



UNIVERSAL ROBOTS



Optimize end-of-line palletizing applications with collaborative robots

Maximizing productivity and efficiency

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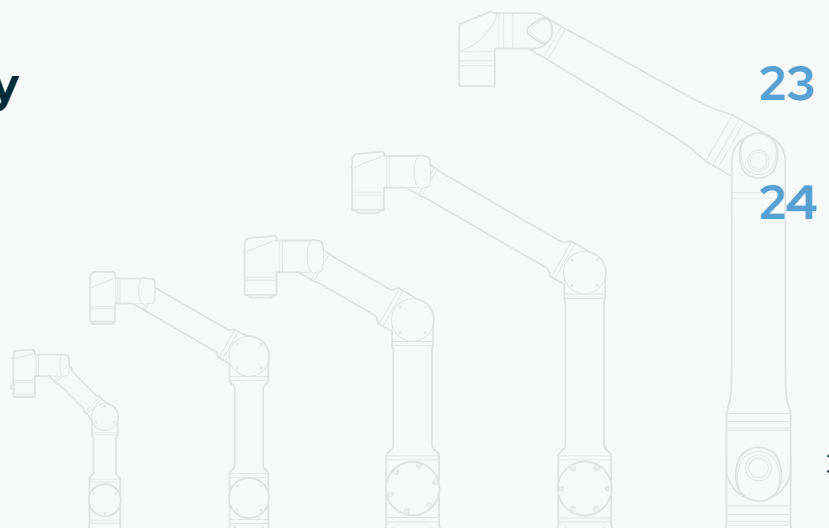
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Effortless palletizing with Universal Robots

Universal Robots' collaborative robots (cobots) are ideally suited for palletizing applications due to their flexibility, ease of use and other technical advantages.

This document explores some of the common palletizing challenges that cobots can solve for you. It also goes through four success stories from our customers and highlights some important factors to keep in mind when considering an automated solution in your production environment. Finally, we also elaborate on possible end-of-line palletizing configurations, using additional axis, with the objective of extending the working range of the cobot.



The solution to solve your palletizing pain points is here

Introducing collaborative automation in end-of-line tasks brings numerous benefits in comparison to manual palletizing or other automated palletizing solutions.

Reduce injury risks and unexpected costs

Manual palletizing requires workers to constantly bend, squat, twist, and lift weights in awkward postures. Over time, these ergonomically challenging tasks can cause repetitive strain injuries to employees, triggering additional problems that affect your production, like attrition, occupational injuries, downtime and reduced productivity.



In United States, overexertion and bodily reaction involving days away from work constituted **21.7% of all workplace injuries in 2020**, according to US Bureau of Labor Statistics.¹

As an industry sector, manufacturing witnesses a statistically higher than average workplace injury rate as well as a labor shortage in many regions of the world. Using cobots has proven to be the answer to **decrease injury risks**, as they free employees to work on less hazardous tasks, and to the **challenge of hiring** into the unattractive manual palletizing jobs.

Bring versatility in and grow your business

There are also many factors that favor a cobot installation versus other automated palletizing solutions, like hard automation (using prismatic joint axis) and traditional robots. Hard automation solutions (cartesian or gantry systems) are usually tailored to a specific family of products (with certain dimensions and weight), making it difficult to:

- introduce new products into the line
- make layout changes
- or simply relocating the system can take a larger effort and longer time

Cobots, on the other hand, can be **reconfigured** and **redeployed** in a different layout, orientation, end-of-arm tool, height, etc. Furthermore, cobots can run night and day, so you can increase productivity when needed. This is particularly useful in the case of seasonal flux in demand.

¹ Top Work-Related Injury Causes. Injury Facts, 2021. Survey of Occupational Injuries and Illnesses Data (bls.gov)

Limited floor space or robotics expertise? No problem

Compared to traditional robots, Universal Robots (UR) delivers robotic arms with a very small footprint that leads to smaller space required (up to 75% smaller robot base depending on robot size). This can be useful when you need to populate a reduced area with more cobot arms to increase productivity and overall efficiency. Traditional robots are bigger and a lot heavier, so layout changes are more cumbersome and complex. Programming them usually requires a robotics expert and a lot more training compared to Universal Robots' technology.

UR focuses on ease-of-use and programming, making cobots easy to deploy and troubleshoot, regardless of your company's knowledge in automation.

Stacking profits with collaborative automation



With labor shortages affecting virtually all manufacturing operations, cobots offer an affordable way to tackle the problem. A McKinsey survey from 2021¹ found that 87% of global companies are either currently or are imminently about to experience labor shortage. Adding cobots to your team means you have the versatility to tackle potential current and future labor shortages.



Further, Universal Robots cobots can be easily deployed and redeployed on a wide range of applications, bringing extra value to picking, packing and palletizing operations. They are quicker to install, simpler to operate than traditional robots, and can be reprogrammed by a member of your team – some end effectors even allow you to switch between tools multiple times per day. This reduces downtime, contributes to ROI and eliminates the intimidating programming costs associated with traditional palletizing solutions.



While industrial robots are larger and heavier, cobots being lighter and smaller require a less robust and lighter lifting column that represents savings in the overall initial capital expenditure, showing faster Return on Investment (ROI), that typically go from 6 to 12 months.



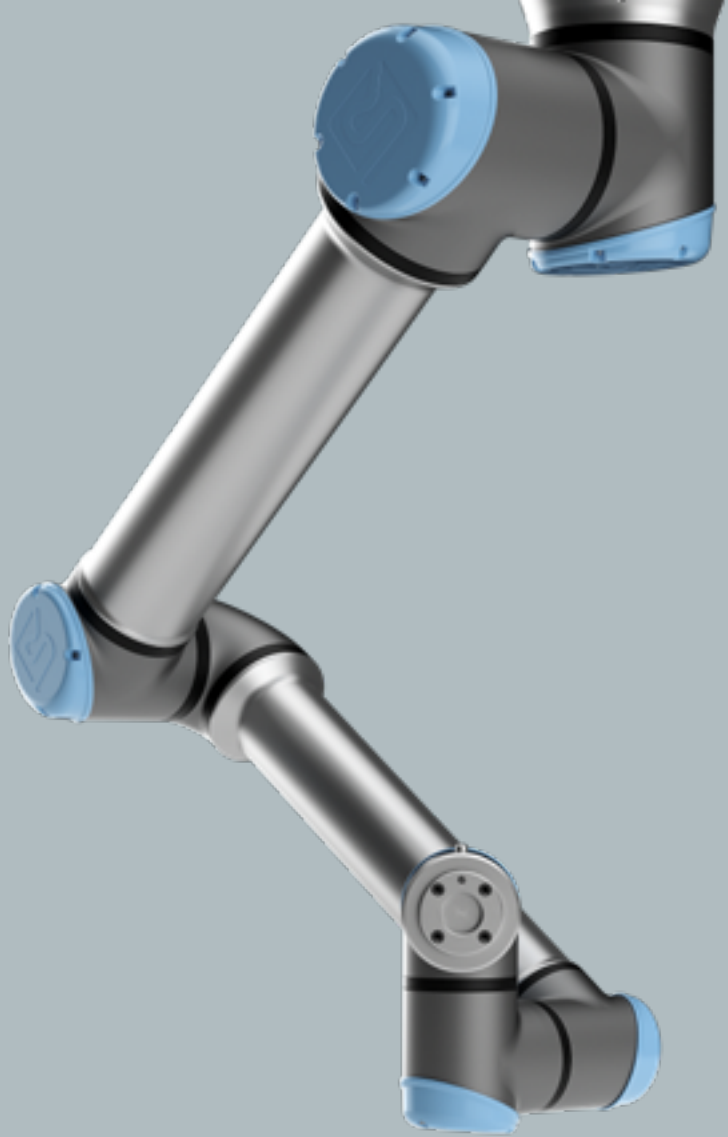
Power consumption is becoming more and more important. A UR5e cobot is comparable to the consumption of a gaming console, approximately 200W only. Another example with a UR10e that consumes 350W while some traditional robots can go over 3000W.



UR cobots are available through Universal Robots' Finance and Leasing programs², which provides additional flexibility for first-time users and reduces some financial risks associated with an automated installation at your factory.

¹ [mckinsey.com/featured-insights/coronavirus-leading-through-the-crisis/charting-the-path-to-the-next-normal/mind-the-skills-gap](https://www.mckinsey.com/featured-insights/coronavirus-leading-through-the-crisis/charting-the-path-to-the-next-normal/mind-the-skills-gap)

² [universal-robots.com/products/collaborative-robot-rental/](https://www.universal-robots.com/products/collaborative-robot-rental/)



Proven palletizing excellence

UR cobots make palletizing automation accessible to companies of all sizes, from global brands to small, family-owned manufacturers and even contract packaging businesses. In the decade plus since our cobots were first deployed on palletizing applications, our technology has provided manufacturers with tangible results and, along the way, UR cobots have gained a reputation for high quality performance and reliability.



Collaborative robots are installed in many different production environments across different industries worldwide. Regarding palletizing applications, and particularly end-of-line tasks, cobots are widely used in the food and beverage, cosmetics, and pharmaceutical industries. Here are some cases where UR cobots are making a difference in performance and employee safety.



[Watch the full story here](#)

At L'Oréal India's Pune plant, for example, manual end-of-the-line operations involved operators lifting approximately 8,500 kg of product per 8-hour shift. Concerned about the ergonomic risk, L'Oréal India deployed two UR10s on palletizing tasks, enabling the cosmetics giant to improve worker health and safety and improving overall equipment effectiveness in the plant by 5%, thanks to the time saved in pallet replacement.

“ Collaborative robots have helped eliminate the ergonomic risk completely. They are user-friendly, maintenance-free and extremely efficient. We are really happy to have Universal Robots' cobots on our line.

Ranjit Ekde, Head of Manufacturing Supply Chain, L'Oréal India Private Limited



[Watch the full story here](#)

Sanofi, one of the world's leading healthcare and pharmaceutical companies, has successfully installed seven UR10 collaborative robots at its Tours site in France. Thanks to the installation of the UR cobots, Sanofi increased its production and reduced the musculoskeletal disorders of its operators who started focusing on higher value-added tasks. Sanofi was able to reduce working time on the palletizing tasks by 10% daily, and calculated a return on investment of 24 months.

“ The advantages of Universal Robots are their reliability and simplicity of programming as well as easy access to a wide range of accessories around the cobot

Gille Marsal, Site Manager at Sanofi



Watch the full story here

Unilever's Katowice, Poland facility, which specializes in tea packing processes, deployed six UR10 robots to handle palletizing tasks. Prior to the implementation, operators spent around 70% of their time packaging and 30% palletizing. With cobots palletizing around 1,100 boxes during an eight-hour shift, throughput and productivity at the facility improved and operators are now free to focus on more ergonomic tasks.

“ Before automation, employees had to perform monotonous tasks involving bending over to place boxes on lower layers of the pallet. This strenuous activity was totally eliminated by UR robots.

Dariusz Ratajczak, Automation Senior Specialist, Unilever



Watch the full story here

RNB Cosméticos, a Spanish cosmetics company, has integrated six UR10 robot arms into its packing plant to perform end-of-line palletizing tasks. They needed a flexible solution capable of complying with its six-packages-per-minute production cycles and handling over 350 different items. As cobots arrived, they were viewed with suspicion by workers fearing they might take away jobs. However, the integration of the UR cobots has not only consolidated the existing staff, freeing them from repetitive and non-ergonomic tasks that involved carrying 7 kg packages, but has led to new staff being hired as a result of the increase in production.

“ We are not hiring expert staff to handle a high-tech robot. We are turning our staff into experts with their skills level on the increase

Aurelio Tornero, General Industrial Manager, RNB Cosméticos

Manual palletizing is wasting your resources

Time

An inconsistent stream of boxes means the person performing the task spends a lot of time waiting. The breaks, holidays, and absenteeism due to illness or injury directly impact productivity, delivery times, and bottom lines. The pressure increases as the customer demand continues to shorten production cycles and expectations for fast delivery continue to grow.

Money

Running a business today can be a constant balancing act between taking advantage of opportunities when they arise, keeping your customers satisfied, and maintaining a happy workforce. Whenever palletizing issues stop you from scaling production, they limit your profits and growth.

Your workers' potential

People will always have a role in industrial operations, but that doesn't mean they have to work like robots. Dirty, dull, and dangerous jobs including manual palletizing can hurt their bodies and crush their spirits while they could really contribute and add value in other roles, at the center of production. Giving people the opportunity to complete more interesting tasks is likely to benefit both you and your employees.

A study conducted by McKinsey found that fulfilled workers are six times more likely to want to stay in their role, four times healthier, and 1.5 times more likely to want to go the extra mile for their employer. And for employers, this will minimize the costly task of recruitment.¹

The list of challenges around manual palletizing is certainly long, but sometimes one pain point is enough to motivate a business to automate the palletizing process with a cobot.

¹ www.mckinsey.com/mhi/focus-areas/brain-health/employee-mental-health-and-well-being

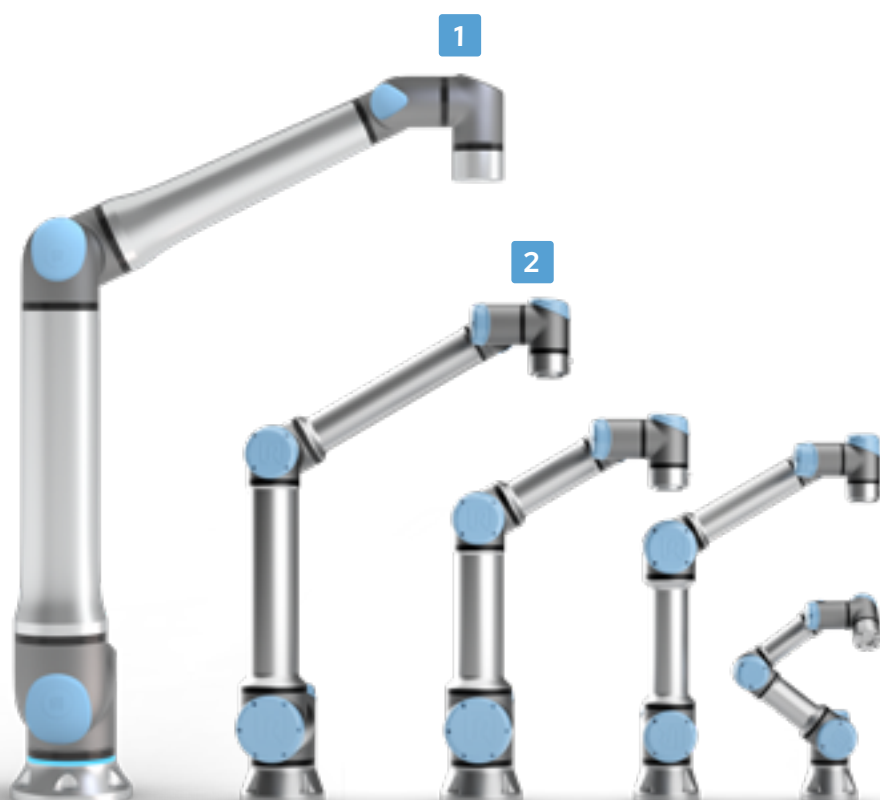
Palletizing factors for success

01 Selecting the right cobot

There are two important factors to keep in mind when selecting the right cobot: handling capacity and arm reach. When considering handling capacity, one must think about the weight of the end-of-arm tool (whether pneumatic or mechanical) in addition to the weight of the parts being handled by the robot. Both masses in combination, should be the factor for choosing the right cobot for your application.

The arm reach corresponds to how far you can extend the arm to pick-up and drop parts. Sometimes, looking at this measurement in 2D is not enough to guarantee the cobot will perfectly fit your facility. Read more about how you can bring your palletizing cobot cell into a virtual environment (3D) on [page 17](#).

When it comes to end-of-line palletizing applications, the most suitable cobots are undoubtedly the ones with longer reach and higher payload. The UR10e is widely used in palletizing applications. More recently, UR has added the UR20 cobot to the robot family – the perfect choice for a palletizing application.



1 UR20

Payload: 20 kg / 44.1 lbs
Reach: 1750 mm / 68.9 in
Footprint: Ø245 mm

2 UR10e

Payload: 12.5 kg / 27.55 lbs
Reach: 1300 mm / 51.2 in
Footprint: Ø190 mm



1750 mm reach

to handle longer tasks, UR20 supports all EUR-pallets and US standard pallet sizes up to 96". UR20 can palletize boxes up to 2.5 m of height.

Introducing



12 boxes

per minute

performing cycle time of up to 12 boxes per minute.



$\pm 120^\circ/s$

base speed

for faster palletizing applications.

Performance

Universal Robots' new cobot handles more tasks, fits more applications, and assists in more environments than ever before. The UR20 is the first in our next generation of industrial cobots designed to take performance to new heights, while embracing the UR hallmarks of versatility, usability, and small footprints.



±360°

work range

giving more flexibility of installing the robot anywhere and placing pallets where required.

the UR20



20 kg payload

allows heavier workpiece handling.

The UR20 is the perfect choice for palletizing.

→ See our entire cobot range and its technical specifications on [page 23](#)

02 Building your palletizing solution

It is essential to consider which path you should take when building the palletizing solution for your end-of-line work cell to ensure a smooth deployment, continuous production run, and fast ROI.

Universal Robots has the expert professionals and

resources to assess your needs and support you in every step – from initial project idea to loading the first pallet.

When building your palletizing solution, you have a number of possibilities at your disposal. The first step is to talk to an expert that can advise you on the optimal path for you, based on your project, specific needs, timeline, and in-house resources. Following this preliminary assessment, two general routes are usually suggested.



Turnkey solution

The turnkey solution path is ideal if you want a plug-and-play solution with low risk, predictable costs, short delivery time, and on-site installation.

Following this path means that first, we'll put you in touch with a solution partner who can walk you through the proposal stages with a plant visit and demo. Some can provide a digital twin simulation too.

The partner also talks you through how you prepare for your end-of-line palletizing cobot cell, exactly how much space it will take up, and the performance you can expect. Following this path means deployment is easy and effective, helping you to reduce complexity and save time and resources.

Do It Yourself (DIY) path

If you have adequate in-house expertise, you can choose a more independent route to build your palletizing solution. Support will still be available, but ultimately you take ownership of the project.

The DIY path entails the following steps:

→ **Procure your cobot from one of our reseller partners**

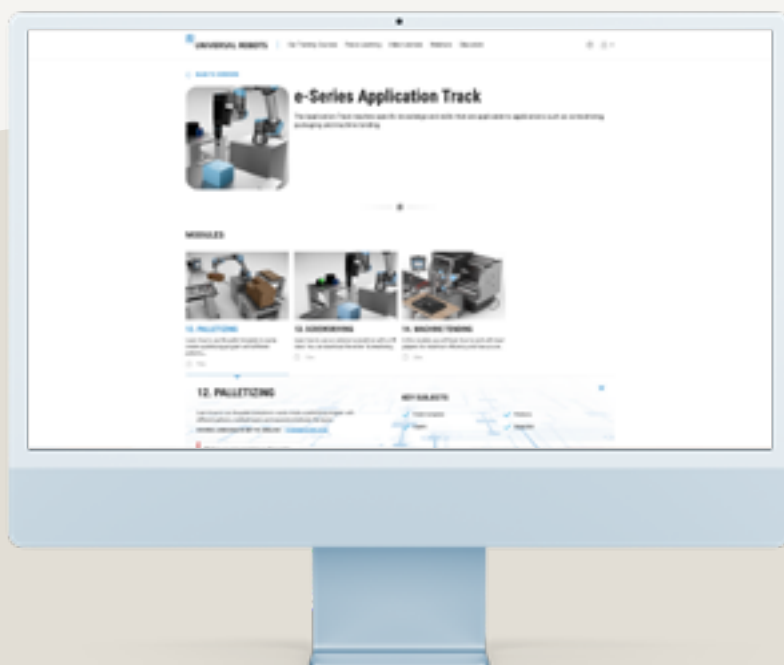
There are Universal Robots reseller partners spread all over the world, ready to answer your questions and get you the right cobot for your palletizing solution.

→ **Select the right product(s) for your palletizing application in the UR+ platform**

Choosing the right end-of-arm tools and accessories required for your palletizing application is crucial for the success of your project. Browsing through the UR+ showroom, you can find the palletizing elements you need to create your own application, from individual components to Application Kits. For your convenience, we'll recommend the nearest partner to you.

→ **Deploy your palletizing solution**

Once the cobot and all components arrive at your location, it is time to get your end-of-line palletizing cell up and running. Before getting your hands on it, we recommend you sign up for the UR Academy and go through the free e-Learning modules. They will provide you with the skills to deploy, program, and set up your cobot for optimal performance.



Here are some elements specifically designed for palletizing cobot cells:

Solutions

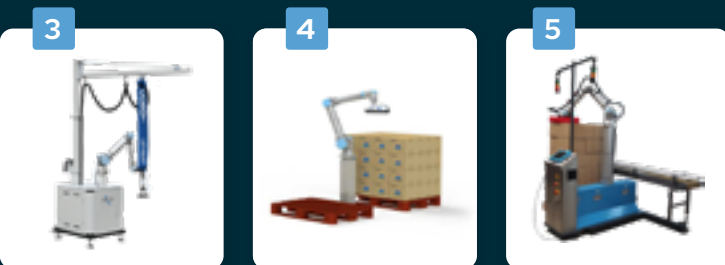


1 [ROBOTIQ Palletizing App Kit - AX Series](#)
Open the box, and the hardware and software is already connected and ready to install.

2 [Kameleon Palletizing](#) is a complete palletizing solution with a super quick ROI (Return on investment).

3 [The Cobot Lift](#) increases the payload of your UR10 from 10 to 45 kg. It is available as a mobile and a stationary model.

Application Kits



4 [Advanced Palletizing Software](#) by Rocketfarm is a flexible, customizable and quick to install palletizing software which includes an upfront simulation of your project.

5 [Dahl Palletizing Kit](#) - The compact palletizing solution with mobile frame and two pallet locations.

Components



6 [The OnRobot 2FGP20](#) electric gripper offers a wide stroke and customizable arms to easily handle heavy or open boxes, shelf-ready products, and other containers.

7 [The FXCB robot set](#) is ideal for handling workpieces in the field of intralogistics using pneumatic vacuum generation.

8 [Coval's CVGC carbon vacuum grippers](#) correspond perfectly to the weight constraints, flexibility and safety of collaborative robot applications for handling of cardboard boxes, plastic or metal parts.

9 [ELEVATE](#) is an easy-to-use electric lifting column that extends the range of your cobot, where it is especially relevant.

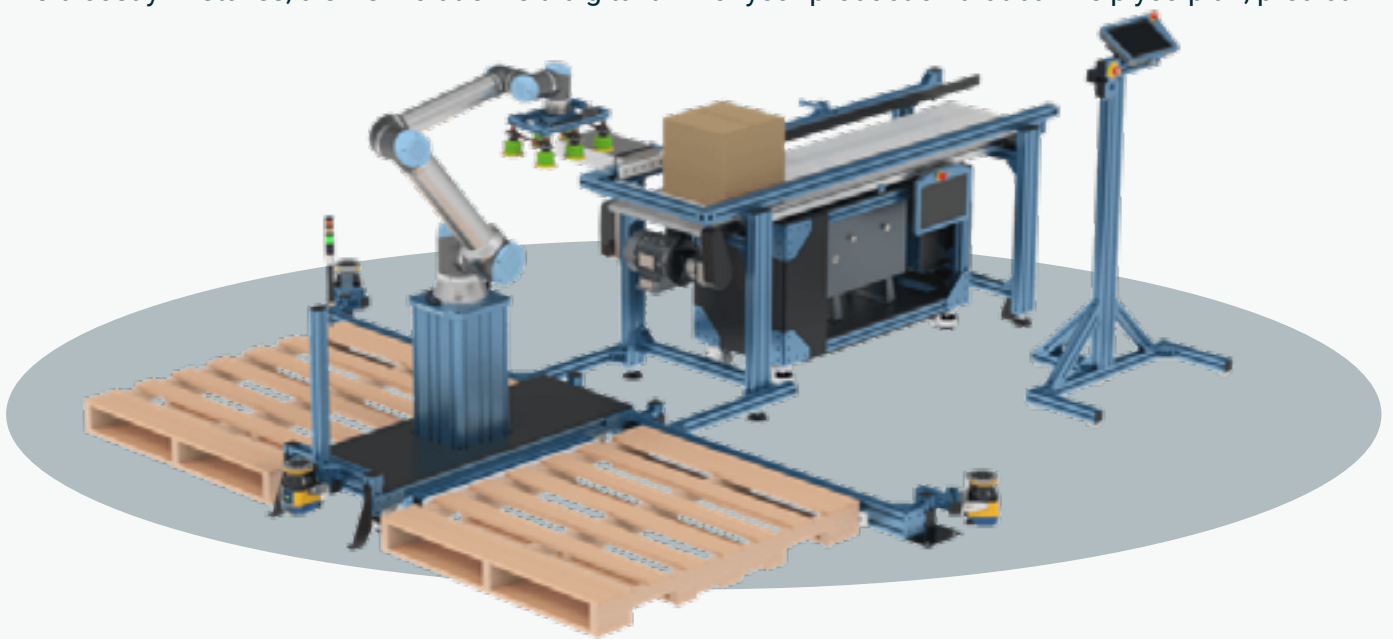
10 [The FQE](#) is a flexible area gripper for handling products regardless of size and geometry.

See more at UR+ products at universal-robots.com/plus/products/

03 Layout

Mounting all related equipment is as important as equipment selection, hence it is recommendable to use CAD systems, either in 2D or 3D to accurately place the robot and peripheral equipment to avoid problems with the robot reaching all positions within the pallet and conveyor belt. Often, we have seen layout changes during installation and commissioning, causing delays and unwanted additional costs. The most efficient approach to this task, is to perform a 3D simulation that will help you reduce risk and generate an accurate layout. At the same time, you will be able to efficiently calculate throughput and cycle times or generate new ideas to accommodate production.

Avoid costly mistakes, a 3D simulation is a digital twin of your production that can help you plan, predict



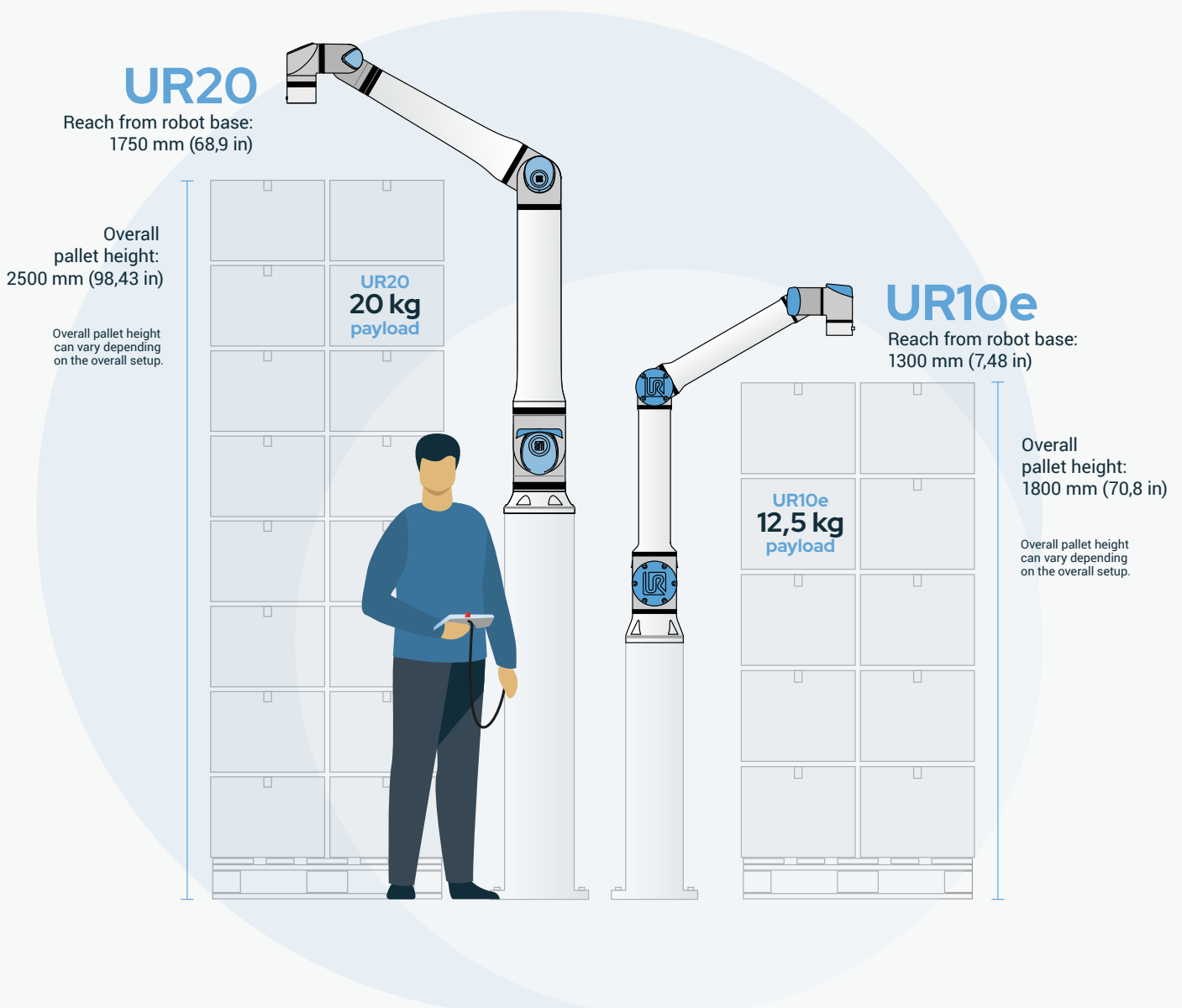
performance and help engineers take decisions ahead of time. Some of our partners have simulation software that can create a digital twin of your proposed, end-of-line palletizing cobot cell so you can see it in an accurate approximation of real-life (3D). That way you can see the palletizing cobot in action. Other partners have cobot cell demo units - so they can bring one to your shop floor for demo.

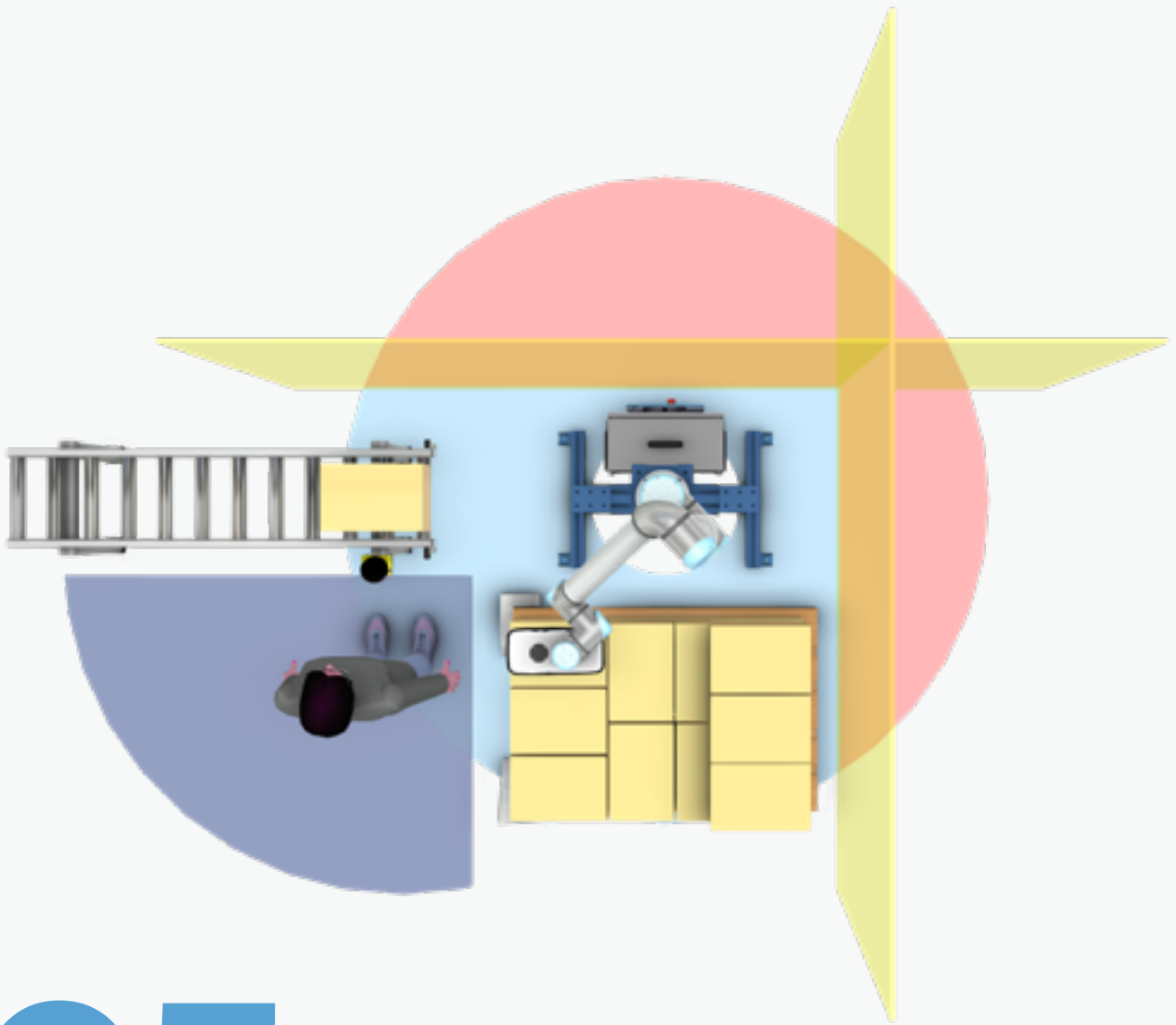
An advantage of using cobots in palletizing, is that many times our customers need to add a robot to their existing production line, this means space is always a limiting factor to bring automation making it difficult to install a traditional robot that requires more than double the space.

04 Pallet patterns

Efficient palletizing is of course related to the size of your boxes and allowed heights (depending on regulations of your regions), so you want to maximize the space based on the pattern, but also this can bring stability to the pallet when forklifts are maneuvering the load in facilities and avoid accidents.

For UR cobots, programming these patterns is an intuitive, fast task, but we also have partners in our UR+ ecosystem that provide you with even more advanced software that help you solving all kind of challenges based on parametric offline programming.





05 Safety

Safety is one of the pioneering features of collaborative robotics thanks to its design and built-in configurable safety functions. UR cobots are certified by TÜV NORD for ISO 10218-1 and safety functions are rated as Cat.3 PL d according to ISO 13849-1. However, it is crucial to perform a risk assessment to ensure everything in the production cell is safe for people and other machinery elements around the robot.

A thorough risk assessment will identify potential hazards, classify them (evaluate the risk) and explain how to mitigate them, in order to avoid

unwanted consequences during production and always keep your staff safe.

Our users can meet demanding safety standards, but you should always refer to the industry safety regulations in your country or region. Different industries will have specific regulations and legal implications governing work hazards and risks. Reach out for expert help either to Universal Robots or a partner.

Common palletizing configurations

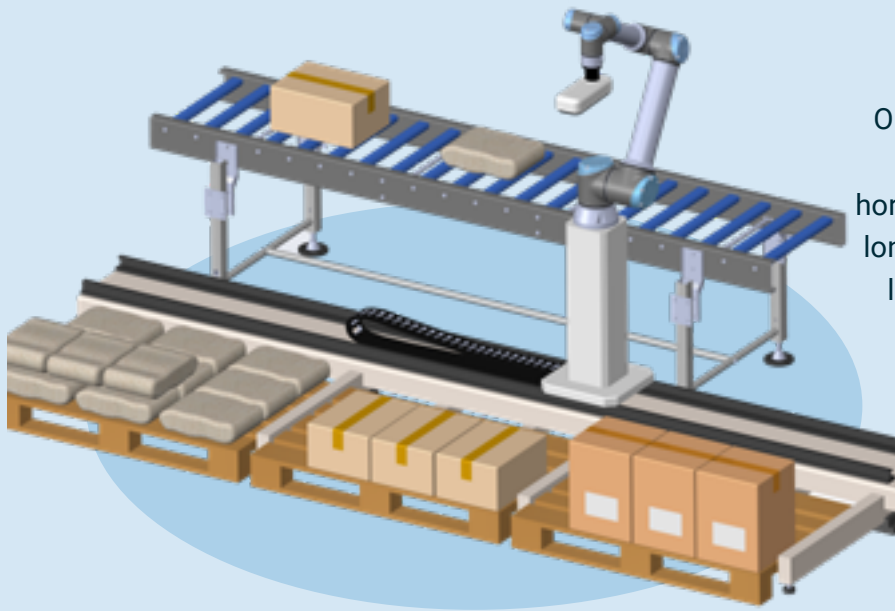
There are numerous ways to set up your palletizing application, depending on the type of product being handled and the throughput of your palletizing operations. There is peripheral equipment that integrated to a UR robot, can make the overall solution more efficient and effective. Some of these are external axis that extend the working range of the robot in either a vertical or horizontal axis which we will explore here below.

1. Vertical axis

In this configuration you will basically have the robot moving up and down making it accessible for the robot to reach higher avoiding other important motion constraints of the arm. In other words, you can stack-up more boxes than having the robot just mounted at a fixed position.

Vertical axis setups open up for a wide range of palletizing use cases that you just wouldn't be able to perform with a fixed robot arm.



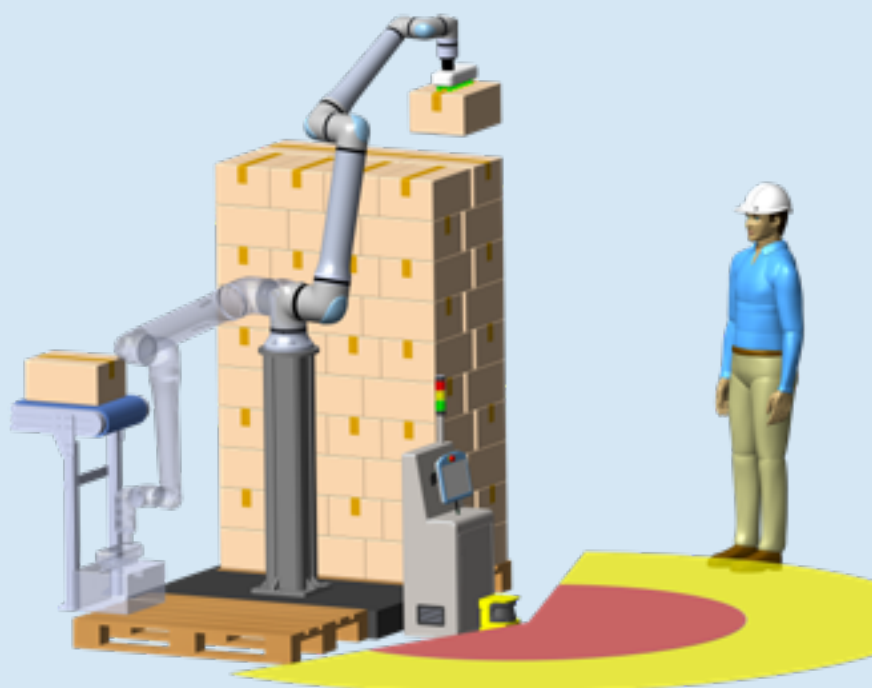


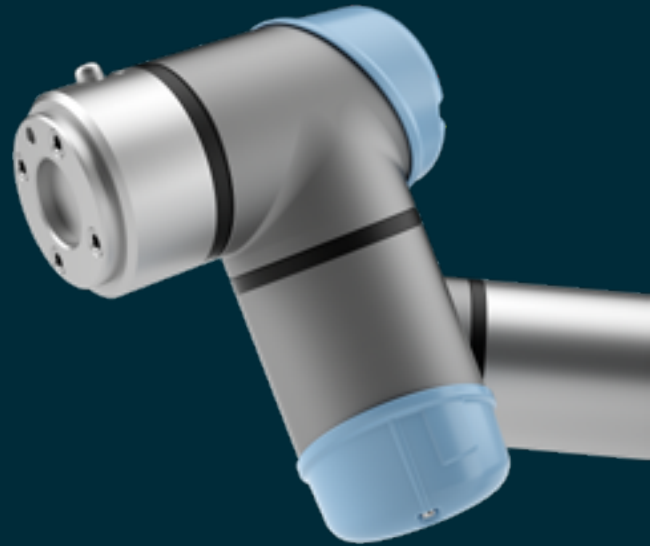
2. Horizontal axis

On the other hand, when you need the robot to work with multiple in-feed conveyors, a horizontal axis can move the robot to reach a longer area. This solution is typically seen at larger facilities with a high mix of products and relatively low throughput. You can find manufacturers that deliver modular solutions in basically every required length.

3. Fixed height

As the name alludes to, robot is mounted on a fixed riser (or pedestal) that maintains the robot static at the same height, which reduces complexity of the overall system and is of course, more cost effective than the other alternatives. Programming is easier as there are no additional motors involved in the robot configuration. As a rule of thumb, If the robot envelope covers the required volume and is enough to reach all eight corners of your pallet configuration (four corners at the pallet level, plus the four corners at the highest point of the overall stack), then you are good to go. Remember that a simulation will always help you define these types of design questions, so reach out to an expert to help you with your equipment selection.





Ready to talk palletizing?

We are here to help. At Universal Robots we have a team of application experts in every region of the world, ready to provide help and guidance with important engineering questions. Also, since October 2022, we set up a Global “Center of Excellence” for palletizing applications, where we

have equipment available for test, develop proof of concepts, develop feasibility studies, simulate robot solutions and guide our customers with high-level application questions, and are ready to support you.



Want to learn more about automating palletizing tasks?

Keep exploring the benefits of automated palletizing and learn how businesses from different industries have been using collaborative robots to tackle their palletizing tasks.

Visit: universal-robots.com/applications/palletizing/

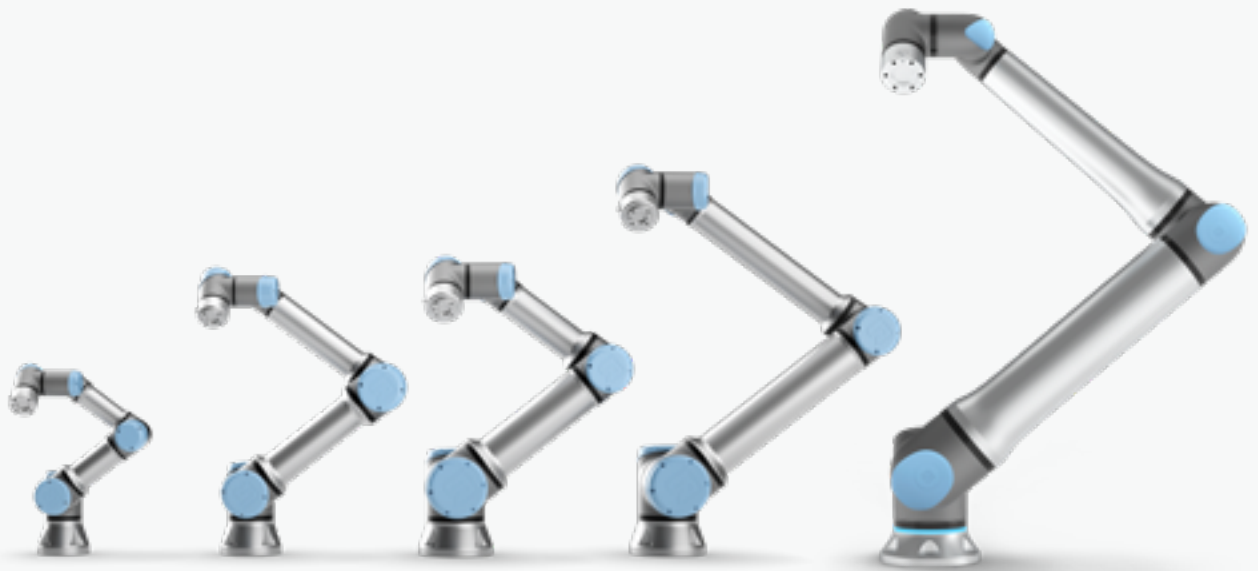


Take the next step to automate your palletizing tasks

Whether you have some technical questions about using one of our cobots in a palletizing application or you are ready to get your own cobot palletizing cell going, there’s someone ready to help you. Talk to one of Universal Robots’ experts today.

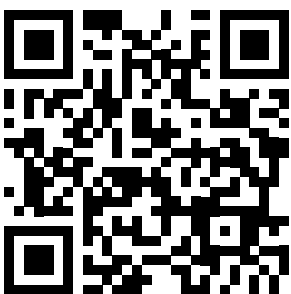
Visit: universal-robots.com/get-started/

Discover our robot family



	UR3e	UR5e	UR16e	UR10e	UR20
Reach	500 mm / 19.7 in	850 mm / 33.5 in	900 mm / 35.4 in	1300 mm / 51.2 in	1750 mm / 68.9 in
Payload	3 kg / 6.6 lbs	5 kg / 11 lbs	16 kg / 35.3 lbs	12.5 kg / 27.55 lbs	20 kg / 44.1 lbs
Footprint	Ø 128 mm	Ø 149 mm	Ø 190 mm	Ø 190 mm	Ø 245 mm
Weight	11.2 kg / 24.7 lbs	20.6 kg / 45.4 lbs	33.1 kg / 73 lbs	33.5 kg / 73.9 lbs	64 kg / 141.1 lbs

Compare all robots at www.universal-robots.com/media/1827367/04_2023_collective_data-sheet.pdf



Scan the QR-code
and read more or visit:
universal-robots.com/products/



About Universal Robots

Universal Robots aims to empower change in the way work is done using its leading-edge robotics platform. Since introducing the world's first commercially viable collaborative robot (cobot) in 2008, UR has developed a product portfolio including the UR3e, UR5e, UR10e, UR16e and UR20, reflecting a range of reaches and payloads.

The company, which is part of Teradyne Inc., is headquartered in Odense, Denmark, and has offices in the USA, Germany, France, Spain, Italy, the Czech Republic, Romania, Türkiye, China, India, Japan, South Korea, Singapore and Mexico.

For additional information about automation using cobots from Universal Robots, please visit: universal-robots.com