HERMES AWARD 2017

Superior Clamping and Gripping

SCHUNK

Co-act Gripper Meets Cobots

The NEW SCHUNK Grippers for Collaborative Operations

Superior Clamping and Gripping

Henrik A. Schunk, Kristina I. Schunk, brand ambassador Jens Lehmann, and Heinz-Dieter Schunk

Top Performance in the Team

SCHUNK is the world's No. 1 for gripping systems and clamping technology – from the smallest parallel gripper to the largest chuck jaw program.

As a competence leader, we recognize and develop standards with a large potential for the future, which will drive the rapid progress in many industries.

Our customers profit from the expert knowledge, the experience, and the team spirit of 3,400 employees in our innovative family-owned company.

The Schunk family wishes you improved end results with our quality products.

Heinz-Dieter Schunk

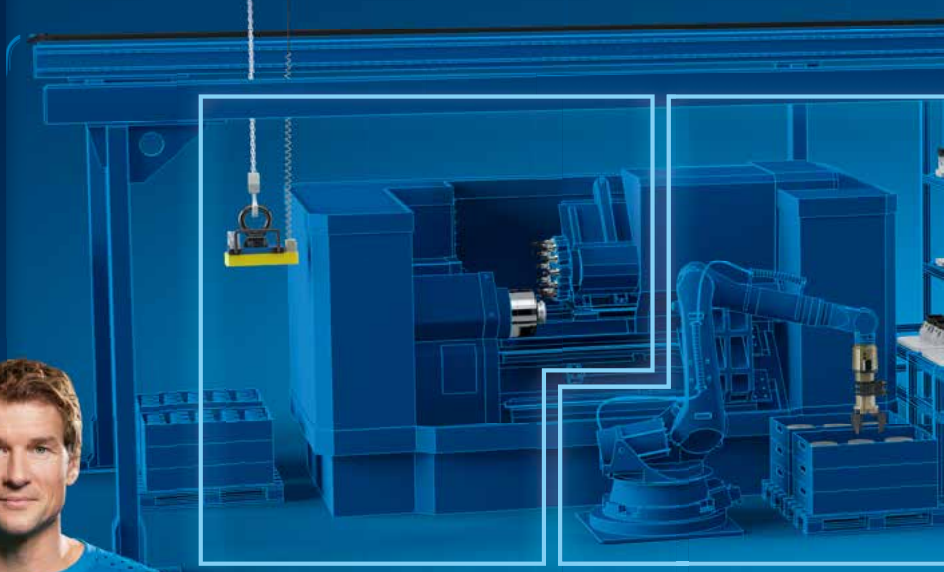
Henrik A. Schunk

Kristina I. Schunk

Superior Clamping and Gripping

Jens Lehmann stands for safe, precise gripping and holding. As a brand ambassador of the SCHUNK team, the No. 1 goalkeeper represents our global competence leadership for gripping systems and clamping technology. The top performance of SCHUNK and Jens Lehmann are characterized by dynamics, precision, and reliability.

For more information visit our website:
schunk.com/lehmann



... in your Lathe

... in your Automated Machine Loading

Jens Lehmann

It's time to use your machine's full potential!

Our superior components can unlock potential where you would never expect to find it. In your machine. SCHUNK Synergy – the perfectly harmonized relationship of gripping systems and clamping technology and turns our customers into productivity champions ...

SCHUNK Grippers

Gripping precisely!
From some grams to more than a ton.

Linear Modules

Exactly moved!
With high speed in all axes.

Modular Assembly

A unique individuality!
Flexibility due to the use of a modular system.

Robot Accessories

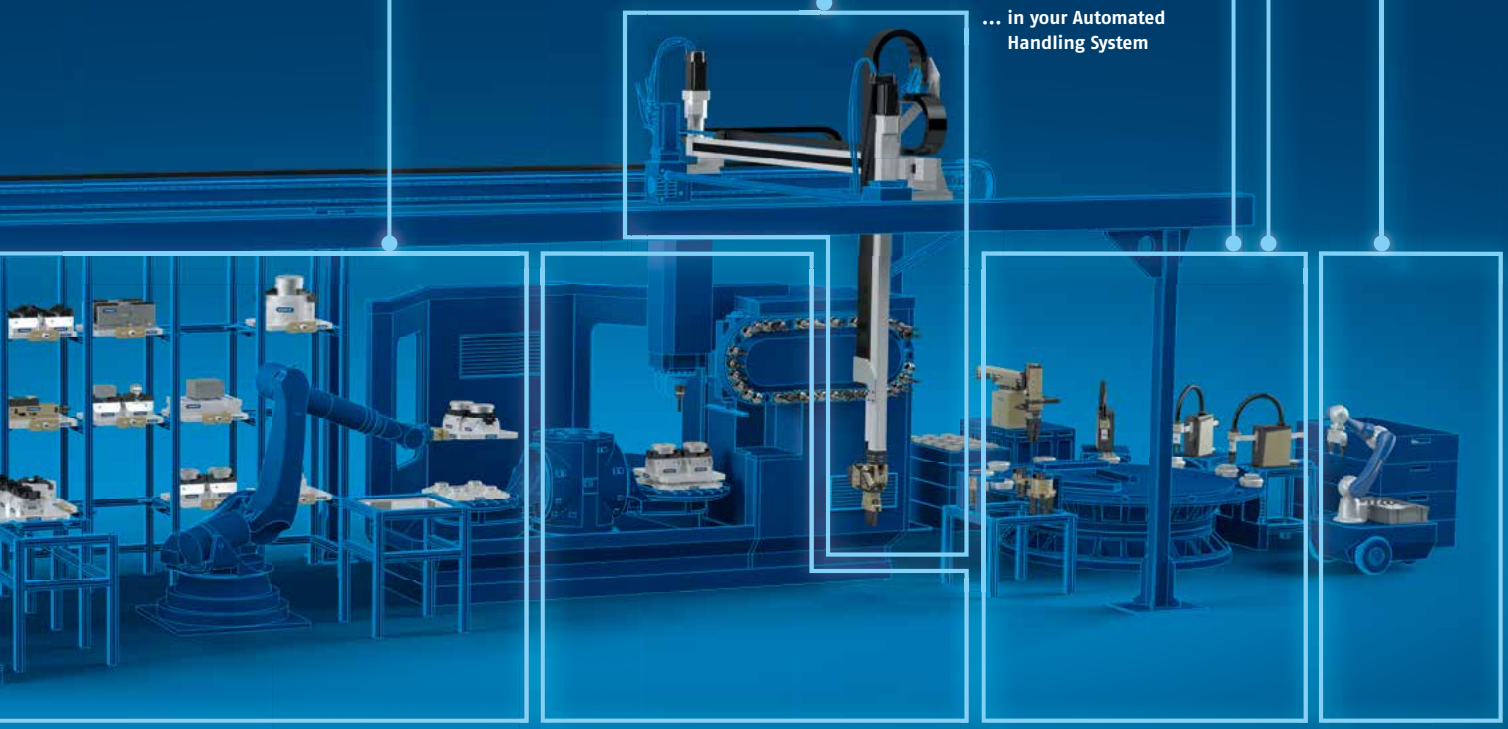
Perfectly combined!
The interplay of robot and tool.

Rotary Modules

Controlled rotation!
Limited or endlessly – free or cycled.

Mobile Gripping Systems

Handling technologies for the future.



... in your Automated Handling System

... in your Machining Center

... in your Automated Assembly

... in your Service Robotics Application

„With human to robot collaboration, SCHUNK has technology firmly in its grasp. I am proud to have the SCHUNK gripper for collaborative operations, the **Co-act Gripper JL1**, bear my initials."
The SCHUNK Co-act Gripper JL1 is characterized by the strengths of world-class goalkeeper and SCHUNK brand ambassador Jens Lehmann: precision, safety, teamwork and No. 1 position.
J. Lehmann
Jens Lehmann, German goalkeeper legend, SCHUNK brand ambassador since 2012 for safe, precise gripping and holding.
schunk.com/lehmann

Co-act JL1
Gripper

The NEW SCHUNK Technology Carrier for Collaborative Gripping

With its NEW SCHUNK technology carrier Co-act Gripper JL1, SCHUNK is setting the stage for the first intelligent gripper for collaborative operations that interacts directly with humans. Adjustments to the gripping processes can be made in real time using diverse sensor systems. In essence, various "senses" are used to record, evaluate and communicate situational, environmental and operational conditions.

In the future, SCHUNK Co-act Grippers will be able to transmit all relevant data about processes and surroundings to the control and production systems. The focus will be on the process optimization, intelligent flow of materials, and continuous documentation. The intuitive interaction between gripper and operator perfectly complements the system.

Capacitive Sensor System
To avoid collision situations due to early detection

Touchscreen
Enables communication with the gripper as well as teaching or switching to various operating modes

Camera
Mounted between the fingers, for detecting the surroundings, differentiating and searching for objects

Parallel and Angular Grips
Two types of grips for gripping any geometries

Safe Force Limitation
The right gripping force for every handling task, even for heavy workpieces

Tactile Sensor System
For in time detection and differentiation of workpieces and humans

Optical Feedback
Through the use of LED lights, the Co-act Gripper JL1 provides information to the operator about the status of the gripper and identification of the workpieces

The Mega Trend of Human-Robot Collaboration

From robots that replace workers to robots that serve as helpful colleagues, the field of robotic automation is experiencing a new trend that represents a huge challenge for component manufacturers.

Whenever full automation of production or assembly lines is not the most economically feasible option, it is necessary to single out individual processes to be delegated between humans and robots. In such situations, autonomous cobots, meaning robots used in the worker's immediate environment, can handle non-ergonomic or monotonous tasks such as assisting with lifting or positioning loads. This reduces the physical workload for workers and makes the process more efficient. At the same time, humans and robots working hand in hand helps to minimize space requirements and increase flexibility.

The number of robotic assistance systems will increase in the future, especially with regard to assembly applications. Reliable grippers, safety functions, sensors and end-to-end integration at the component level will be vital.

As the competence leader for gripping systems and clamping technology, SCHUNK is intensely committed to this new challenge.

co-act Gripper

The NEW SCHUNK Grippers for Collaborative Operations

co-act MPG-plus Gripper

co-act EGP Gripper

Co-act WSG
Gripper

Co-act JL1
Gripper

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Human-Robot Collaboration: Teamwork in Production Automation

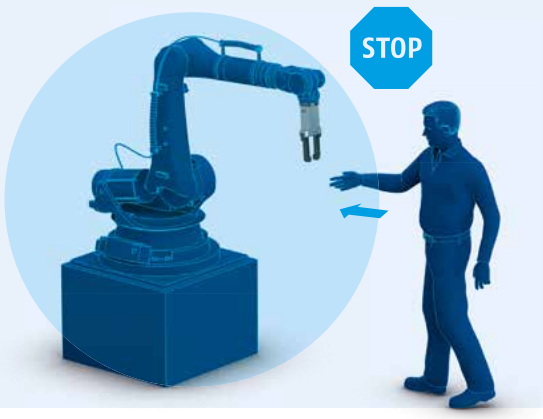
The closer humans and robots work together, the more technologies and components are required to meet higher safety requirements.
The various forms of interaction between humans and robots are controlled by the relevant standards and guidelines. Differentiations are made between **safe hold**, **hand guiding**, **speed and seperation monitoring**, and **power and force limiting**.

For over 30 years, SCHUNK has been setting the benchmarks for technological innovation and gripping system solutions. Our goal is to open up new and sustainable possibilities for more efficient production automation, whether for full automation, functional safety or human-robot collaboration.

Normative Subdivision of Human-Robot Collaboration according to ISO/TS 15066

Method 1 – Safe Hold

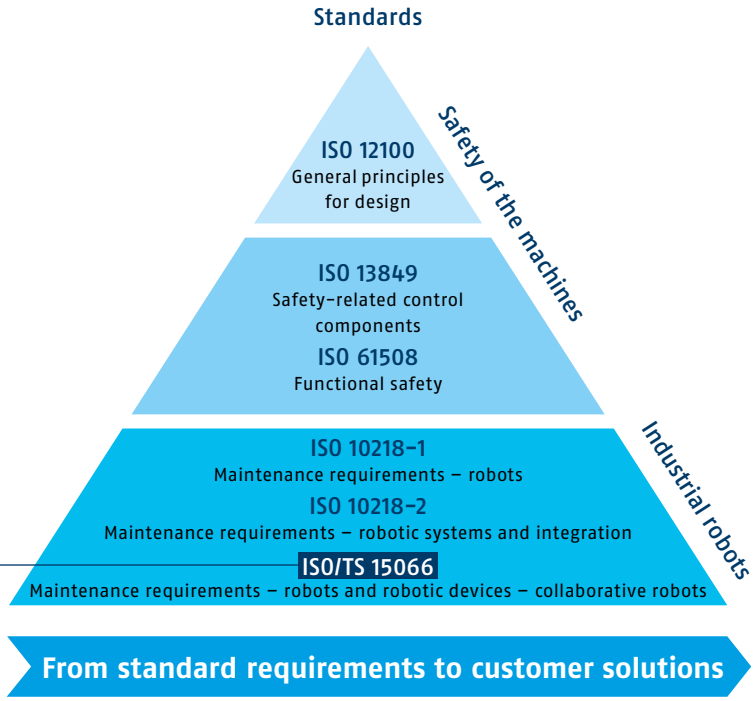
The robot system works at normal speed, provided that there is free access in the machining area. When a human enters the area this is monitored i.e. by a laser scaner, and the robot system enters into a safety-monitored stop.



Method 2 – Hand Guiding

The robot system is guided by a human.
In order to do so, the system must be able to detect the force of the human e.g. using a force/torque sensor.
The robot system only moves when this movement is enabled by the human using a safety switch. Otherwise the robot system is in a safety-monitored stop.

Standards and Guidelines for Human-Robot Collaboration



The listed standards and guidelines are not exhaustive. For every application the applicability of further standards or guidelines have to be determined.

Method 3 – Speed and Separation Monitoring

The machining area of the robot system is divided up into successive zones. If the entry of a human into one of the first zones is detected for instance by a laser scanner, the robot system goes into a lower speed. When the zone directly next to the robot is entered, the robot system goes into a safety-monitored stop.

Method 4 – Power and Force Limiting

The robot system works with limited force and power when collaborating directly with humans. The maximum forces and pressures applied to humans may not exceed the values specified in the technical specifications. This is ensured by an inherently safe design or safety functions.

Source: ISO/TS 15066:2016

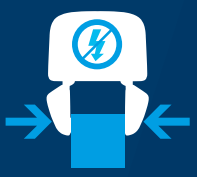
SCHUNK is defining Human-Robot Collaboration with a Focus on Grippers

With the **Co-act Gripper JL1**, SCHUNK is capturing a trend and focusing on the technology carrier in the development of actuators for collaborative operations. The aim is for **SCHUNK Co-act Grippers** to interact and communicate directly with humans in accordance with normative directives.

The SCHUNK Co-act gripper's JL1 technology carrier is based on three principles derived from the HRC standards on human-robot collaboration. A gripper for collaborative operations does not have to comply with all the principles here.

Grippers
never cause injuries
when gripping

Grippers
always detect
human contact



Grippers
never lose
a workpiece

In implementing these principles, SCHUNK focuses on interactive perfection between the various technologies and components:

Force Limitation

A gripping force limitation that is activated in case of direct presence or intervention of a human. Otherwise, the gripper can be operated with any force possible.

Collision Protection

Risks of injury can be reduced or eliminated by means of an optimized design.

Gripping Force Maintenance

Grippers must prevent injuries to humans even with high gripping forces. Gripped parts are held reliably if a process is interrupted.

Environmental Sensor Systems

The use of different sensor systems for detecting humans and the environment while simultaneously sensing the workpiece and differentiating it from human hands.

Software

Gripper software that evaluates and processes the signals of the environmental sensors. This intelligent software empowers the gripper with artificial intelligence.

The Path toward the optimum Gripper for your HRC Application

To determine the optimum gripper for HRC applications, the properties of the task, workpiece and gripper must be taken into account.

The **SCHUNK Co-act team** recommends a structured approach that considers all factors and parameters.

Step 1

Task Description and Feasibility Check

- Are the task and workpiece suitable for human-robot collaboration?

Step 2

Selection of the Robot or Cobot

- Definition of the basic system with mechanical and electrical connection of the peripheral devices
- Ensuring that the coordinates for a stop are defined

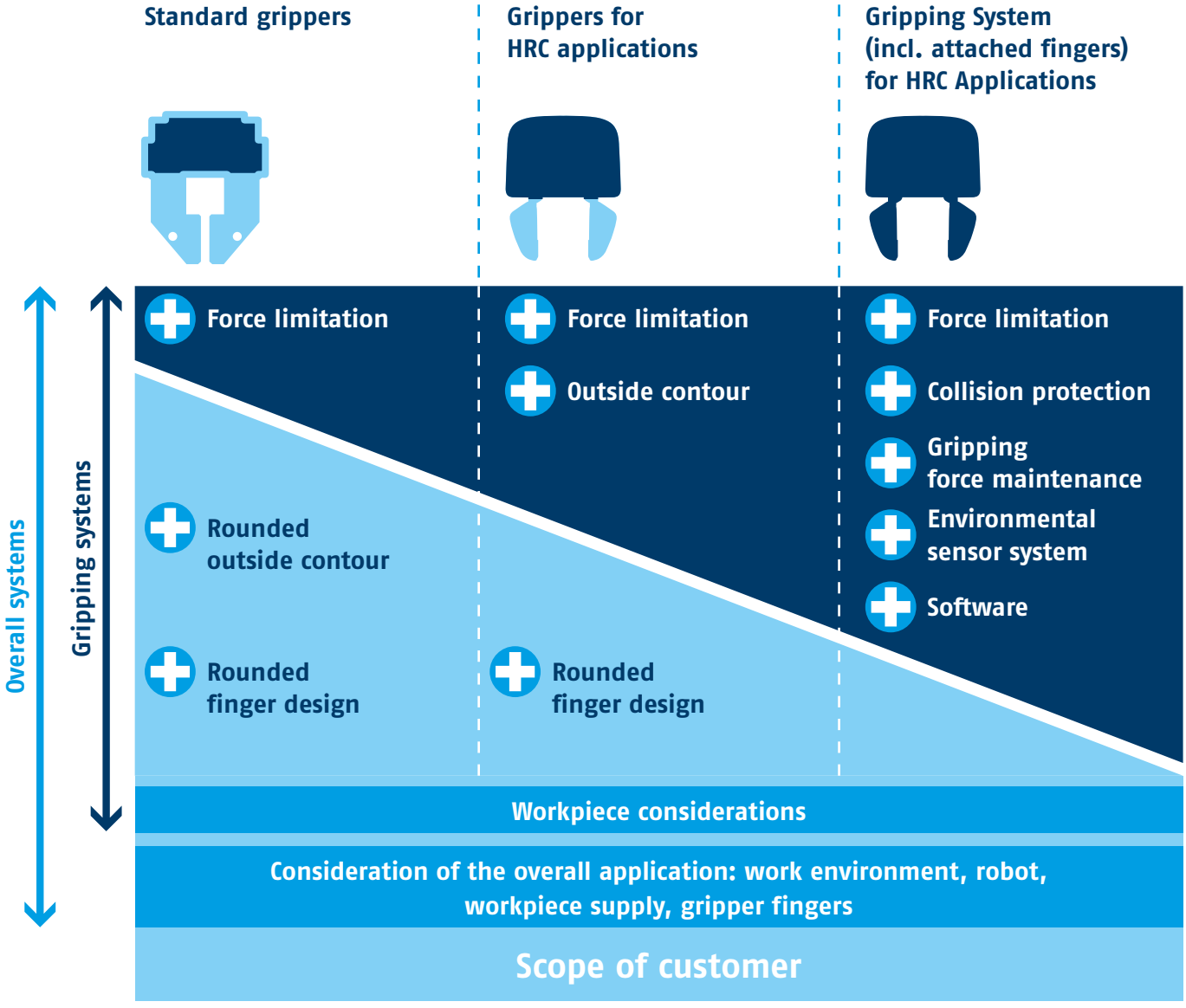
Step 3

Selecting the Gripper in Collaboration with the SCHUNK Co-act team considering the following Points:

- Workpiece with respect to gripping position, required gripping force and required stroke
- Pick and place position and in turn analysis of the interfering contour
- Connection to the superordinate mechanical and electrical periphery
- Clamping and shearing points on the gripper or the attached fingers

SCHUNK Gripping Competence for HRC Applications

In the context of its technology carrier, SCHUNK is oriented toward real-world applications within a variety of industries with its gripper concepts for HRC applications. The experience gained as a result will influence the ongoing development of **SCHUNK Co-act Grippers**.



Aim: The results of this technology carrier are intended for the specific development of a certified overall Co-act Gripper system. Therefore, the gripper, the finger design, the environmental recognition, as well as other factors such as the work environment, robot and workpiece supply are all considered.

Co-act meets Cobots
Applications

Humans and Robots working in a Team

Co-act MPG-plus Gripper

Industry: Electronics

HRC topic: Collaborative assembly of mechatronic assembly groups

Application: Using a Co-act Gripper MPG-plus, robots precisely insert electronic components in the housing. The final assembly and functional test are carried out by the employee.

Customer benefits: Increase in efficiency due to simultaneous work processes and taking over tasks that require high concentration.

Co-act EGP Gripper

Industry: Automotive

HRC topic: Collaborative assembly of heavy workpieces

Application: Using a Co-act Gripper EGP, robots guide motor adapters to motor blocks, position them and hold them in position while fitting the screws. The fine adjustments and screw fittings are carried out manually by the employee.

Customer benefits: Improvement of ergonomics and increase of efficiency due to simultaneous work processes.

Co-act EGP Gripper

Industry: Assembly and handling

HRC topic: Collaborative handling of workpieces in partially automated assembly

Application: During gripper assembly, the employee is assisted by a robot with Co-act Gripper EGP. The components are fed by the gripper and the employee performs the assembly.

Customer benefits: Increase in efficiency and relief in terms of monotonous assembly work.

Co-act EGP Gripper

Industry: Assembly and handling

HRC topic: Collaborative handling of workpieces in dangerous areas

Application: After the set-screw installation with screw fastening, the robot with Co-act Gripper EGP removes the protruding adhesive residues on a sharp-edged extraction plate. The worker performs the assembly and carries out a quality check.

Customer benefits: Improvement of the ergonomics and reduction of the risk of injury for the employee.

Checklist for Co-act Gripper

To determine the optimum SCHUNK Co-act Gripper, we recommend completing the following checklist and sending it to the SCHUNK Co-act team. This checklist is also available online at: **schunk.com/checklist-co-act**

Contact data

Company	Name	Department
Street	ZIP Code	City and country
Phone	Fax	Email
Date	Consultant	
Order number	Offer number	

Application

Field of application of the Co-act Gripper:

☐ Assembly ☐ Handling ☐ Quality check ☐ Other

Short description of the application

☐ Integration into existing system ☐ New workstation ☐ Replaces previous workstation

Robot type

☐ Specified by the customer ☐ Suggestion desired ☐ Industrial robot, type _____

☐ FANUC CR 35iA	☐ KUKA iiwa 7	☐ COMAU Racer5 Collabor	☐ UR 3	☐ Rethink Robotics Sawyer
☐ FANUC CR 7iA	☐ KUKA iiwa 14	☐ COMAU AURA 110	☐ UR 5	☐ BOSCH APAS Assistant
	☐ ABB YuMi	☐ COMAU AURA 60	☐ UR 10	☐ Other

Portable robot version ☐ Yes ☐ No

HRC type of collaboration

☐ Safe hold ☐ Hand guiding ☐ Speed and separation monitoring ☐ Force and power limiting

Required gripping force

Note: For collisions with a hand, exact limits of 140 N of applied force and ~200 N/cm² pressure are valid; other safety aspects are to be observed for higher forces (e.g. sensor system in gripper fingers, actuation of grippers in a separate area).

Type of gripping: ☐ Form-fit gripping ☐ Friction ☐ 2 fingers ☐ 3 fingers ☐ Parallel

Preliminary gripper selection

☐ Collision protection cover required

Finger design

☐ Supplied by the customer ☐ SCHUNK

Material of the attached fingers ☐ Steel ☐ Alu ☐ Plastic ☐ Other _____

Accuracy at the fingers _____

Are interfering contours to be taken into consideration when removing workpieces? ☐ Yes ☐ No

3D data of point of removal available ☐ Yes ☐ No

Actuation

Robot via

☐ PROFIBUS ☐ CAN ☐ PROFINET ☐ Ethernet ☐ Other _____

Gripper via

☐ Pneumatics ☐ Digital I/O ☐ PROFINET ☐ Ethernet ☐ Other _____

Safety

☐ FT sensor in gripper necessary for collision detection (no redundant FT sensor available)

☐ Support from SCHUNK desired for safety concept

Pictures available

☐ Workpiece ☐ Workpiece deposit and mounting ☐ Existing system

Drawings available

☐ Workpiece ☐ Workpiece deposit and mounting ☐ Existing system

Notes

Co-act team

We would be happy to advise you on the optimum SCHUNK Co-act Gripper for your application.
Please copy the checklist, complete and email it to: **co-act-team@de.schunk.com**
You can reach the Co-act team under the following number: **+49-7133-103-3444**

Catalog Order

Copy, complete, fax to +49-7133-103-2779

Reg. No. 003496 QM15

schunk.com/catalogorder

The SCHUNK Gripper Catalog

The world's most comprehensive gripper portfolio of more than 1,800 pages. Order now!

Catalog Order

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Quantity

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Synergy SCHUNK

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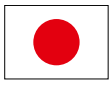

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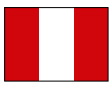

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