

GLOSSARY OF TECHNICAL TERMS

This glossary of technical terms contains definitions of certain terms used in this document in connection with our Group and our business. Some of these may not correspond to standard industry definitions or usage of these terms.

“AGV logistics scheduling system”	Automated Guided Vehicle logistics scheduling system, is a material handling system that transports goods or materials within a controlled environment without the need for a human operator or driver
“AI”	artificial intelligence, the ability of a machine or computer system to perform tasks that typically require human intelligence
“attention mechanism”	a component in neural networks that allows the model to dynamically focus on the most relevant parts of the input data when performing a task, such as translating a sentence or recognizing objects in an image
“automation”	the application of various control systems, such as robots, control and vision systems as well as information technologies, to operate equipment and processes in a wide range of industries
“axis” or “axes”	each represents a degree of freedom, where increasing the number of axes allows a robot to access a greater amount of space or greater flexibility
“bevel gear transmission”	a power transmission system that uses cone-shaped gears (bevel gears) to transfer motion between intersecting shafts, typically at a 90-degree angle
“CE safety certification”	a part of the CE marking process that demonstrates an industrial product’s compliance with European health, safety and environmental protection directives for machinery
“cobot”	also known as collaborative robot; designed to work alongside humans in a shared workspace, it is equipped with advanced sensors and safety features that allow it to operate safely around people
“controller”	the core computing unit that processes commands, executes control algorithms, and manages the operation of a robot or automated system
“conveyor”	a mechanical system that often features a powered belt or series of rollers used for the automated transportation of materials or products from one location to another
“CRM system”	Customer Relationship Management system, a software platform used to manage a company’s interactions with current and potential customers, centralizing data related to sales, marketing, customer service and support
“cycle time”	the total time required to complete one full cycle of a specific operation or process

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“decoupling”	the process of designing controllers to make individual system outputs, such as a robot’s axis movements, independent of each other, allowing them to be controlled separately without unwanted interaction
“deep learning algorithm”	machine learning that uses multi-layered neural networks to learn and make decisions from complex data patterns
“deformable convolutional networks”	a type of neural network architecture where the convolutional filters can adapt their sampling locations based on the input data, improving the model’s ability to handle object geometric variations
“degrees of freedom” or “DOF”	the count of independent axis of motion that a robotic system can autonomously manipulate to perform tasks
“drive-and-control”	an integrated architecture where the power drive units and the motion controller are combined into a single system for efficient, synchronized control of actuators
“dynamics”	the study of the forces and torques that cause motion in robotic systems, analyzing how a robot’s movement results from applied forces and its physical properties like mass and inertia
“dynamic scaling method”	an integrated design strategy that simultaneously accounts for a robot’s motion capability, torque requirements and dynamic response, ensuring the robot maintains both agility and stability during high-speed operation
“EI”	Engineering Index, a world-renowned literature retrieval system in the field of engineering
“embodied intelligent robot”	a robot whose intelligent behavior emerges from the interaction between its computational algorithms and its physical body situated in a real-world environment
“end-effector”	the tool mounted on the robot according to the customer’s requirements, such as vacuum suction cups, pneumatic grippers, electric grippers, specialized jigs or dispensing valves
“ERP system”	Enterprise Resource Planning system, an integrated software suite used to manage and automate core business processes across an organization, such as finance, human resources, supply chain, manufacturing and services
“error compensation”	techniques and algorithms used to identify, measure and correct systematic deviations or inaccuracies in a robot’s movement or positioning to improve precision
“FEA”	Finite Element Analysis, the simulation of a physical phenomenon using numerical mathematic technique
“FPGA”	Field-Programmable Gate Array, an integrated circuit that can be configured and reconfigured by the user after manufacturing to implement custom digital logic

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“full-stack”	a development approach where a company designs and manufactures all critical components of a system, from low-level firmware to high-level software and algorithms
“GPM”	gross profit margin
“high-order trajectory planning”	a method for generating smooth and precise motion paths by accounting for higher derivatives of motion, which reduces vibration and improves accuracy during high-speed movement
“Hooke’s joint”	a mechanical coupling that allows the transmission of rotary motion between two shafts whose axes are inclined to each other, which is commonly used in robotic wrist assemblies to provide flexibility in movement
“industrial protocol interface”	a standardized hardware or software interface that enables communication and data exchange between industrial devices, such as PLCs and robots, using specific fieldbus or industrial Ethernet protocols
“industrial robot”	programmable, automatically controlled, reconfigurable machines designed to perform tasks with precision and efficiency in manufacturing and other industries
“inertia”	the physical quantity that measures the degree to which the moving components of a robot resist changes in their motion state, and it is a key factor in achieving system responsiveness
“IP rating”	an international standard that classifies the degree of protection of an enclosure provides against intrusion from solid objects and liquids
“joint module”	an integrated modular drive unit that incorporates a motor, speed reducer, torque sensor and encoder into a single assembly to deliver precise motion and force control for robots
“kinematics”	the study of motion in robotic systems without considering the forces that cause it, focusing on the geometric relationships between links and joints to describe position, velocity and acceleration.
“Linux”	an open-source operating system kernel that serves as the foundational software layer for managing hardware resources and executing programs, widely used in embedded and industrial systems
“machine vision”	the technology and methods that enable robots to acquire, process, analyze and understand images or video to perform tasks such as inspection, guidance and identification
“magnetic circuit topology”	the specific geometric arrangement and design of the magnetic flux paths within an electric motor or electromagnetic device, which determines its efficiency, torque characteristics and power density
“mechanical topology”	the fundamental geometric arrangement and connection scheme of components, such as links and joints, that defines the kinematic structure and motion capabilities of a robot

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“MES”	Manufacturing Execution System, a software system that monitors, tracks, documents and controls the process of transforming raw materials into finished goods on the factory floor, providing real-time operational data
“multi-modal”	pertaining to a system that processes and integrates information from multiple types of sensory inputs to perceive and interact with its environment
“parallel robot”	a type of robot where the end-effector is supported by multiple arms that work together in parallel
“payload”	the maximum weight that a robot can handle while performing its tasks and maintaining its specified performance, such as speed and accuracy
“PCB”	Printed Circuit Board, a flat board that mechanically supports and electrically connects electronic components using conductive tracks
“perception system”	the integrated hardware and software components of a robot responsible for sensing, interpreting and understanding its surrounding environment
“PL standard”	an international standard for the ability of safety-related parts of a machine’s control system to perform a safety function under foreseeable conditions
“PLC”	Programmable Logic Controller, a specialized digital computer employed in industrial settings for automation and control
“pole-slot coordination”	the design relationship in an electric motor between the number of magnetic poles on the rotor and the number of slots in the stator, which is critical for optimizing performance, minimizing torque ripple and reducing vibration and noise
“power-density”	a measure of the amount of power a motor or drive system can deliver relative to its size or weight, typically expressed in watts per kilogram or similar units
“QR code”	quick response code, a type of matrix barcode or two-dimensional barcode that can be scanned
“rated power”	the maximum continuous power input or output a robot is designed to handle without risk of damage
“reducer”	a mechanical gear assembly (gearhead) used to reduce the high speed and low torque output of a motor to a lower speed with higher, more usable torque for driving a load
“redundancy”	the inclusion of extra or backup components, whether hardware or software, within a system to increase its reliability, ensure its continuous operation and provide fault tolerance in case of a failure

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“repeat positioning accuracy”	a robot’s ability to consistently return to the same commanded position over multiple cycles under identical conditions, typically measured as a deviation
“rotary vector reducer”	a high-precision, high-rigidity gear reduction mechanism using a two-stage cycloidal gear design
“SCARA”	Selective Compliance Assembly Robot Arm, a type of articulated robot where the robot can move freely and maintain stiffness in three axes while being compliant in the final axis
“SCI”	Science Citation Index, an international journal literature retrieval tool
“servo motor”	an electric motor that can precisely control its output torque, rotational speed and position in accordance with control signals
“servo system”	a closed-loop control system consisting of a motor, feedback sensor and controller that precisely governs the position, velocity or torque of a mechanical component
“SIL standard”	an international standard that defines the required level of risk reduction for a safety function in electrical or electronic systems
“SLAM navigation”	Simultaneous Localization and Mapping navigation, a technology that enables a robot or autonomous system to construct a map of an unknown environment while simultaneously tracking its own position within it
“Stewart mechanism”	a type of robot mechanism typically using six extendable legs as actuators connected to a moving platform
“stiff” or “stiffness”	a measure of a material’s or structure’s resistance to deformation, such as bending and twisting, when subjected to an applied force
“working range”	the area or volume within which the robot can operate and perform tasks
“Xenomai”	a real-time development framework that provides a co-kernel or interface to achieve hard real-time capabilities for applications running on Linux, enabling precise and deterministic timing for industrial control
“zero-backlash”	a mechanical design characteristic that eliminates free play or lost motion between engaged components, such as in gears