▶ Human-robot collaboration. Safety guaranteed!

Robotics

The closer man and machine are able to work together the more efficient the work becomes, at the same time however this places greater demands on safety. Interaction between man and robot increasingly demands new technologies and solutions. The entire safety functionality from the sensor to the logic and beyond to the actuator must be considered.

**Pilz is your partner for the safe automation of your robot application:**

▶ A portfolio of services that are tailored to the individual life cycle of a robot system, from process analysis to risk assessment and CE marking

▶ Safety solutions compliant with standards such as DIN EN ISO 10218-2 and ISO/TS 15066

▶ Collision measurement in accordance with ISO/TS 15066 limit values

▶ Training in the requirements of robot safety

▶ Safe control systems, drive technology and sensors, such as the safe camera system SafetyEYE for zone monitoring and the protection of detection zone

▶ Participation in the formulation of standards for safe human-robot collaboration

▶ Active cooperation with leading research centres

PILZ
THE SPIRIT OF SAFETY

▶ Automating robot systems safely and efficiently

Collaboration between human and robot is becoming increasingly important because every workspace must achieve maximum productivity but protection of the operator is of the highest priority. Pilz offers services, products and systems for the seamless monitoring of hazardous workspaces, particularly in collaboration with robots.

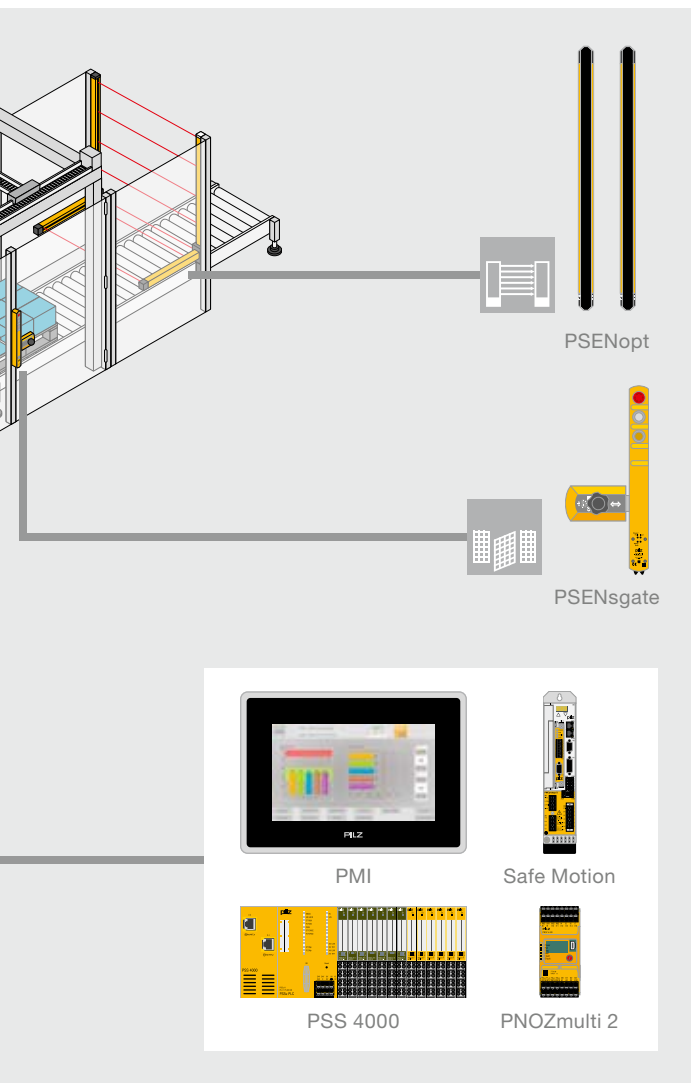SafetyEYE

PITenable

PSENcode

PITmode
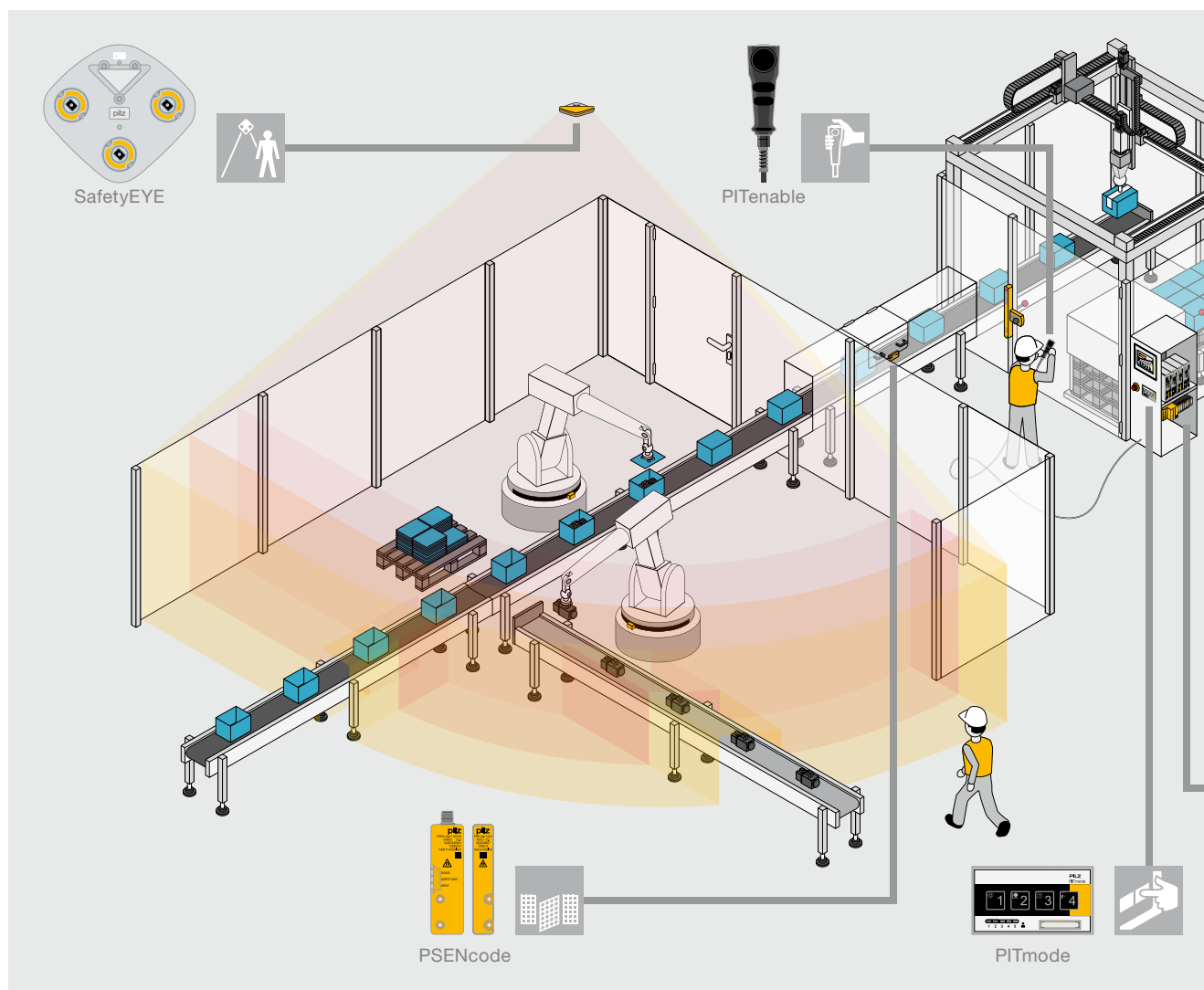
+ Cell control

Automation system PSS 4000

Optimum interaction of hardware and software components, network devices and real-time Ethernet. The consistent distribution of the control functions in the periphery allows projects to be realised more easily and flexibly. The PSS 4000 also offers solutions for safety and automation.

Configurable control systems PNOZmulti 2

Multiple safety functions can be implemented on plant or machinery. The system can be expanded by modules and connected to all standard communication networks. The control system also enables motion monitoring for one or more axes.

PSENopt

PSENsgate

PMI

Safe Motion

PSS 4000

PNOZmulti 2

+ Speed monitoring

Safe drive technology – safe motion

Safe motion – PMCprotego DS is a drive with integrated
safety functions up to PLe on horizontal and vertical axes.
The stop, movement and brake functions enable safe setup,
reduce changeover times and maintenance costs and
enhance productivity.

+ Operation and monitoring

Operating mode selector switch PITmode
Safe changeover of operating mode and control of
access authorisation in one unit.

Enabling switch PITenable
Safe working in the hazardous area if the protection
provided by the guard has to be lifted.

Operator terminals PMI
Modern touch terminals for visualising processes
and for interaction between man and machine.

+ Material handling/access to the hazardous areas

Light beam devices PSENopt
Ideal for cyclical intervention, e.g. insertion work
or material feeding and removal.

Coded safety switch PSENcode
The safety switches are used to monitor the position of
guards and also for general position monitoring.

Safety gate system PSENsgate
The safety gate system combines secure safety gate
monitoring, safe guard locking and control elements in
just one system, up to the highest category PL e.

Safe camera system SafetyEYE
Monitors workspaces in which man and robot
collaborate, even without any guards. The hazardous
area is surrounded by a virtual three-dimensional detection
zone. This ensures unhindered access to the robot
and means that workstations can be designed with
ergonomics in mind.

▶ Safe human-robot collaboration

In traditional industrial robot systems activities that involve the motor skills of humans cannot be automated. The skills of the human and the advantages of a robot (force, endurance, speed) will be combined more strongly in the future. That places increased demands on the safety requirements, however, they are largely governed by the particular application. One of the most important milestones on the road to a safe robot application is the creation of a risk analysis.

Methods of human-robot collaboration according to EN ISO 10218-2 and ISO/TS 15066
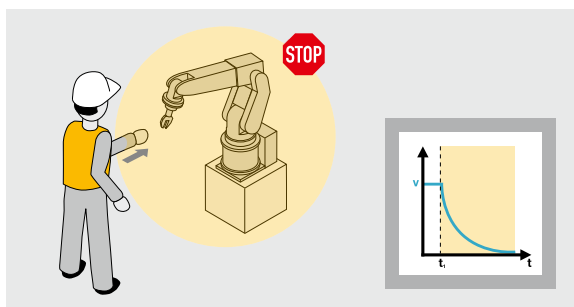
Method 1 – safety-rated monitored stop
On entry into the collaboration zone the robot goes into a safe operating stop. On departure the robot resumes its movement automatically or by a reset. The speed is determined according to the risk assessment.
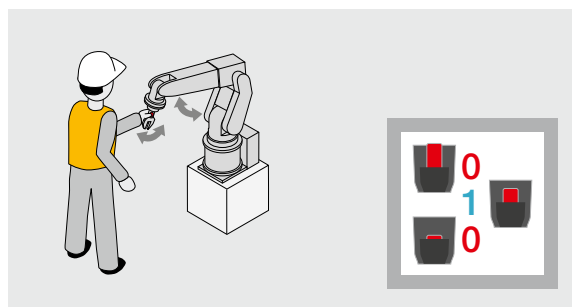
Method 2 – hand guiding
The robot can be guided manually at a safely reduced speed. The speed is determined according to the risk assessment. In addition, an enabling device and an emergency stop device must be within easy reach and be safety rated.
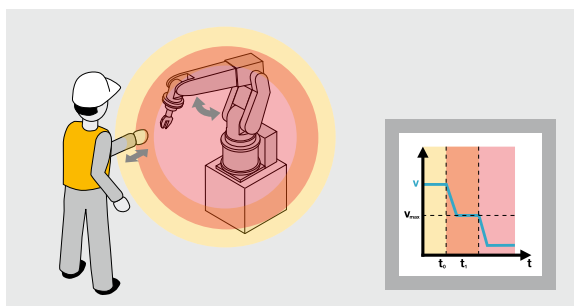
Method 3 – speed and distance monitoring
Non-fixed guards are positioned in such a way that people can approach the robot at any time without any risk. The distance between the person and the robot is monitored and the speed is adjusted accordingly. When the detection zone is left the robot resumes its movement without a reset.
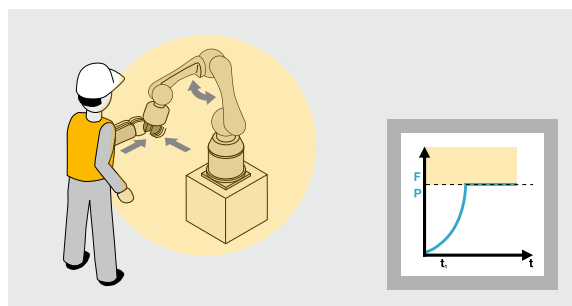
Method 4 – power and force limiting
A collision of man and robot is possible if certain load parameters are observed. This necessitates additional requirements on the robot. As well as the obligatory safety functions, torque, force, power and speed must be monitored safely.

▶ Services throughout the life cycle of a robotic system

As a solutions supplier, Pilz is here to support in the implementation of relevant standards and directives. We are happy to work with you to develop a global safety strategy for your Robot application, throughout the life cycle of your robot system production from development to CE marking. The services are complemented by a training package with practical, up-to-date content.

Fully compliant solution

Safe integration and verification

Safe concepts

Safe system design
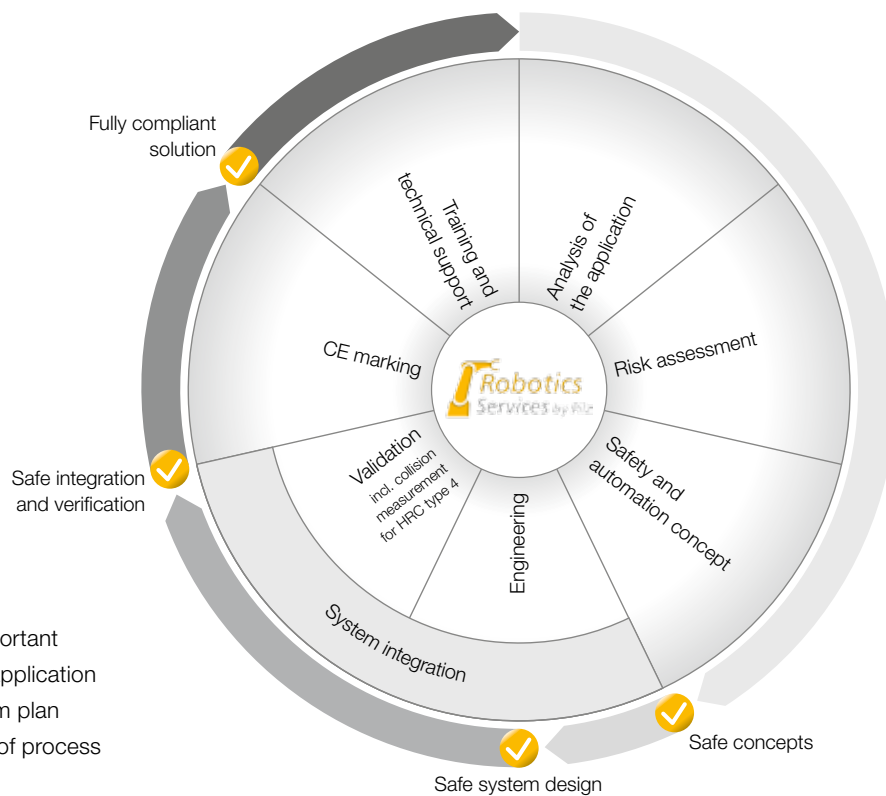
Training and technical support

Analysis of the application

CE marking

Risk assessment

Validation incl. collision measurement for HRC type 4

Safety and automation concept

Engineering

System integration

Robotics Services by Pilz

Application analysis
We document the most important components of your robot application and prepare a outline system plan based on the requirements of process and safety technology.

Risk assessment
We review your robot application in accordance with the applicable national standards and directives and assess the existing hazards.

System integration
The results of the risk assessment and safety concept are implemented to suit the particular requirements through selected safety measures.

CE marking
We control all activities and processes for the conformity assessment procedure, including the technical documentation that is required.

Safety concept
We develop detailed technical solutions for the safety of your robot application through mechanical, electronic and organisational measures.

Validation
Our expert specialist staff review and analyse the risk assessment and safety concept and perform collision measurement in accordance with the limit values laid down in TS/ISO 15066.

Training and technical support
Our training courses impart professional expertise relating to the safe application of robots. Our technical support team can be contacted round the clock.

▶ Support

Technical support is available from Pilz round the clock.

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Pilz develops environmentally-friendly products using ecological materials and energy-saving technologies. Offices and production facilities are ecologically designed, environmentally-aware and energy-saving. So Pilz offers sustainability, plus the security of using energy-efficient products and environmentally-friendly solutions.

energy saving by Pilz

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Partner of the Engineering Industry
Sustainability Initiative

The 4-fold safety of automation

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SYSTEMS
SERVICES
Technical Ecological
Personal Economical

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Presented by:

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