

Collaborating with a robot

The collaborative robots market is set to be huge. Some forecasts say it will treble in size in the next decade. According to Loup Ventures, the total market size will reach \$9 billion by 2025. That's just one example of one report. The figures may vary from one researcher to another, but most agree that the prospects for growth are very good.

One of the main reasons for the increase in the number of collaborative robots is that they can be used in almost any environment, whether in a factory or in an office, on a desktop, or even in the home.

Traditionally, industrial robots have been big, hulking masses of metal and electronics, undertaking heavy industrial work, and caged off because they are potentially dangerous to human workers.

Collaborative robots, however, are smaller, lighter, and have built-in safety mechanisms which make them safe enough for humans to work with, much like as if they were any other power tool, possibly even safer.

Some collaborative robots stop when they are touched by a human, others stop even when they detect a human in close proximity. Such safety mechanisms are made possible by the huge variety of sensors and massive increase in computing power now available to machine builders and developers, or mechatronic engineers.

Another key differentiator, and possibly the reason why collaborative robots are likely to become widespread is that they can be used by anyone with just a little training – usually about 30 minutes.

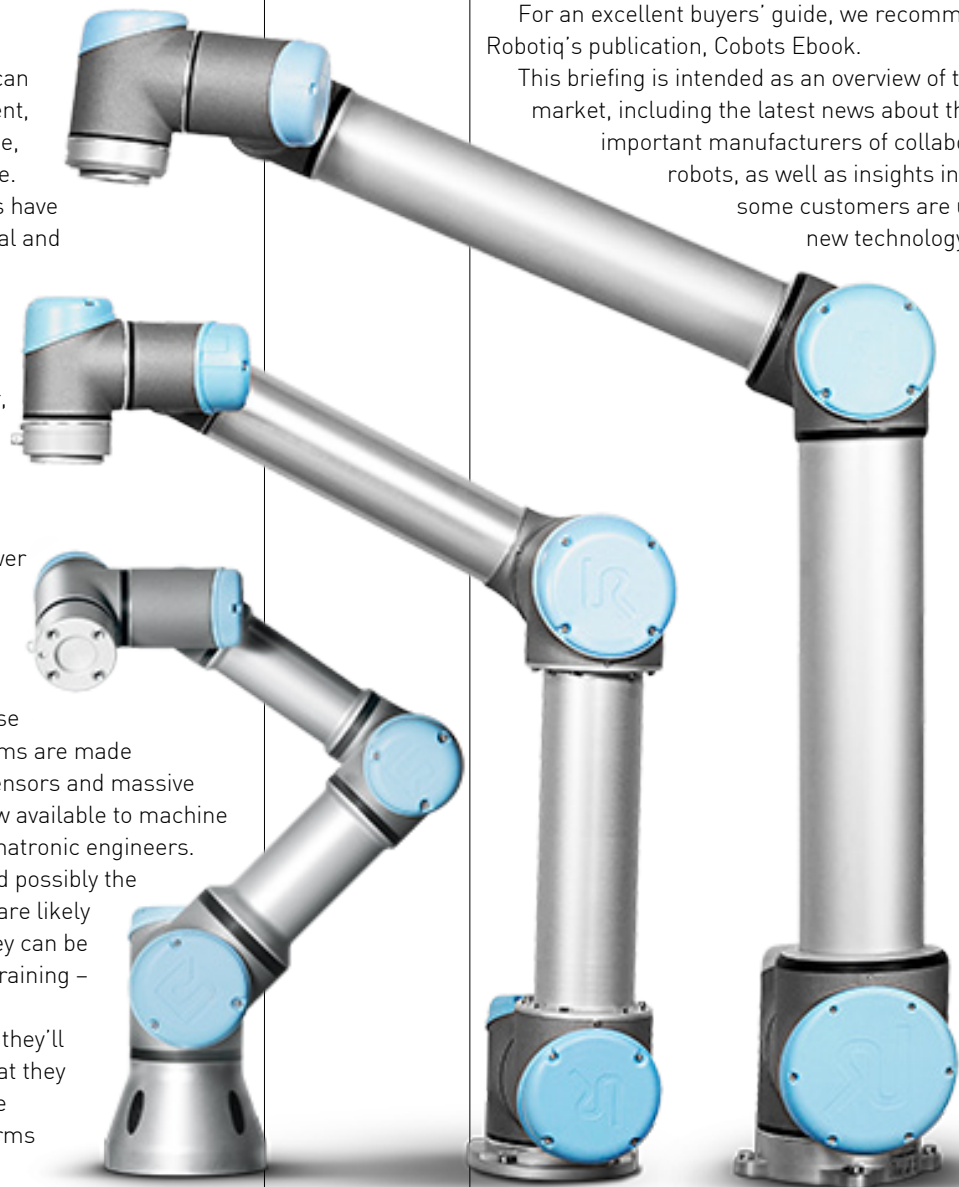
But perhaps the main reason they'll be bought in huge numbers is that they are significantly cheaper than the conventional industrial robotic arms seen in factories.

The big, traditional industrial robots used in much of manufacturing cost upwards of \$100,000 each, and require specialists to use and maintain, which adds to the total cost of ownership.

Collaborative robots cost a fraction of that – starting at around \$20,000 each, or even less, depending on factors such as size, payload capacity and so on.

For an excellent buyers' guide, we recommend Robotiq's publication, Cobots Ebook.

This briefing is intended as an overview of the market, including the latest news about the most important manufacturers of collaborative robots, as well as insights into how some customers are using the new technology. ■



News



Universal Robots finds work at traditional glassblowing company

Universal Robots is believed to have been the first company to have developed collaborative robots, and now has three models in its range.

Perhaps because of this first-mover advantage, the company has become the largest supplier of the technology, surpassing 10,000 robot installations some time earlier this year.

Universal Robots machines have found their way into large automotive plants as well as small workshops of startup companies.

One recent application it found was at family-owned glassblowing company Hofmann Glastechnik, where one of its robots feed highly sensitive glass tubes into a forming machine, relieving human workers to concentrate from what is essentially a monotonous and repetitive task.

goo.gl/CAg4Jf

Tennplasco puts Rethink Robotics' Sawyer to work

Rethink Robotics is one company which has a lot of media attention, partly because one of two collaborative robots was one of the first to be dual-armed, Baxter.

The other one, Sawyer, has probably been more successful commercially, but Baxter is often treated more of a research robot at the moment.

The latest story to emerge is of Tennplasco, a plastic injection moulding company which says the robot has already paid for itself.



goo.gl/aBvCeH

Kuka revs up its mobile collaborative robot

Kuka builds some of the world's largest industrial robots, but it's also launched a collaborative robot called iiwa.

The lightweight robot is used by automakers such as BMW for various tasks which usually require it to be in a fixed location.

But lately, the company – which was bought by home appliances manufacturer Midea recently – has been demonstrating the iiwa as attached to an autonomous mobile platform, or self-driving cart, for use in logistics.

goo.gl/iwN2dn



Stäubli showcases its TX2 collaborative robot

Stäubli has a long history in automation, having started in textiles and eventually having bought the Jacquard looms company.

Its industrial robots are everywhere in industry, but until recently they were most the traditional type.

Now, Stäubli has launched a collaborative robot, the TX, which is not only touch-sensitive, but also proximity-sensitive, meaning it can stop if someone is too close.

goo.gl/MioEJv



Fanuc shows its collaborative robot's flexibility

Fanuc has been demonstrating the range of tasks its new collaborative robot can be applied to.

From gearbox and motor assembly to picking and placing while on an autonomous vehicle, Fanuc's new CR models are the company's offering in the collaborative robots space.

Already the world's largest manufacturer of conventional industrial robots, Fanuc is likely to challenge for the lead in the collaborative robotics market, currently held by Universal Robots.



goo.gl/PbMwdt

ABB's YuMi is cobot is close being a celebrity

Its aesthetically pleasing exterior is probably what makes ABB's YuMi among the most eye-catching of all collaborative robots.

YuMi is dual-armed and is claimed by the company to be the first "truly" collaborative robot, although Universal Robots might question that, since they claim to have been the first.

YuMi was recently asked to ring the opening bell at the Nasdaq stock market, and, being a robot, robotically obliged.



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Yaskawa Motoman launches collaborative robot

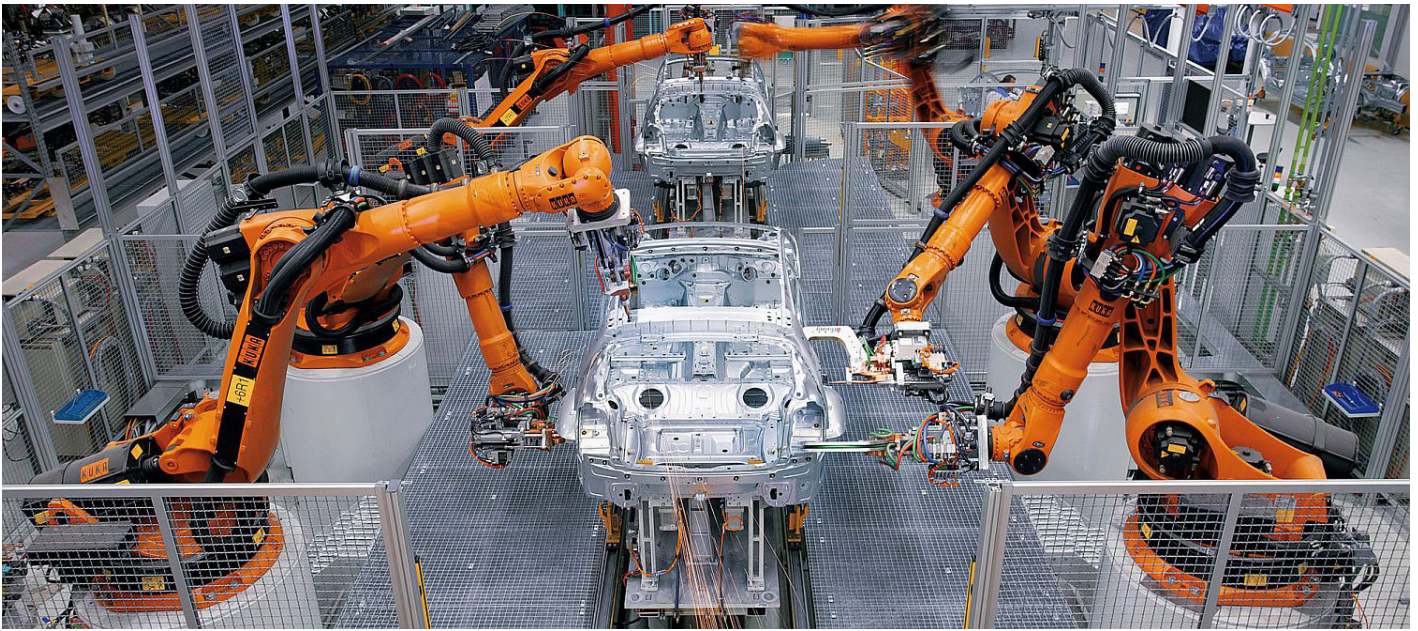
Yaskawa Motoman is vying for the lead in the industrial robotics market with Fanuc in terms of the number of installations, and recently entered the collaborative robots space.

The company showcased two new cobot ranges – the Motoman HC10 as well as the GP series – for the first time at the recent Automatica event.

Yaskawa, too, seems convinced that cobots on mobile platforms is literally the way to go, especially for logistics.

goo.gl/KbNrYZ





Robots for a new world

The world is much more automated than ever before, and yet this is just the beginning for robots

When the first industrial robots were integrated into plants in the decades from the 1950s to the 1980s, they were treated with something akin to awe. Their size, their power and their wide-ranging capabilities made them the perfect worker.

But being caged off, traditional robots don't have the potential for growth of collaborative robots. Some say cobots will find entirely new markets, and that's just the robotic arms.

If the machine builders get it right, there is a real prospect that some sort of collaborative robot will be in every office and in every home – much like computers are. This is the view of experts in the industry such as Mike Hilton, whose background includes many years at Microsoft, which itself ushered in the computer era.

Many people may think of robots as being humanoid, but, as Hilton says, robotic technology is likely to take many different forms in the future, and the relatively simple appliances found in most homes – washing machines, dishwashers and so on, will also get smarter as artificial intelligence becomes more prevalent.

Interview: <https://goo.gl/wAAdBC>

There's more than one app for that robot

In the past, programming an industrial robot was massively complex task, usually undertaken by experts with PhDs and computer science backgrounds. To a

great extent, that is still the case when it comes to the big, heavy-duty robots seen in factories.

But collaborative robots don't need to be programmed – they can be, but it's not always necessary. They are much easier learn to use, and easier to program and develop hardware and software applications for.

Since it was the first to really explain the idea of collaborative robotics, it's fitting that Universal Robots was probably the first to open an "app store", through which developers can distribute their work, whether it's a new type of gripper or software for better vision.

UR+ as it is called has proved popular and is an ecosystem that is being emulated across the industry now. Which is remarkable given how closed the whole industrial robotics sector used to be.

goo.gl/Niw2po

The bottom line

Perhaps the most crucial thing about collaborative robots is that they're a lot cheaper than their larger, factory-bound counterparts.

The most inexpensive collaborative robot can be bought for prices ranging from \$12,000 to \$50,000. This is about one-tenth of the cost of buying a traditional industrial robot, and we're not even considering the programming and maintenance costs, which make the gap much wider.

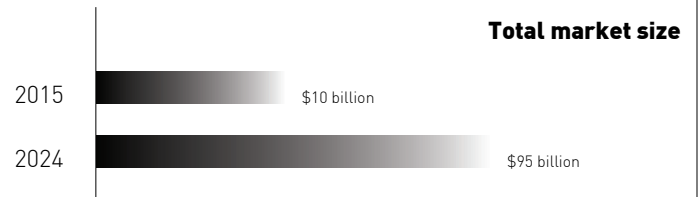
Such relatively low prices make collaborative robots not only affordable to small and medium sized businesses, they shorten the time in which the robot pays for itself in time and savings made.

goo.gl/bfx4mq

Infographics & tables

The estimates for the growth of collaborative robotics are generally very positive, but no-one knows for sure how the entire market will evolve, since there is the chance robots will become as ubiquitous as computers.

The chart is based on data by Transparency Market Research and mostly considers robotic arms.



Source: Transparency Market Research

Robotiq's collaborative robots buyer's guide

<http://blog.robotiq.com/collaborative-robot-ebook>

| Nº | Company name | Summary of Robotiq's evaluation – details at Robotiq.com |
|-----|---------------------|---|
| 1. | ABB YuMi | Smaller payload, higher mid-price range, easy to program |
| 2. | Aubo | Medium payload, mid- to low-priced robot, easy to program |
| 3. | Bosch Apas | Low to medium payload, price not available, less easy to program |
| 4. | Comau Aura | Very high payload, high price, relatively easy to program |
| 5. | Fanuc CR-4iA | Low to medium payload, mid- to high-priced, proprietary programming |
| 6. | F&P Prob 2R | Small to medium payload, mid-price, easy to program |
| 7. | Productive OB7 | Small to medium payload, low- to mid-priced, easy to program |
| 8. | Kawada NextAge | Smaller payload, mid- to high-priced, not so easy to program |
| 9. | Kawasaki duAro | Small payload, mid-priced, not so easy to program |
| 10. | Kuka LBR IIWA | Medium to high payload, high price, easy to program |
| 11. | Motoman HC10 | Higher payload, higher price, relatively easy to program |
| 12. | Rethink Sawyer | Medium payload, medium price, relatively easy to program |
| 13. | Staubli TX | Small to medium payload, medium price, proprietary programming |
| 14. | Techman TM | Medium payload, medium price, relatively easy to program |
| 15. | Universal Robots UR | Small to high payload, mid-priced, relatively easy to program |

We haven't included all of the robots Robotiq evaluated, we just highlighted some, and not in order of merit – it's random.

Robotiq reviews and rates all of the collaborative robots, giving each one a star rating, depending on how easy it is to program.

Also, we haven't included the pricing information since it's data acquired through the hard work of the people at Robotiq. They probably wouldn't mind, but their ebook is free to download at the link above.