Low Cost Automation

MAGAZINE

Do more with less:
Affordable automation solutions with motion plastics®

motion plastics®

igus®.com...

www.igus.com/LCA

Low Cost Automation provides access for companies of all sizes.

What does igus® Low Cost Automation stand for?

Traditional automation can expensive, but they can pay for themselves in a few years. However, small and medium-sized companies that want to make different products in small batches find it hard to get into automation. This magazine aims to show that Low Cost Automation is a good way to boost productivity and save money in the long run. The igus® Low Cost Automation team wants to make affordable and easy-to-use automation solutions available to everyone.

igus.com/low-cost-automation

The ReBel Robot arm with an igus 7th axis allows for a flexible working space

Build or buy your robot

Automation is usually considered too complex and time-consuming

Flexible modular components are crucial in a world where robotics requirements are always changing. Our modular system allows users to quickly create an automation solution. We make it easy for you to get started by offering expert advice and testing your ideas in our customer testing area at igus®. Our motto is “Test before you invest!” Depending on your needs, you can either automate entire processes or just parts of them. You can choose between ready-made robotics solutions or individual subcomponents to create a customized automation solution that meets your needs.

Industrial robots from
$30,000 – $250,000

Lightweight robots from
$10,000 – $30,000

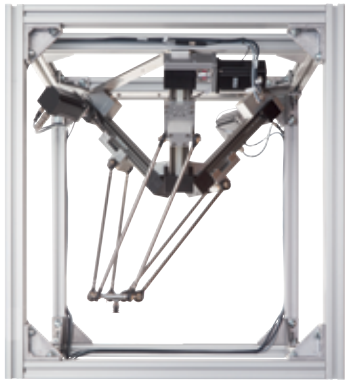
igus® Low Cost Automation
from $1,000 – $10,000

Building your robot

- Online configuration for robotic systems
- User-friendly robot programming with the free igus® Robot Control (iRC)
- Standard components from stock, available in 24 hours
- New: drygear® modular gearbox system for even more flexibility in building your automation solution. Suitable for robots or cobots

Buying your robot

- Robot arms for industry, educational institutions, and private use
- Delta robots for fast pick & place tasks.
- Gantry robots (or XYZ robots) for modular automation
- Pre-configured control system for each robot.



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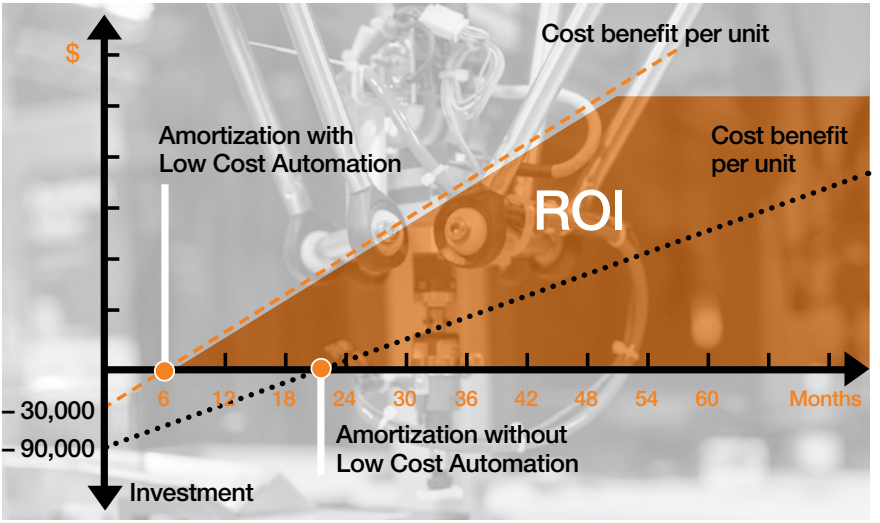
Costs for a robot system: when does automation pay off?

The economics of an automation system depend not only on acquisition costs, but also on reoccurring costs, such as for additional devices, adjustments to existing machines, and installation costs.

What are the benefits of automation and robotics? **Support for employees:** with such benefits as physical relief and improved ergonomics **Flexibility:** individual adjustment to production facilities and processes **Reliability:** high technology reliability and low error rates **Speed:** handles large order volumes at peak times In addition to direct costs, the economic efficiency of a robot system also depends heavily on system quality and flexibility. Robots are characterized by their variable usability, which means that they can also be used for other tasks when production is changed. This usually greatly reduces investment costs for new production plants.



ROI: Return on Investment

Low Cost Automation creates an overall cost advantage of around 70 to 75%. Applications with Low Cost Automation take between 3 and 12 months to pay for themselves if the robot system meets payload and dynamic requirements.

Cost-effectiveness of automation solutions – the ABCs of costs

Operating costs

Operating costs are calculated from maintenance, space, energy, personnel, tool, and auxiliary and operating materials costs. Since these costs depend on the production process, they can vary significantly over the period of use. Material, set-up, storage and disposal costs must also be taken into account.

Servicing costs

Servicing consists of maintenance, inspection, and repair. Although these costs are affected by the type, duration, and frequency of servicing measures, these factors are also associated with the probability of unplanned machine downtime. Planned servicing is therefore subject to the conflicting objectives of high system availability and low servicing costs. For an initial approximation, a factor can be used to calculate servicing costs. A typical figure for annual servicing costs is 10 % of system procurement costs.

Space costs

The space the robot requires is defined by the system's reach and space requirements. Material flow and delivery strategy must never be ignored in this definition. If the robot system is surrounded by a safety fence, the area within the fence can be used for the space requirement. The periphery located outside this area should be taken into account.

Energy costs

The costs for electricity and compressed air comprise a robot system's energy costs and are not constant over its service life. An automated system's main power consumers are the robot, the control system, and application-related equipment such as a welding table, welding power source or transformer, and the laser. In practice, the robot's energy consumption depends on size, reach, payload, acceleration, and travel speed.

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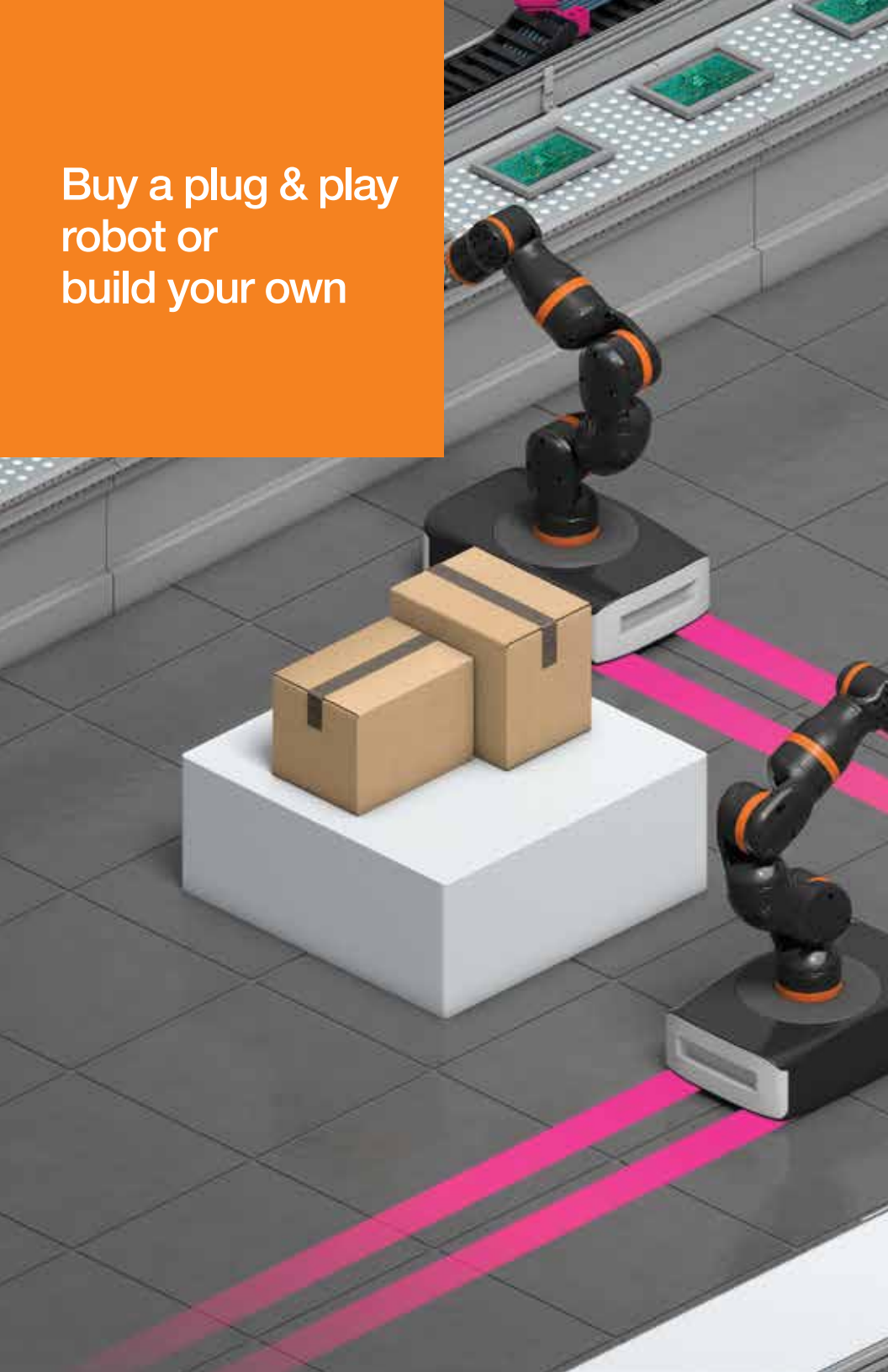
Buy a plug & play robot or build your own

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The ReBeL® robot arm as an industrial and service robot

Lightweight ReBeL® robot prepared for human-robot collaboration applications

For the first time, a cobot will be added to the Low Cost Automation portfolio. Electronic components in the fully integrated ReBeL® strain wave gear allow human-robot collaboration capabilities. The ReBeL® robot arm is thus suitable for:

- Suitable as cobot or service robots
- Mobile applications
- Collection and delivery services
- Pick & place tasks
- Assembling assistance
- Quality control
- Education area for university and school training purposes

Technical data:

ReBeL® robots

- **Payloads of up to 2kg**
- **Reach of up to 664mm**
- **Application areas: industrial and private applications as cobot or service robots**

Scan to visit the ReBel webpage

Fully integrated strain wave gear

As little as half the weight of other cobots (8.2kg dead weight)

Can be controlled with the igus® Robot Control (iRC) system for all robots. Available as a plug & play solution or as an open-source variant

No control cabinet - control system integrated in the base


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Bin-picking

The pick & place robot solution takes care of insertion 24/7 and features integrated delivery note management. The bulk pharmaceutical material is sorted autonomously into the chemist's inventory system, automating the entire process. The articulated arm robot is one system that can be used here.

Amortization: about 6 months

Technical data:

articulated arm robot

- **Payloads of up to 3kg**
- **Reach of up to 790mm**
- **Application areas: flexible pick & place applications**

Scan to visit the robolink webpage

igus.com/low-cost-automation

Robots in a packaging machine

Technical data:

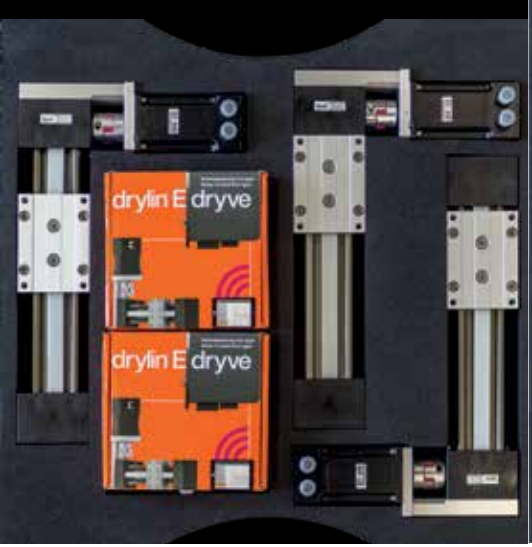
drylin® ZLW seventh axis for all robots

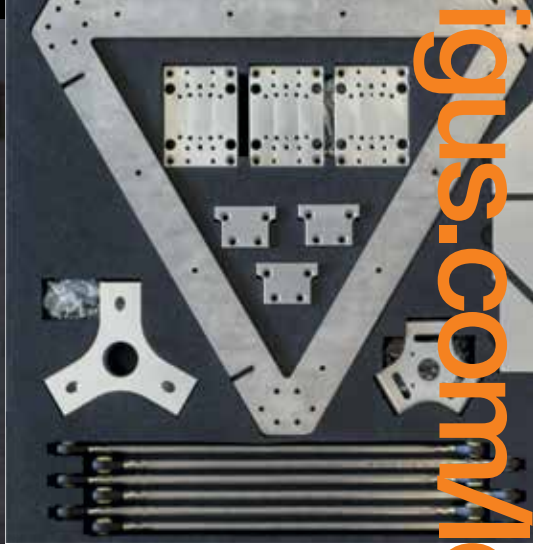
- Maximum strokes: 3,000mm (up to 6,000mm depending on technical design)
- Max. speed: 200mm/s
- Precision: ±0.3mm

igus.com/low-cost-automation

E2/000 energy chain, which can be opened from both sides in the inner radius. The E2/000 system: easy, versatile assembly and installation combined with robustness – high strength with quiet operation, long cable service life, and many mounting options

Quick, efficient sorting with pick & place delta robots





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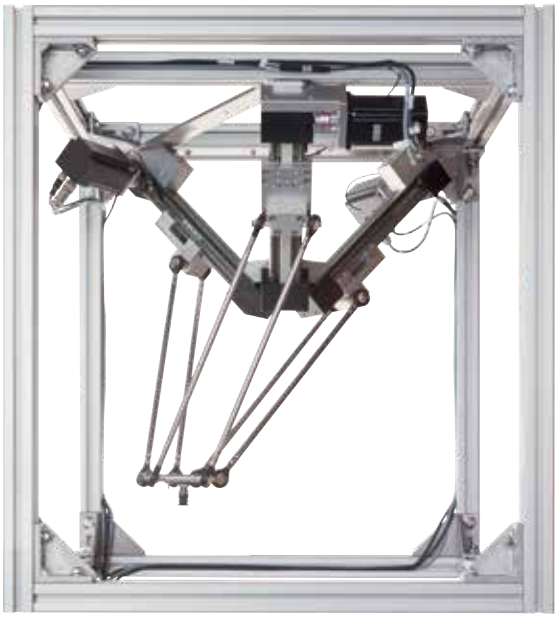
Available fully assembled or as a kit

Sorting for fire protection at Vetrotech Saint-Gobain

To produce fireproof glass, the delta robot sorts bulk material onto predefined pallets which then go through the manufacturing process. This frees up employees and significantly reduces costs. The robot system also allows more flexibility thanks to short set-up times and can be expanded as required. The delta robot with a working area of 360mm is used in this application.

Amortization: about 8–12 months



Technical data:

delta robots

- **Payloads of up to 5kg**
- **Speeds of up to 3m/s**
- **Application areas: fast pick & place applications**

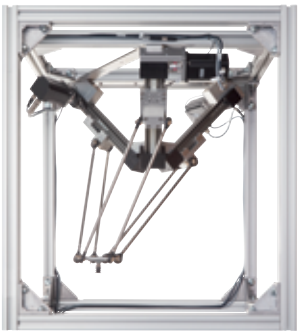
Scan to visit the delta webpage

Agricultural automation: delta robot removes weeds chemical free with laser

Ecological weed control

The lightweight, cost-effective delta has opened up new possibilities for these robots in mobile applications and demonstrated a new technology in a harsh outdoor environment. This application uses a corrosion-free delta robot with a working area of 660mm.

Amortization: about 12 months



Technical data:

delta robots

- **Payloads of up to 5kg**
- **Speeds of up to 3m/s**
- **Application areas: fast pick & place applications**

Scan to visit the delta webpage

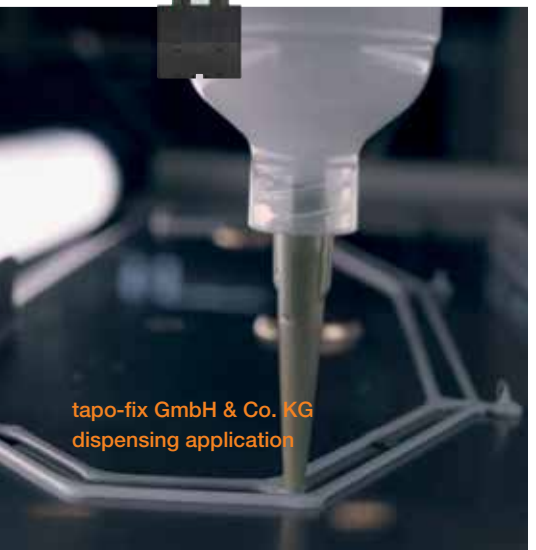
igus.com/low-cost-automation

Dispensing processes: Automated bonding and sealing

Our dosing and bonding robots bond components with the highest precision, ensuring consistent quality. The processes can be repeated exactly.

The robot's user-friendly set-up and control system and modular concept governing our robotics components allow the bonding processes to be adapted flexibly. The robot is also available as a complete solution with frame and CE marking. The compact DLE-RG-0001 room gantry robot is used.

Amortization: about 6 months



tapo-fix GmbH & Co. KG
dispensing application

Technical data:

gantry robots

- **Payload: up to 10kg**
- **Repeatability: ±0.2mm**
- **Speeds of up to 1m/s**

Scan to visit the gantry robot webpage

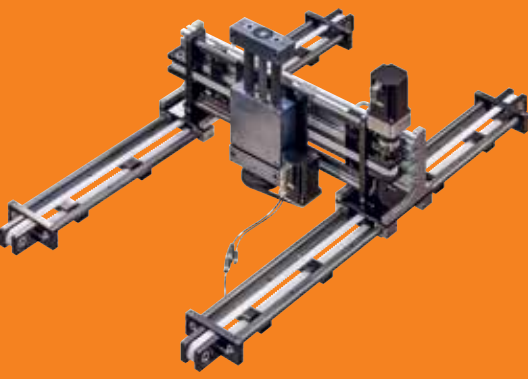

igus.com/low-cost-automation

Individual gantry robot: describe the application, receive an offer

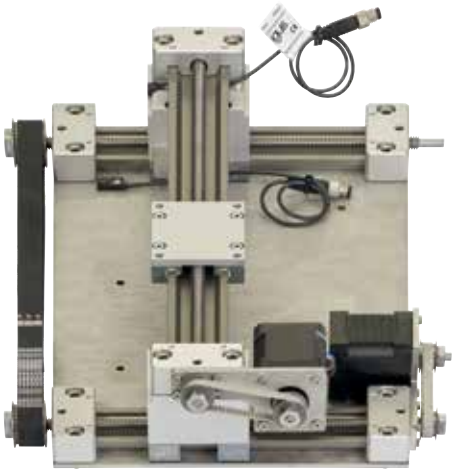
Robust, customizable, and lightweight

drylin® gantry robots consist of various linear actuators that perform xyz linear movements. The self-lubricating components are corrosion-free, maintenance-free, and lightweight. drylin® gantry robots cost up to 60% less than conventional gantry robots.

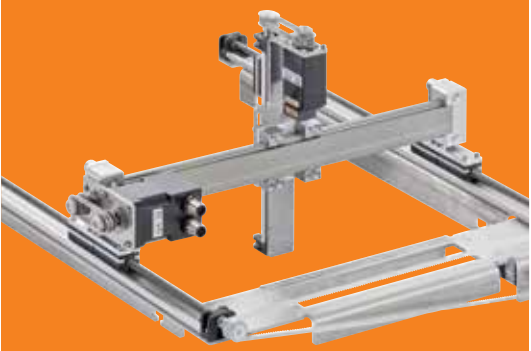
igus.com/low-cost-automation



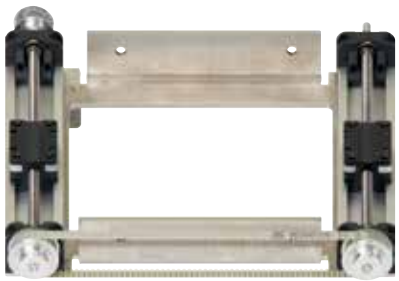
Particularly flexible



Customizable



Lightweight

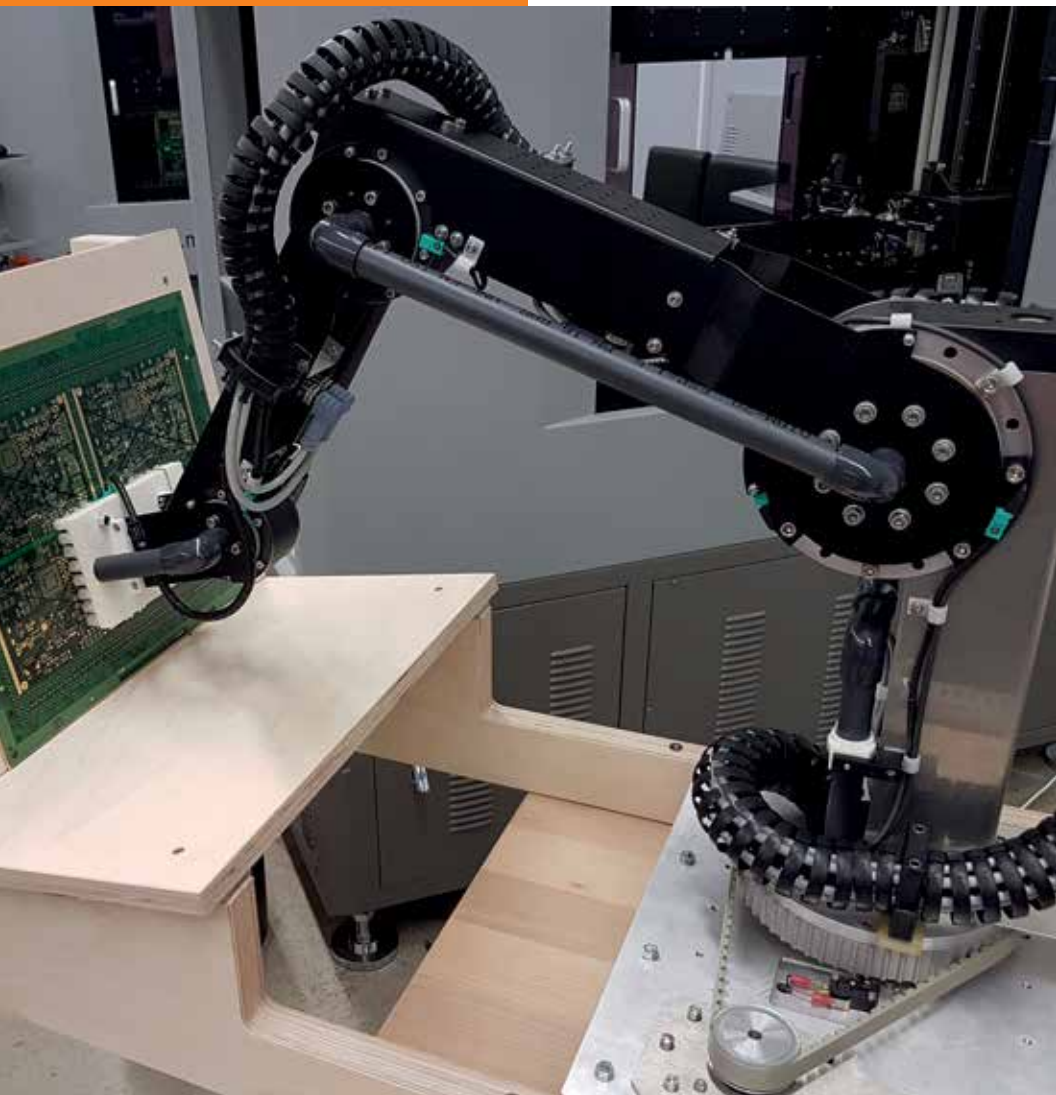


The heart of your robot: gearboxes with or without motor for flexible, adaptable applications

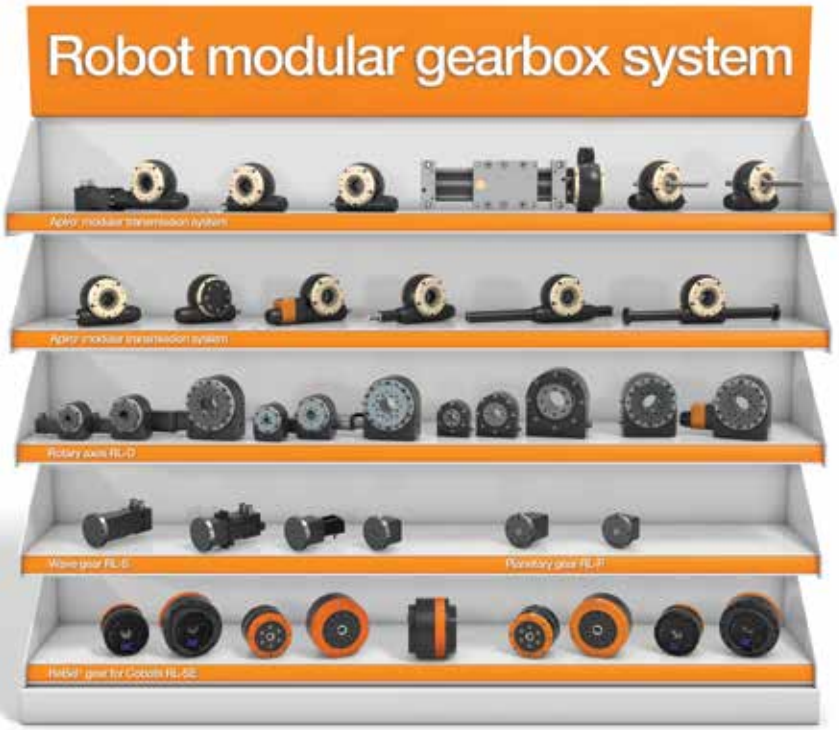
From robot to format adjustment – modular construction kit for robotics, cobots and automation solutions

- Worm gears, strain wave gears, planetary gearbox
- Modular
- With and without motor
- Lightweight construction
- Areas of application: flexible automation solutions, robot and cobot construction

Amortization: about 4 months



Robot modular gearbox system



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ReBeL® gearbox for industry and service robots. Build or buy

Technical data:

- **Payloads of up to 2kg**
- **Reach of up to 664mm**

Build your own robot kinematics with fully integrated individual joints.

Based on the ReBeL® gearboxes, an individual robot can be designed with connectors, and thanks to the additional electronic components, it can also be implemented as a cobot. The gearbox can be used, for example, in the last axis of articulated arm, linear, and delta robots with various gripper systems.

ReBeL® fully integrated strain wave gear

- **Fully integrated individual gearbox with motor and control system**
- **Output with encoder and mounting flange**
- **Brushless DC motor (external rotor)**
- **CAN-BUS motor driver board**
- **25% lighter than conventional strain wave gears thanks to igus® high-performance polymers**

Scan to visit the ReBel webpage

igus.com/low-cost-automation

Technical data:

- Payloads of up to 1kg
- Reach of up to 300mm

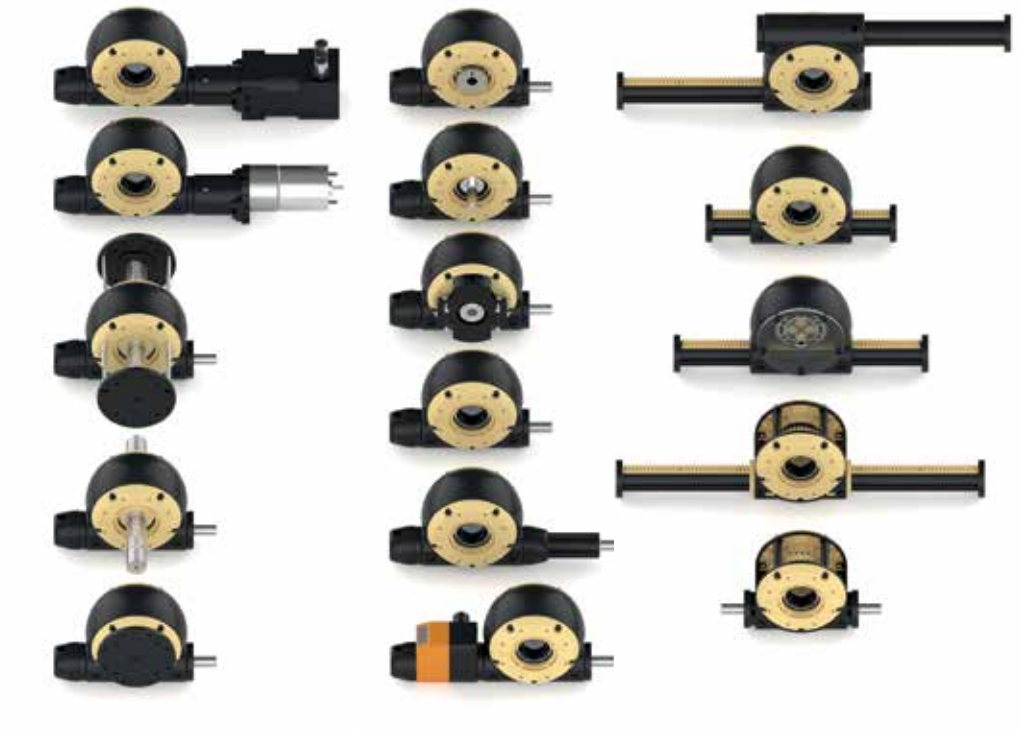
Apiro® robot iDeas

Our Apiro® gearbox system for a wide variety of kinematic elements and superstructures was named after the Greek word for "infinite". It allows modular, cost-effective implementation of individual applications.

Typical areas of application are

- **Lane adjustments**
- **Pusher tasks**
- **Gears with different ratios**
- **Rotary tables and rotary axes**

Scan to visit the Apiroi® webpage

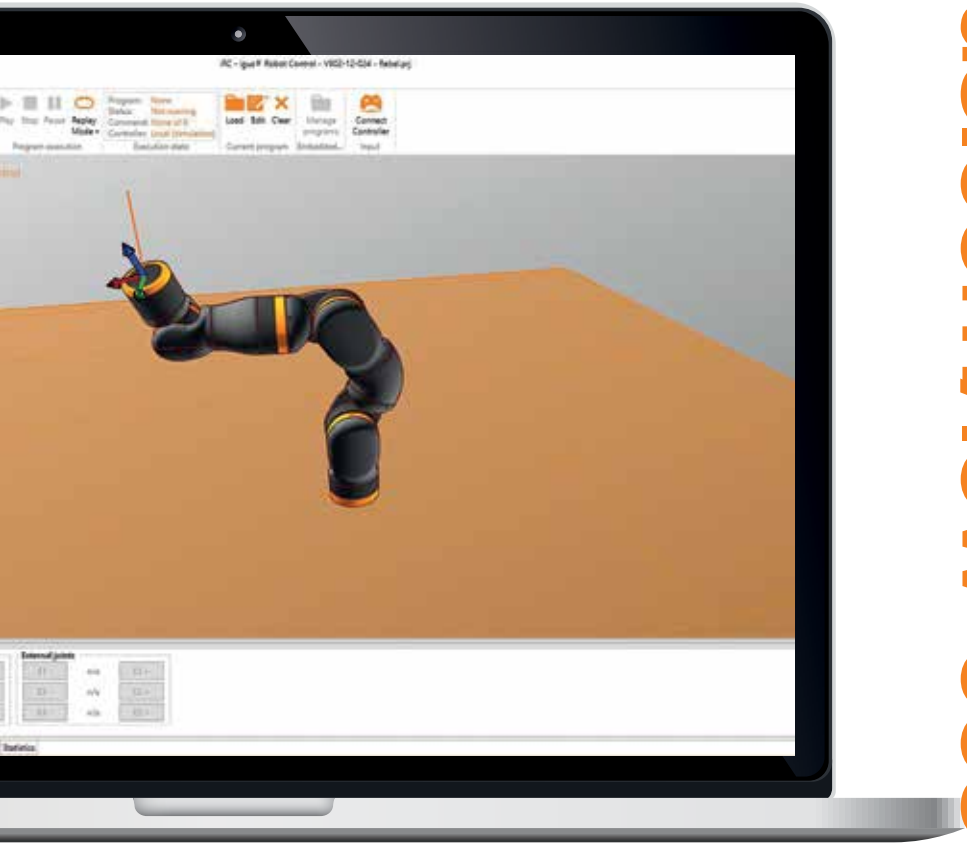


From a single part to a complete robot

igus.com/low-cost-automation

Intuitive igus® Robot Control System with free software

igus.com/low-cost-automation



Control system for all igus® kinematics:

- Test robots with a digital twin before you buy
- Free software
- No programming expertise required, user interface similar to well-known office programs
- Can be programmed with gamepad or handheld control function
- Use with Windows 10 operating system or download as an app
- Preconfigured projects for all igus® robots, SCARA, delta, single axes, AGVs, and much more
- Gripper and camera integration included
- Custom design (optional)

Scan to visit
the igus Robot
Control webpage

Low-cost robotics technical data

Articulated arm robot

- Payloads of up to 3kg
- Reach of up to 790mm
- Application areas: flexible pick & place applications

drylin® ZLW, seventh axis for all robots

- Maximum strokes: 3,000mm (up to 6,000mm depending on technical design)
- Max. speed: 200mm/s
- Precision: ± 0.3mm
- Adaptable to all igus® robots, but also robots from UR, ABB, and many more

Technical data:

- Payloads of up to 1kg
- Reach of up to 300mm

Application areas: Education and didactic

igus® Robot Control (iRC)

- Free software download
- No programming expertise required
- Can be programmed with gamepad or handheld control function
- Available for all robot kinematics

drygear® Apiro® modular gearbox system

- Payloads of up to 2kg
- Available transmissions: 4:1, 32:1, 64:1
- Output torque: 2.5Nm
- Stroke: 60–1,050mm
- Areas of application: lane adjustments, pusher tasks, rotary tables, and rotary axles

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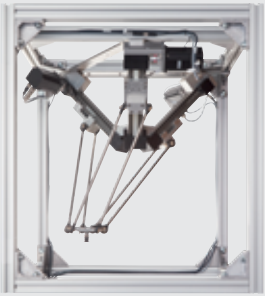
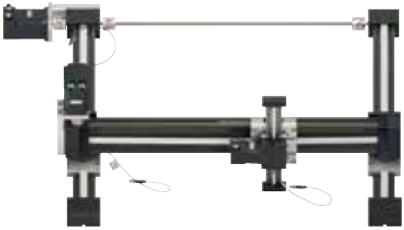


Delta robot

- Payloads of up to 5kg
- Working area diameter of up to 660mm
- Speeds of up to 3m/s
- Application areas: fast pick & place applications

Gantry robots

- Payload: up to 10kg
- Repeatability: ±0.2mm
- Speeds of up to 1m/s



ReBeL® robots

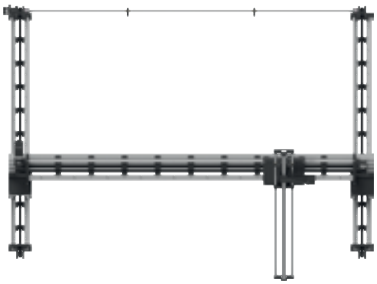
- Payloads of up to 2kg
- Reach of up to 664mm
- Application areas: industrial and private applications as cobot or service robots

Modular construction kit for robotics, cobots and automation solutions

- Modular
- Fully integrated gearbox with motor, control system and encoder
- Lightweight construction areas of application: flexible automation solutions, robot and cobot construction

Assembly kit for room gantry robots

- Includes three D1 motor control systems
- Areas of application: control of linear and rotary drives
- Easy initial operation



"XXL" room gantry robot

- Workspace: 2,000 x 2,000 x 1,000mm
- Payload of up to 10kg
- Precision: ±0.8mm
- Speeds of up to 500mm/s

Introduction to the world of automation

Which factors are important when purchasing a robotic system?

When planning for automation, it is important to select the right kinematics to ensure long term success and avoid unnecessary set-up cost.

Keep cost low

In addition to hardware costs (robots, grippers, etc.), it is imperative that other costs be considered, such as those for safety technology, maintenance and repair, CE certification, sensors, programming, and operating costs. The right kinematics limit acquisition costs and pay for themselves in the shortest possible time.

Direct and reliable support

Companies investing in automation systems want long-term support from the manufacturer. The Low Cost Automation team provides long-term support and spare parts service, guaranteeing customers maximum planning security.

How do I select the right kinematics for my application?

There are many factors that influence robot selection. The most important are:

Required accuracy at the operating point

Process cycle time

Payload

The maximum allowable load that a robot can handle in addition to the tool load. Robots are divided into small-load, medium-load, and heavy-load robots based on their maximum load.

Reach and nominal reach

Nominal reach is the working space in which the robot can work in the long term. In the short term, the robot can also operate within its maximum reach.

Degrees of freedom

Degrees of freedom indicate how many independent driven movements a workpiece or tool attached to the robot can perform in relation to a fixed coordinate system.

Low Cost Automation – checklist

LOW COST AUTOMATION by igus

sales@igus.com
Fax: 401-438-7270

Your data

Name _____ **Date** _____

Company _____ **Telephone** _____

Contacts _____ **E-mail** _____

Application _____

Required information

Quantity/batch size _____ ☐ Single application ☐ Volume application

☐ New design ☐ Technical improvement ☐ Cost reduction

Application data

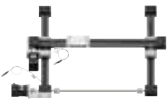
Cycle time _____ s Speed _____ ft/s Reach _____ mm

Payload _____ lbs

System design

☐ Line robot

☐ Flat gantry robot



☐ Room gantry robot

☐ Articulated arm

☐ Delta robot

☐ ReBeL®

☐ Mini ReBeL

☐ Linear axis with motor

☐ Complete cells, rbtx.com

Installation position

☐ Horizontal ☐ Vertical ☐ Lateral ☐ Overhead

Required accuracy (at the operating point) _____ mm

Ambient temperature _____ °F

Humidity ☐ Yes ☐ No

Notes/application description

_____

_____

_____

_____

_____

_____

igus®

Low Cost Automation – checklist

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sales@igus.com
Fax: 401-438-7270

Control systems

☐ iRC

☐ Motor control system

e-chain® cable carrier

Drag chain ☐ Yes ☐ No

Additional services ☐ Yes ☐ No (such as pneumatic/electric)

Customer Testing Area

Do you have recent pictures or video of the application?

(If so, please send them to us. If not, please describe your application below).

☐ Yes ☐ No

If you have a video, do you consent to it being published?

☐ Yes ☐ No

Which accessories are to be tested with the robot?

☐ Camera ☐ Gripper ☐ Control systems ☐ Other: _____

RBTX low cost robotix

igus® Desktop Display

☐ I would like to pre-order an igus® Desktop Display with product samples for testing. More about the igus® Corner at: igus.com/corner

Planning and framework conditions

Preparation for successful deployment. If you are planning to use a robot for any application, you should first carefully consider the existing framework conditions. The fundamental questions can be broken down into a few core issues.

Degrees of freedom

Number of available robot degrees of freedom (DOF)

System

Stationary or non-stationary system (robot mobility)

Precision

Required precision or repeatability at the end effector (requirements for the component that interacts with the environment)

Payload

Robot payload on the end effector

Working space

Required workspace

Speed

Travel speeds and number of movement cycles

Flexibility

Modular flexible configurability for the entire system (including subsequent conversion options)

Sensor technology

Required sensors for environment monitoring

Compatibility

Programming and compatibility with existing control systems

Quality

Workmanship quality and protection against environmental influences

Costs

Investment and maintenance costs

Feel free to contact us. We would be happy to provide you with free consulting on the kinematics best suited to your application.

igus.com/low-cost-automation

Automate your applications in four steps

1. Book free live consultation with our experts

2. Show us your application, and we will check its feasibility

3. Together we will find the necessary components

4. You will receive a fixed-price offer for all components and their integration

Scan to book a video consultation with an rbtx expert

Test before you invest – Customer Testing Area

Workpiece test for your desired application. Your benefits:

- Exceptionally fast feasibility analysis without your own setup
- With accessories such as grippers or vision sensors
- Direct testing with your workpiece in our robot cells
- Individual consulting with automation experts
- Fixed price with a parts list

The RBTX online marketplace has the right accessories for your application: **www.RBTX.com**

Over 10,000 robots in use

igus.com/low-cost-automation

Online tools: ReBel® online designer and gantry robot configurator

ReBel® configurator

- Configure articulated arm robots online
- Intuitive CAD interface
- Parts list output
- Simulate movement for the entire robot
- "Teach" function for learning movement sequences with several intermediate steps
- Maximum range, movable weight and calculable workspace
- Also configure the linear axis as a seventh axis

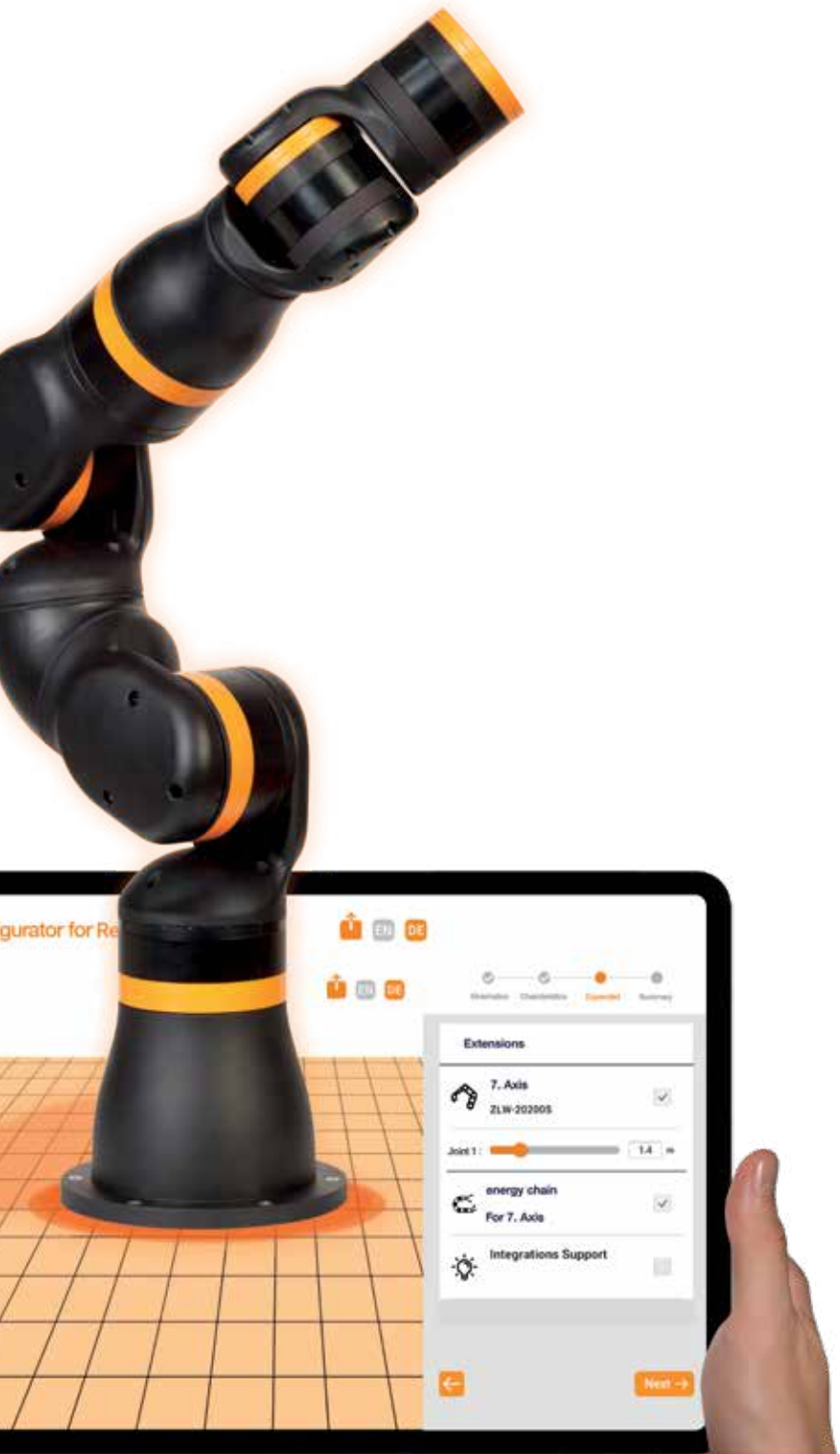
Scan to visit the igus ReBel configurator

Gantry robot configurator

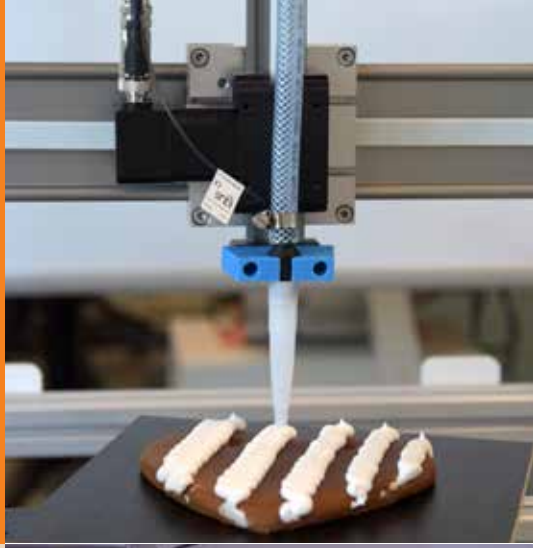
- Configure an individual gantry robot and receive CAD data
- Live price display for individual workspace with and without a control system
- Program the robot's digital twin directly online and test the application
- Save time: configure your individual gantry robot in just five minutes
- Other accessories with rack or grippers

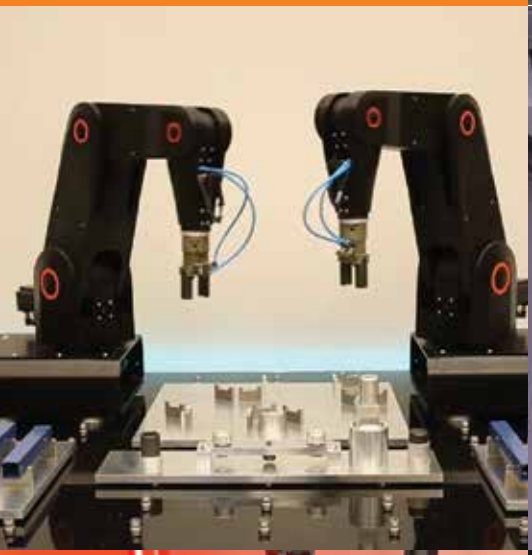
Scan to visit the igus Gantry Configurator

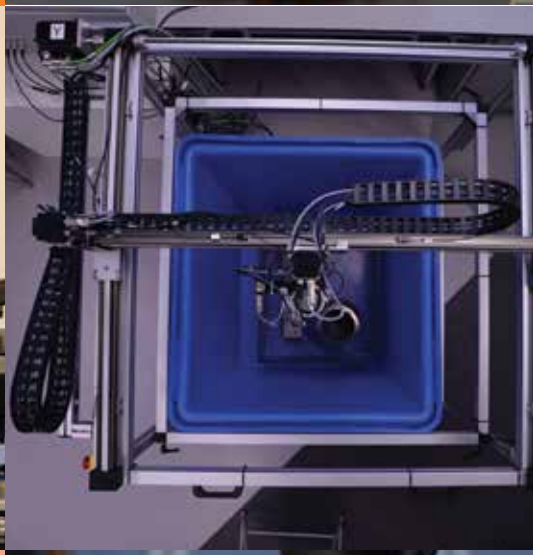
igus.com/low-cost-automation

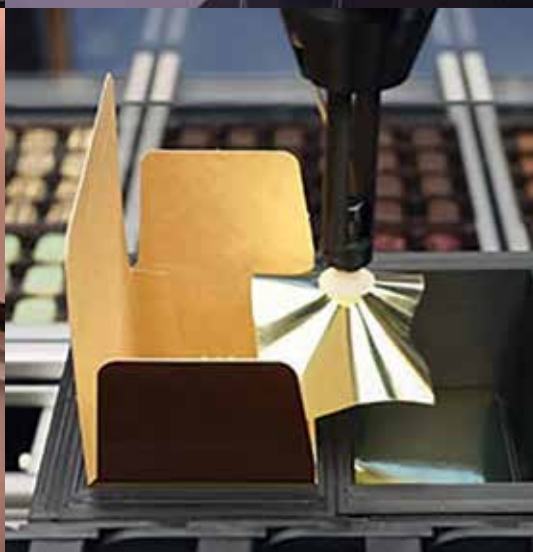


More than
8,000 individual
solutions per
year –
there for you all
over the world









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