YASKAWA

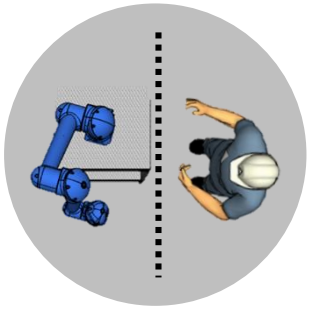
HC20DT IP67

Large Payload Robot for Human-Robot-Collaboration

Cobots are preferrable, when…

... when Cycle Time is not primary target.

… when workers should be physically relieved.

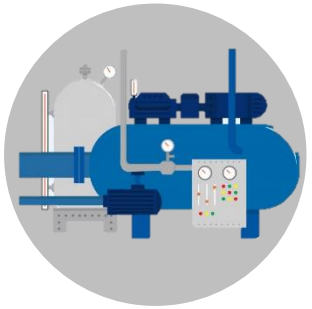


… when resonable Man-Robot Interaction phases are useful.

-- when steel construction cost should be minimized by lightweight cobot design.

... when fencing of the robot is not desirable or possible.

… when little space is availble.

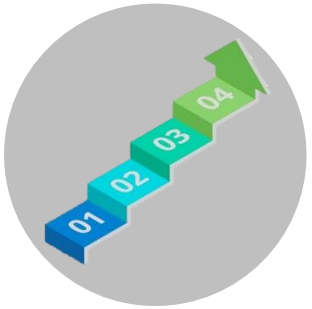


... when work contents should be concentrated in narrow space.

… to start automation projects in Brown Fields.

… when small lot sizes require frequent robot programming.

… when the current process is not reliable and requires frequent interventions.



… for step-by-step automation of processes.

.. the production environment is under permanent change.

Yaskawa HC20DT IP67 Key Features

Safety PLd Cat. 3
certified

20kg
payload

1700mm
reach

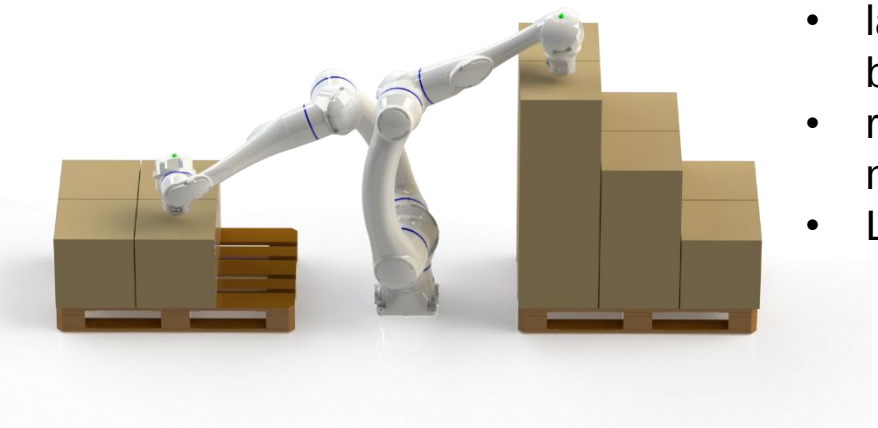
+/- 0,15mm
accuracy

IP 67
protection class

Food grade
grease

Manipulator Weight
only 140 kg

HC20DT – Large Reach and High Payload

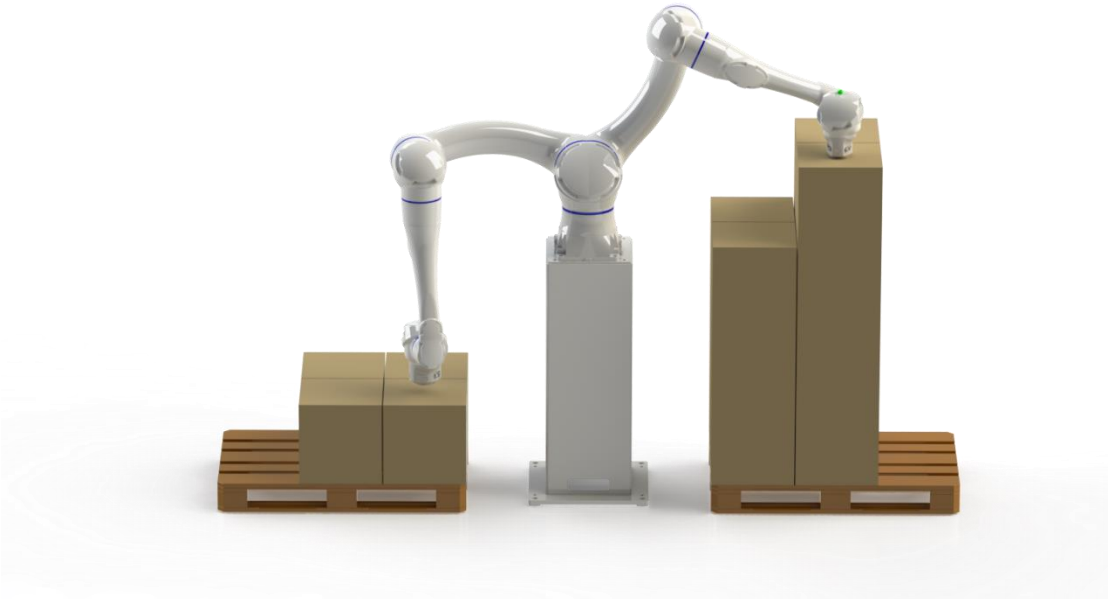


Ideal for Collaborative Palletizing Applications

- large working area, flip over and working below robot base level
- reaching a large floor area (long side of a pallet) without need of a robot stand
- Large stacking heights achievable

Relieving workers from unhealthy work

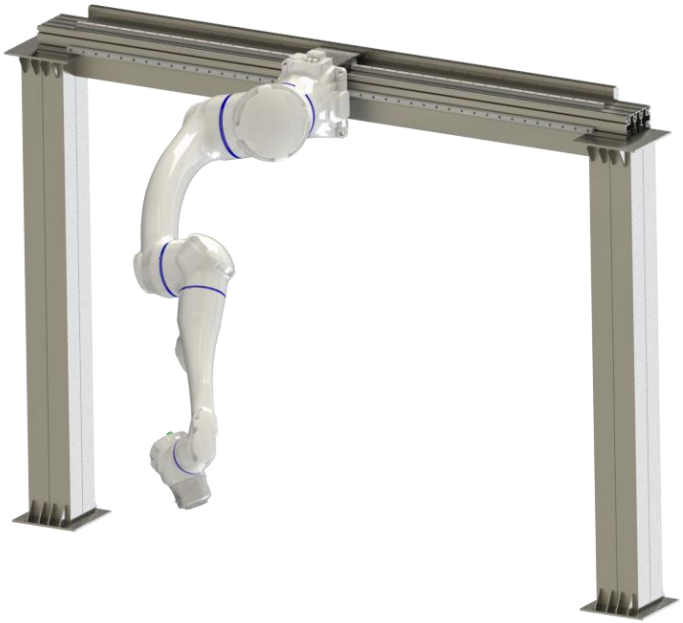
- Even considering a gripper weight of 2kg, the HC20 can move boxes up to 18 kg.



HC20DT– Compact & Lightweight Design

Pick and Place in Warehouses

- Collaborative Design for narrow spaces avoiding fences



Gantry Operation

- low manipulator weight requires less massive gantry steelwork

AGV operation

- low manipulator weight and collaborative design allows intergation in AGV Fleet solutions

HC20DT – IP Protection

The HC20 is the ideal Collaborative Robot for Rough Environments:

CNC Machine Tending

- High IP67 Protection for working in chips and coolant atmosphere

Powder Coating

- Easy teaching by Hand Guiding
- Robust Industrial Design

CNC Injection Machine Tending

- High IP67 Dust Protection

Configurations

HC20DT
IP67

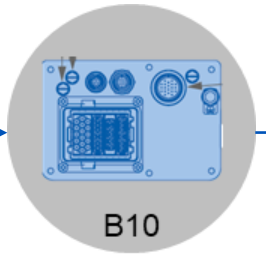
Controller

Pendant

Application Media Supply

YRC1000

TeachPendant

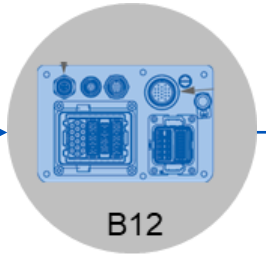


B10

-2x Air
-Media connection mating plug

YRC1000micro

SmartPendant



B12

-Ethernet port
-Media connection mating plug

Robot Controller Versions

YRC1000

- Full functionality of an Industrial Robot Controller
- Built in a compact Standalone abinet
- Many Communication Options (I/O, Fieldbus, IoT)
- Functional Safety (FSU) Options

400V-3 phase

YRC1000 micro

- Compact and Lightweight Controller
- Functionality dedicated for High Performance
- 19“ Rack design matching in Customer‘s cabinets
- Simple Peripheral Connections
- Functional Safety (FSU) Options

400V-3 phase (with additional transformator or directly via 3x200V)

Operating Concepts

Classic Teach Pendant

- Full functionality, logic
- For experienced robot programmers
- Emergency stop, dead man switch

- Code line based, no graphical HMI
- Less intuitive
- Bulky at frequent reprogramming

Innovative Smart Pendant

- Modern HMI for quick, intuitive programming
- Plug&Play
- For unexperienced programmers
- Partially with emergency stop, dead man switch

- Limited functionality, complicated representation of complex logic

Intuitive Direct Teaching

- Quick, intuitive programming
- For unexperienced programmers
- Suitable for frequent reprogramming

- Only for pick&place applications
- Complicated teaching in 1/100mm area
- Safety/ emergency stop more complicated

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Smart and Easy-To-Use

HC20 Product Functionality Highlights

HC20DT IP67 Function: Hand Guiding Option

- Move the robot flange by hand and record the motion
- Integrated Direct Teach Buttons supporting Position Confirmation and Gripper Control
- Simple menu to use Hand Guiding Menu

Smart Pendant Option

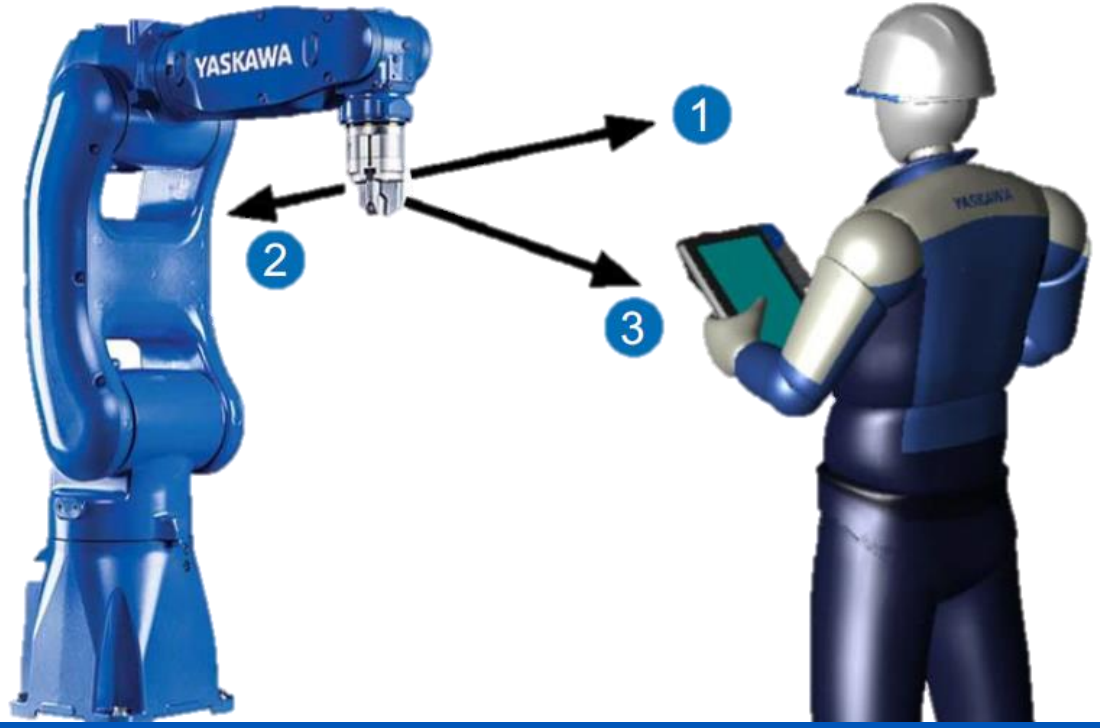
- Main menu allows an easy switch between screens
- Convenient access to all functions
- Perfect overview of all entries in the navigation menu
- Smartphone-like usability for all handling robots with YRC1000 and YRC1000 micro controls

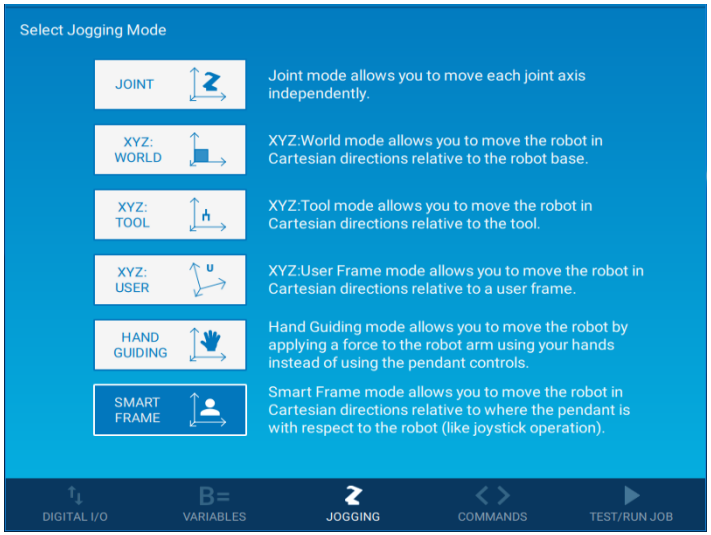
Advantages:

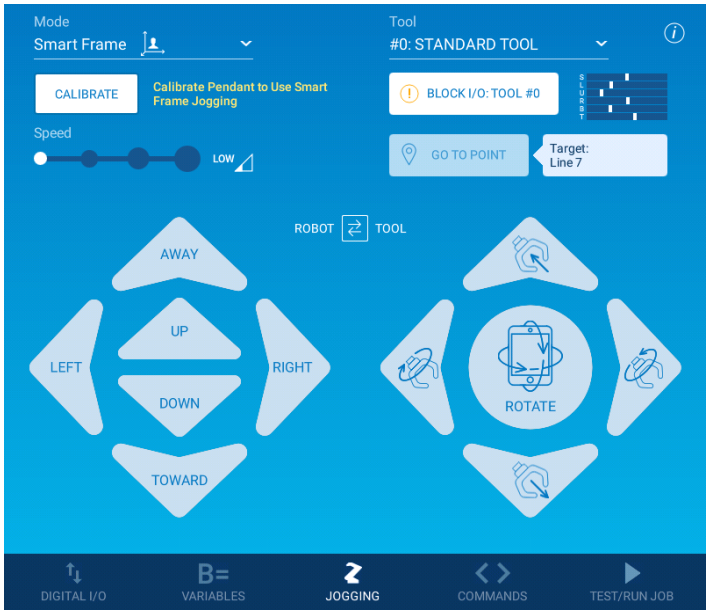
- **Intuitive handling and user-friendly interface**
- **Easy INFORM programming**
- **Integrated help and instruction menu**

Smart Frame© - Intuitive Jogging of the Robot

- The Smart Frame‘s patented technology on the Smart Pendant determines the user‘s orientation relative to the robot
- Eliminates error-prone mental transfer into coordinate systems (X, Y, Z) required
- Intuitive robot jogging by tilting the Smart Pendant







Smart Frame© - Smart Pendant Demo

Smart Pendant vs. Teach Pendant

Smart Pendant

Teach Pendant

	Operating Purpose	Training & Experience	Easy-to-use for new users	Guidance & Assistance	UI Software	Direct Teaching
Smart Pendant	Simplicity	Low	Bigger touchscreen with simplified commands	Command descriptions, instructive UI elements, built-in Help Menu	State of the Art, portable to tablets	Seamless Direct Teach Integration
Teach Pendant	Efficiency	Extensive	Smaller touchscreen with broader functionality	Command abbreviations, efficient coding for experienced programmers	Classic industrial pendant	Easy Direct Teach support

Safety

Sophisticated safety technology for direct human-robot interaction

Safety - Standards

CE Marking of Human-Robot-Collaboration Workstations
requires a risk analysis based on these standards:

Machinery Directive

MD/2006/EC

- HC20 is an incomplete machine and falls under the regulation of the MD

Robots and robotic devices – Safety requirements for industrial robots – Part 1: Robots

EN ISO 10218-1
EN ISO 10218-2

- Standard for all robots (incl. collaborative robot) and for robotic systems

Safety of machinery – Safety related parts of control systems – Part 1: General principles for design

EN ISO 13849-1

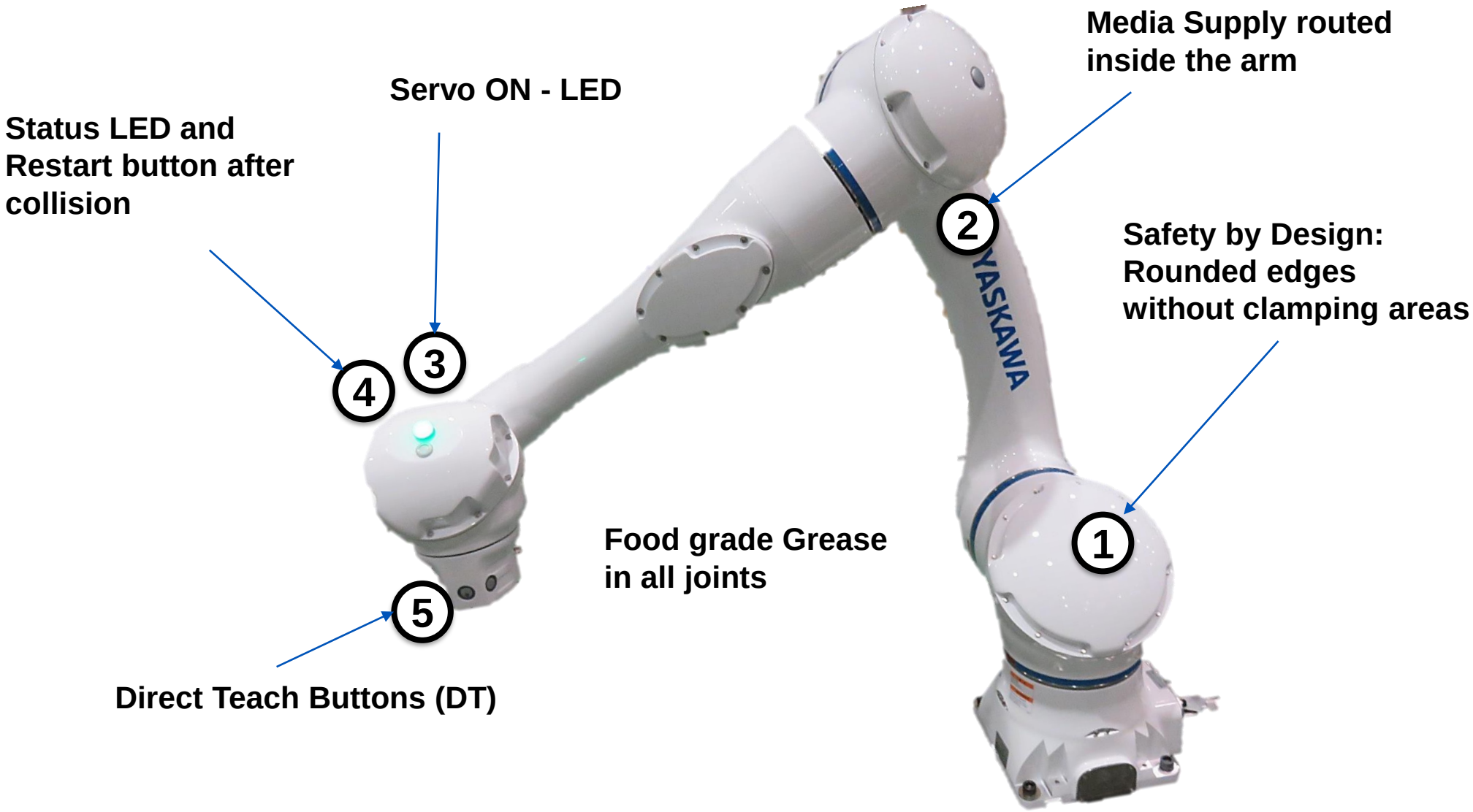
- Requirement Performance Level: PLd Cat. 3

Robots and robotic devices – Collaborative robots

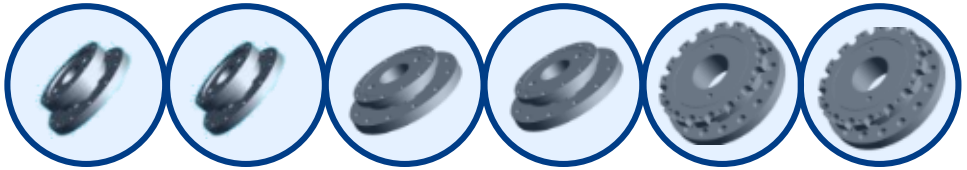
ISO TS 15066

- Technical Specification, no standard
- Extension of ISO 10218-1

Safety - Manipulator Design



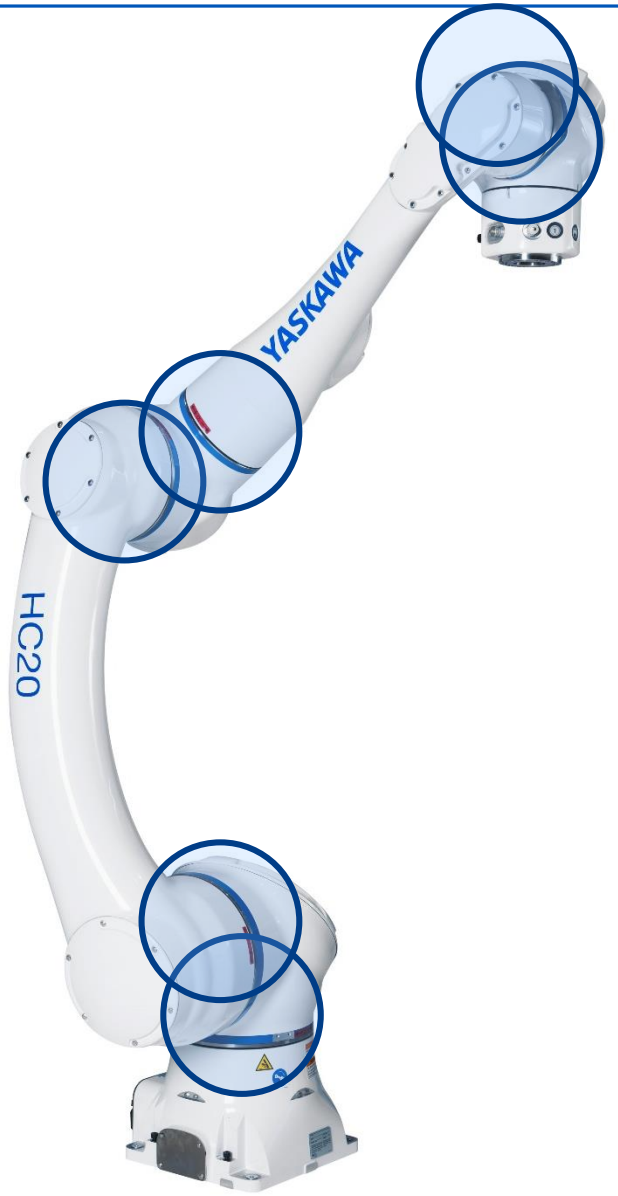
Safety - Integrated Safety Torque Sensors



The safety functions are based on the sensor data of the 6 torque sensors integrated in each single joint.

When an external force is exceeding the predefined treshold value of the torque sensors (in a collision case), the robot performs a safe stop (defined by ISO 10218-1) (Power-Force-Limitation, PFL).

The Safe Stop can be triggered by confirming the reset button.



Safety - Pushback Function

The robot can be pushed away smoothly while moving, i.e. when the robot gets in the way of the operator during manual work. After push back, the robot moves back to it‘s last position and continues his work.

Safety – Retract Function

The robot detects a clamping situation and moves back within it‘s teached path, to enable the operator to free himself.

Clamping situation

Freed from clamping

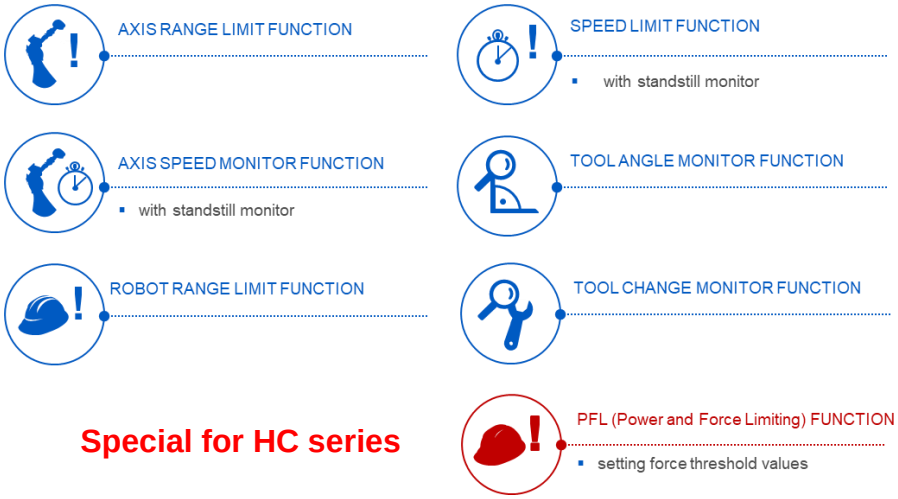
Functional Safety Unit (FSU)

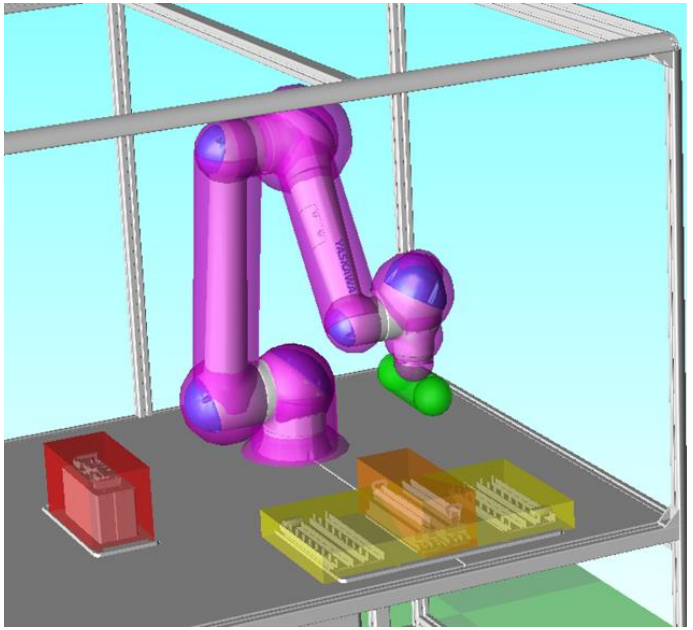
The FSU (Functional Safety Unit) is an integrated, certified safety control for YASKAWA robot controls, that monitors positions and operating speeds safely.

Powerful functions restrict collisions between operator, manipulator, tools and fixtures, such as the definition of cartesian zones, axis areas, virtual walls and tool envelope curves.

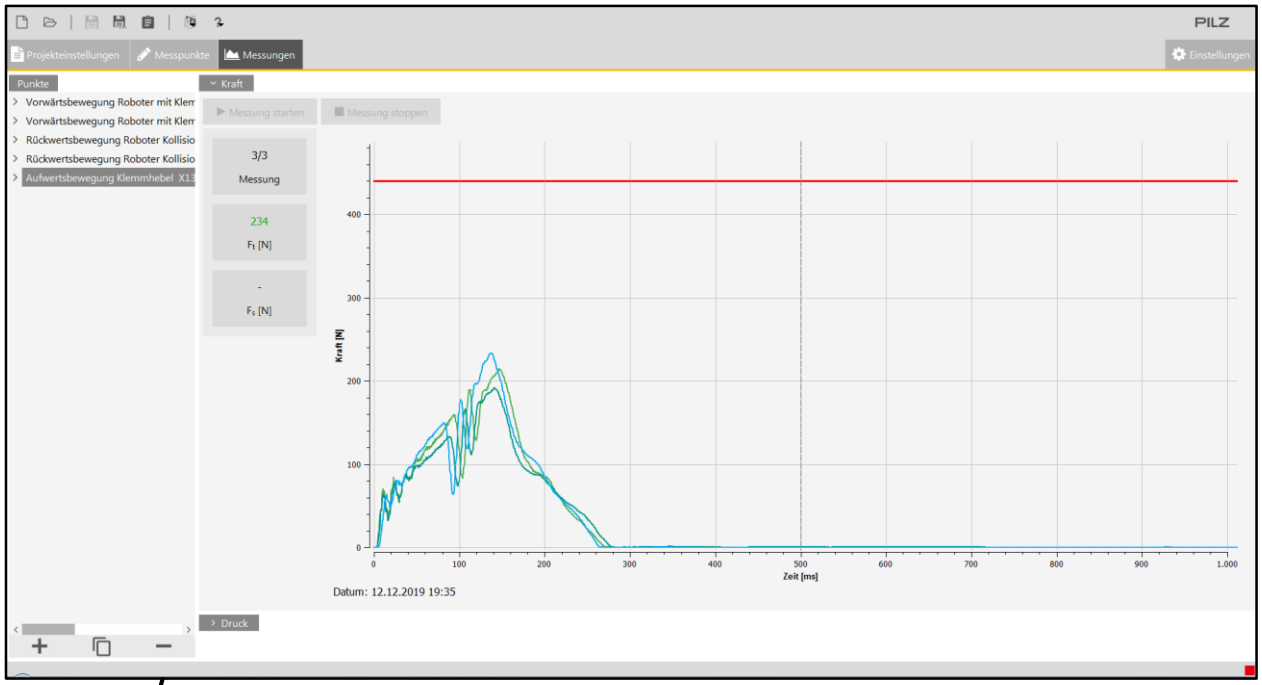
FSU Advantages:

- Reduced installation space due to secure restriction
- Enables lightly constructed safety fences or fenceless operation
- Defines secure loading and unloading zones
- Protects tools, fixtures and other devices within the working area





Force and Pressure Measurement Service



- Is mandatory by law when commissioning a HRC workspace
- Certified measuring equipment to be used according ISO/TS 15066
- Measuring critical force/pressure situations during HRC operation
- Determining the maximum collaborative speeds allowed for the very application

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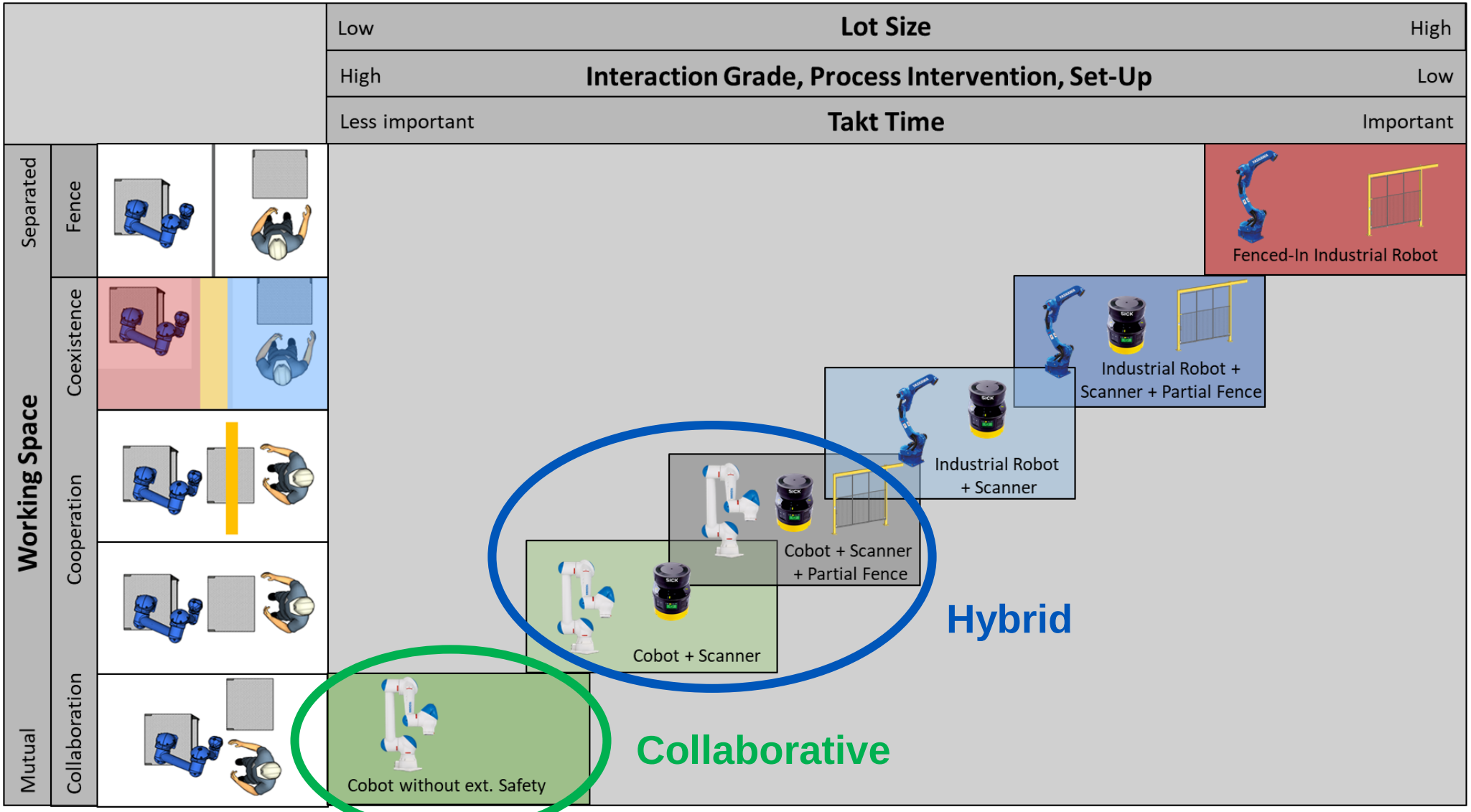
Hybrid and Collaborative

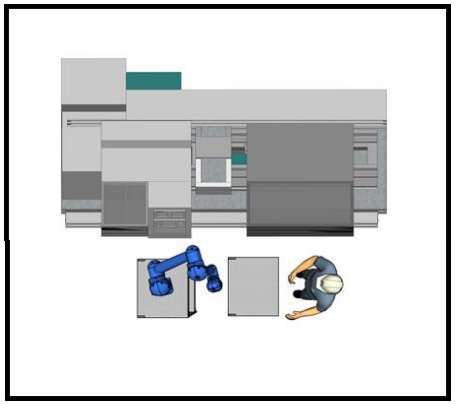
Optimal Takt Times by combining full and collaborative speed

Forms of Human-Robot Interaction

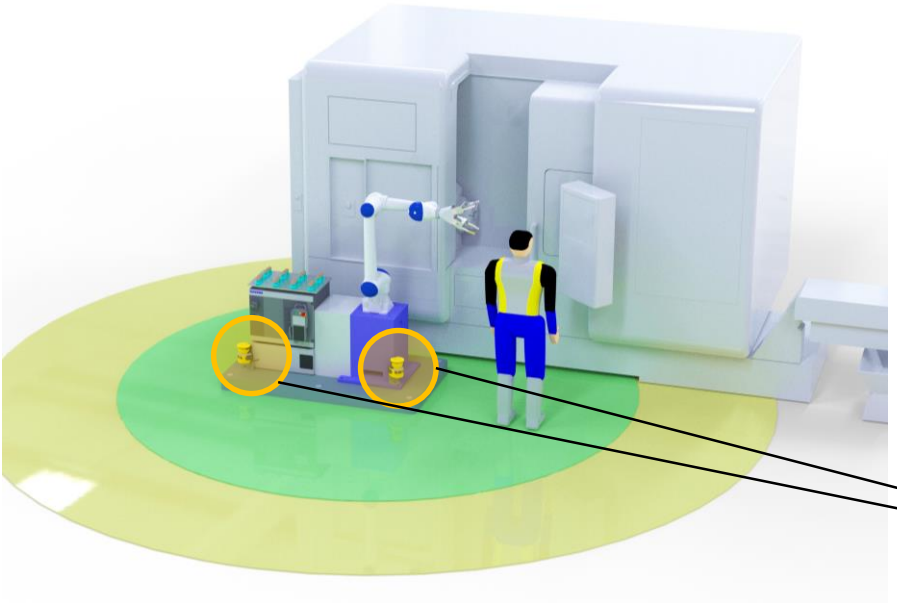


Collaborative and Hybrid Operation

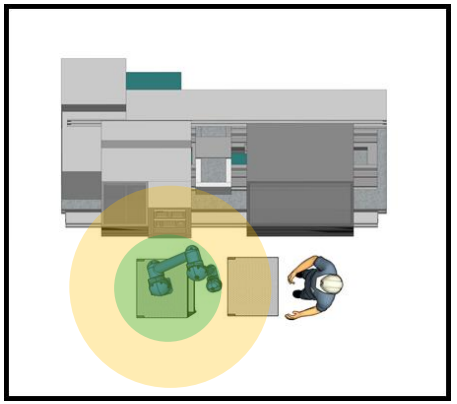
Collaborative Operation



No external Safety



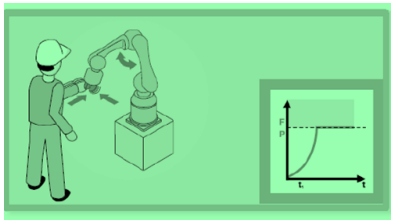
Hybrid Operation



Safety Scanners

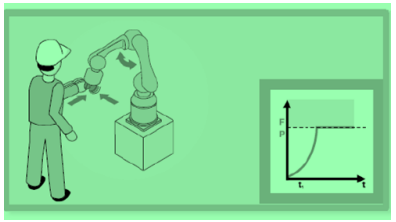
Speed
Collaborative

Power & Force Limiting

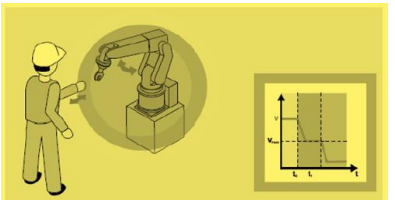


Speed		
Collaborative	Reduced	Full

Power & Force Limiting



Speed Separation Monitoring



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