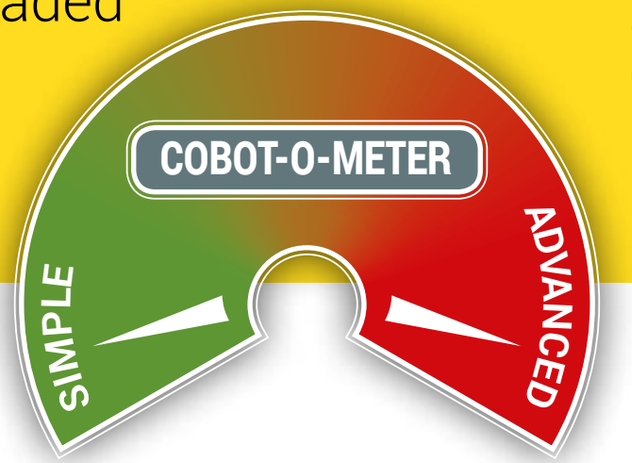
Consistent parts, easy to pick up with standard grippers

Variable part sizes and shapes or custom end effectors

7 Mounting & Fencing

In the simplest applications, the cobot is mounted in one place and stays there, doing the same thing over and over. Lightweight and easy-to-program cobots can also be moved between processes — even mounted on a rolling cart to make that convenient. Just keep in mind that each time the cobot is moved, it needs to be localized to its work space so that parts and machines are where the cobot expects them to be. Programs can be stored on the teach pendant and reloaded by the press of a button.

Most cobot applications don't need additional safety guarding or sensors, depending on your risk assessment. Built-in features adhere to current safety requirements on force and torque limitations, so the cobot automatically stops operating and doesn't cause bodily harm if it collides with a person.



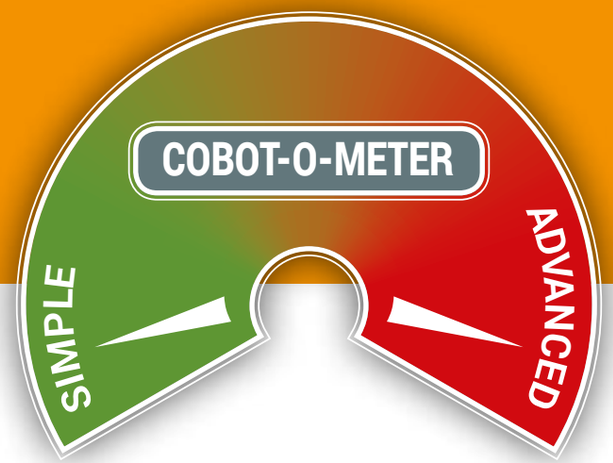
Robot mounted in one place, moving at typical human speed

Robot moves, operates at high speeds, or requires additional safety precautions

8 Environment

Cobots work in almost any environment that humans can work in, without complaining about temperature, noise, or dirt. At the other extreme, you can also find cobots that can work in hygienic environments or are even cleanroom-certified. But like any equipment (or human workers, for that matter), cobots in extreme environments may need added protection.

Protective covers protect the robot arm from temperature and humidity extremes, fluids and corrosive atmospheres, and particulates such as grit, dust, or debris. These covers are often available off-the shelf, but the more extreme the situation, the more complex it is to automate.



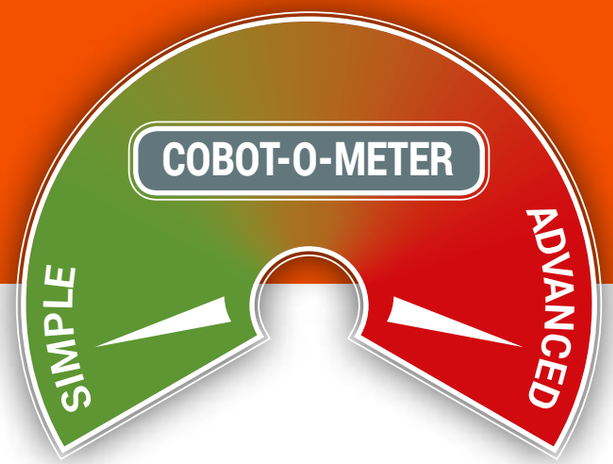
Standard work environment for human workers

Extreme environments or applications with hygienic or cleanroom requirements

9 Programming & Logic

The more machines or devices you need the cobot to interact with, the more complex the application becomes. Simple pick-and-place operations, with consistent parts in ordered positions, might be programmed in minutes. Changing to different operations or part types can typically be done quickly and easily as well. As a rule of thumb, a good candidate for easy automation is any process where the robot can do its job with simple and minimal feedback from external sensors or controllers.

The process gets more complex if you need vision systems or force sensing to identify and pick up parts, or feedback devices to monitor and control the robot's performance and interaction with other machines.



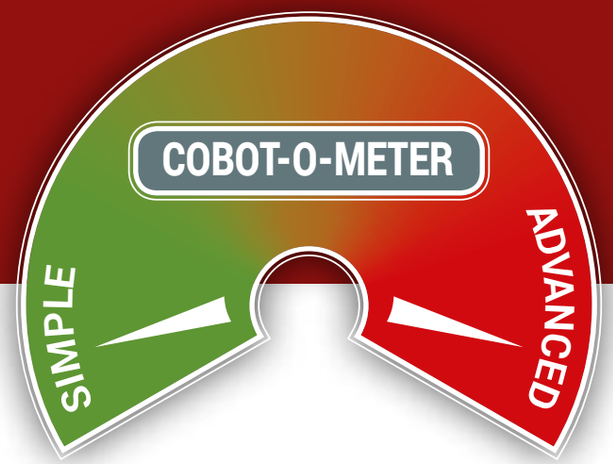
Simple, consistent pick-and-place processes

Applications that require vision guidance, force-, or safety-sensing

10 Future Needs

If you're just getting started with cobots, it's a good idea not to be too ambitious. But that doesn't mean you shouldn't think ahead. Once you've experienced your first successes, you'll find yourself looking at all your manual operations with new eyes. Research available cobots and think about whether the cobot that meets your needs today will also meet your future needs. Once you get your first cobot application up and running, you might find that what seemed ambitious when you started out is now completely reasonable.

Cobots are flexible, lightweight, and easy-to-program, so you may find yourself moving your first cobot to test new and more ambitious applications on your production floor. Choosing from a family of cobots of different sizes and specifications lets you easily translate gained knowledge and quickly launch new operations.



Today's consistent processes

What seemed ambitious when you started may soon feel straightforward!

We Make It Easy to Get Started!

Request a cobot demo from a distributor in your area and find out just how easy it can be to get started with cobots.

Request a Cobot Demo from a distributor

Universal Robots is the result of many years of intensive research at Denmark's successful robot cluster located in Odense, Denmark. The company was co-founded in 2005 by the CTO Esben Østergaard, who wanted to make robot technology accessible to all by developing small, user-friendly, reasonably priced, flexible industrial robots that are safe to work with and can be used to streamline processes.

Universal Robots, a part of Boston-based Teradyne Inc., is headquartered in Odense and has subsidiaries and regional offices in the U.S., Spain, Germany, Singapore, Czech Republic, India, and China.

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