Glossary of technical terms

ABB Robotics

Collaborative robot automation

An automation application that facilitates collaboration between robots and humans in a shared working environment. Collaborative robot automation refers to all types of collaboration, from merely occupying the same space safely, to intermittent interaction (such as a person bringing new parts for a robot to process), to a human and a robot working together on a common task. The enabling technology can consist of physical or electronic accessories such as sensors and light curtains, or it can be integrated into the robot itself.

Robot cell

A complete automation solution for a specific task, such as welding car doors or polishing kitchen faucets. Robot cells can operate as 'islands' of automation or work together to perform consecutive tasks. For example, robot cells might be combined to package food into boxes and then place the boxes on to a palette for shipping. A cell includes the robot, a controller, peripherals, software function packages and often protective fences or cages.

Robot systems

Turnkey solutions for an entire manufacturing line, such as stamping or painting automobile bodies. Robot systems can include many individual robot cells and a range of manufacturing processes from material handling to welding and assembly. Because of their complexity, robot systems are often designed in close cooperation between the customer and robot supplier.

Robot controller

The 'brain' of a robot, normally a separate hardware device that stores and executes the software programs that govern the operation (motion, position, speed etc.) of one or several robots. The controller also synchronizes robots with other devices such as motors, drives or conveyor belts.

Robot axis

A connecting point in a robot arm, much like an elbow or wrist joint in the human arm. Some axes are constrained on a single motion path; others are more flexible and can move in both a linear or rotational way. The more axes a robot arm has, the more directions it can move. ABB's collaborative dual-arm robot YuMi® has seven axes in each arm, making it easily as dexterous as a human being.

SafeMove2

An ABB collaborative automation software solution that allows humans to work safely in close proximity to robots. SafeMove2 software restricts a robot's motion, speed and position for specific applications, meaning additional safety measures are not necessary – for instance, stopping production when a worker has to come close to a robot to deliver more parts for its to process. By removing the need for safety barriers, SafeMove2 gives manufacturers greater flexibility to organize production on the factory floor.

MultiMove®

A function of ABB's robot controller software that allows several robots to work together with extreme precision, even at high speeds. MultiMove®'s functionality can equally be applied to robot cells, allowing them to switch between working independently and as part of a synchronized processes, as and when necessary. This means robots can be deployed to work on other tasks during slack periods in the cycle, greatly increasing the flexibility and productivity of a production plant.

Robot vision system

An automation solution that uses input from sensors, scanners or two- or three-dimensional camera systems to control a robot. Vision systems might be used to locate objects and determine their shape and orientation so that a robot 'knows' how to handle them. More sophisticated vision systems help robots sort products by color or inspect manufactured parts for defects.

RobotStudio®

ABB's PC-based software solution for programming, configuring and commissioning robots in a virtual environment. Being an exact copy of the software that runs the physical robot, RobotStudio® provides extremely accurate simulations, enabling customers to engineer and optimize their automation processes and train operators without the expense and inconvenience of interrupting production. RobotStudio® also helps to identify bottlenecks and other issues before installation, shortening product changeover times and improving the speed and efficiency of new product launches.

ABB Ability™ Connected Services

A suite of sophisticated service solutions that monitors the performance and health of connected robots to optimize their reliability and performance. By analyzing key performance parameters, ABB Ability™ Connected Services is able to predict when a robot is likely to malfunction, enabling pre-emptive action to avoid production stoppages. Connected Services can reduce stoppages by as much as 25 percent and lead to a 60 percent improvement in response time and issue resolution.

Connected Services is also able to benchmark the performance of a given fleet of robots against ABB's entire installed base, which consists of some 6,000 connected ABB robots in more than 750 factories across 40 countries. Using advanced analytics, underperforming components can be identified and preventive maintenance interventions can be scheduled to extend the life of equipment and avoid expensive shutdowns.

ABB Industrial Automation - B&R

Drive

An electronic device that adjusts the speed of an electric motor to match the load it must perform. Rather than having a motor run at full throttle as would normally be the case, drives continuously calculate and adjust the frequency and voltage of electric current to provide only the power that the motor needs.

Motors equipped with drives consume far less energy than conventional motors, which are controlled by "throttling down," a process equivalent to slowing a car by applying the brake while keeping your foot flat down on accelerator. Reducing a motor's speed by half using a drive can reduce the energy it consumes to one-eighth of its consumption at full speed.

Distributed control system (DCS)

A control system that regulates a process (manufacturing, chemical or other) from a series of strategic positions in the processing plant, as opposed to from a single, centralized control unit. Microprocessor-based distributed control systems (DCS) originated in continuous process industries (e.g., refineries) and integrate distributed automation controllers, networks, application servers, workstations and other modules necessary to build a complete automation system.

DCS sensors sense the process information and send it to the local Input/Output modules, to which actuators are also connected so as to control the process parameters. The information or data from these remote modules is gathered to the process control unit.

The collected information is further processed, analyzed and produces the output results based on the control logic implemented in the controller. The results or control actions are then carried to the actuator devices. The DCS configuring, commissioning and control logic implementation are carried at the engineering station. The operator is able to view and send control actions manually at operation stations.

Programmable logic controller (PLC, or programmable controller)

An electronic device used to control equipment, especially in automation. PLCs are small, programmable units that can receive information from output devices, such as sensors in a control system, and transmit signals to input devices, such as actuators, that can effect changes in the control system.

Real-time

A description given to systems that operate in a deterministic manner, for instance, by responding to an input within a defined time limit, usually instantaneously. For example, safety-relevant systems must always respond within pre-determined time limits. Many automation applications are 'real-time' because unpredictable response times or reaction delays would effectively destabilize the process. To ensure a system is real-time, it must fulfill stringent criteria in both hardware and software design.

Applications that typically respond quickly to an input, but not necessarily instantaneously, are often described as 'near real-time' because it can be assumed that critical time limits will not be exceeded. An example would be communications between an automation system and a business system designed to provide management-level information. Such systems must be fast enough to allow accurate decisions, but not instantaneous.

SCADA (supervisory control and data acquisition)

A computer system that gathers and analyses data across distributed industrial and enterprise-wide equipment, processes and infrastructure. SCADA systems can be deployed in a wide variety of application areas, such as oil and gas gathering, gas and liquids transport pipelines, oil and gas distribution networks, water treatment facilities, electrical networks, and many other areas. SCADA systems may also be used as the platform for higher-level applications such as facilities and asset management, load balancing, production management, leak detection, supply contracts management and a host of other applications.

SIL (Safety integrity level)

The SIL rating is the level of risk associated with a system. It is a measure of a system's ability to perform safely and, in the event of failure, to fail safely. There are four SIL levels, with level 4 indicating the highest performance.

ABB Ability™ System 800xA® plan, build, operate

ABB Ability™ System 800xA – distributed control system

A state-of-the-art of system used in many industry sectors to oversee and control a wide range of processes. ABB Ability™ System 800xA® extends the scope of traditional control systems to include all automation functions within a single operations and engineering environment.

At the core of ABB Ability™ System 800xA® is a flexible integration platform that provides the means of achieving measurable productivity and profitability improvements. Based on 'Aspect Object' technology (see below), ABB's integration architecture relates all plant data (the 'Aspects') to specific plant assets (the 'Objects'). The platform's client-server architecture streamlines controller communications, centralizes configuration and back-up tasks, and provides system-wide management of data for trend, history and audit trail purposes. The collaborative environment of ABB Ability™ System 800xA® delivers a plant-wide overview that enables operator effectiveness and asset optimization.

Aspect Object

This technology relates all plant data, the 'Aspects', to specific plant assets, the 'Objects'. It enables one-click navigation, efficient engineering and presentation of the appropriate information in the appropriate context to the relevant user. Different 'Aspects' enable users to zoom in on the information they are interested in without having to cut through obstructive clutter to get to it.

Operator

Operators monitor all plant operations on screens and computers to make sure that everything is running optimally and identify abnormal operating and equipment conditions.

When an abnormality is detected, the Control Room Operator troubleshoots and repairs the electrical and mechanical equipment to get everything back on track to minimize safety risks and economic losses.

The operator also identifies and recommends changes to improve overall plant reliability, performance and output.

ABB Marine

ABB Ability™ Marine Advisory System – Octopus

A unique portfolio of software solutions for performance management in marine operations. Octopus is a state-of-the-art decision-support tool that enables safe and efficient voyage execution. Leading shipping companies use this technology for route planning and optimization.

Remote Diagnostics

Remote system monitoring, analysis and troubleshooting for our marine customers, who can connect with an ABB service engineer on land while their vessels are at sea. Remotes Diagnostics also enables condition-based maintenance. By measuring the mechanical and electrical condition of the power, automation and propulsion systems, we can observe trends and establish long-term maintenance and retrofit programs.

Azipod® propulsion

A gearless steerable propulsion system in which the electric drive motor is in a submerged pod outside the ship's hull. Azipod propulsion improves vessel safety, energy efficiency, maneuverability and performance. A ship with Azipod propulsion does not need rudders, long shaftlines or stern transversal thrusters.

Ship trim

The difference between the forward draft and the aft draft. Optimizing the vessel's trim ensures minimum water resistance in all circumstances. The optimization method is based on collection and multidimensional analysis of exact real-time data on vessel attitude.

Condition-based maintenance (CBM)

Maintenance when need arises. This type of maintenance is performed after one or more indicators show that equipment is going to fail or that equipment performance is deteriorating.

Autonomous ship

A concept for a ship in which next-generation modular control systems and communications technology enable wireless monitoring and control functions both on board and off. These will include advanced decision support systems to provide a capability to operate ships remotely under semi or fully autonomous control. This description implies two generic alternatives that are combined in an autonomous ship:

- The remote ship, where the tasks of operating the ship are performed via a remote control mechanism, for example, by a shore based human operator and,
- The automated ship. where advanced decision support systems on board undertake all the operational decisions independently without intervention of a human operator.

ABB Mining

GMD - Gearless mill drive
A system consisting of a ring motor and its associated driving equipment such as a cycloconverter, transformers and control equipment. GMDs are used to drive (rotate) mills mainly in the minerals or cement industry.

Cycloconverter
A frequency converter based on thyristor semiconductor technology.

RMD – Ring-geared mill drive
A system used to drive (rotate) a mill. The RMD itself is comprised of motor(s) (synchronous or asynchronous), a frequency converter, transformers and control equipment. As opposed to gearless mill drives, the motor in an RMD is mechanically connected to the mill via a coupling, pinion(s) and ringgear.

Ringmotor (also called 'wrap-around' motor)
A large synchronous motor. The poles of the motor are directly flanged on the driven equipment, i.e., the mill. This means that the mill body becomes the rotor. The stator of the ringmotor is then wrapped around the mill. Building the motor in this way eliminates all mechanical components such as coupling, gearbox, motor shaft and motor bearings.

Harmonics
Generally, harmonics are oscillations in the base power frequency. In electrical AC systems, the base frequency is typically 50 or 60 Hertz (Hz) and harmonics occur in multiples of this, for example 100 Hz, 150 Hz, 200 Hz, etc., where the base frequency is 50 Hz. Harmonics occur whenever there is a disturbance of the voltage or current. The problem with harmonics is that electrical devices may react differently when exposed to a different frequency than the one they are designed for, which may cause damage. Harmonics are an increasing problem in power systems as most power electronics solutions cause harmonics. Harmonics can be reduced by the use of power filters.

Switchgear

Equipment used to control, protect, and regulate the flow of electrical power in a high-voltage transmission network as well as in medium- and low-voltage distribution networks. Switchgear can be associated with any electrical equipment that might need to be isolated for fault correction or for maintenance purposes. The main components of switchgear are circuit breakers, which interrupt current to protect electrical equipment from excessive current. The terms gas- and air-insulated switchgear (GIS and AIS) refer to high-voltage switchgear equipped with gas- and air-insulated circuit breakers. The gas-insulated variety is more costly than the air one, but it takes up less space and is therefore the preferred option when installing switchgear in urban environments (the substations can be one-fifth the size of a conventional AIS substation).

HPMS (Hoist Performance Monitoring Service)
A condition and performance control service that provides continuous or periodic monitoring of specified hoist key performance indicators (KPIs). HPMS collects high-resolution data from more than 20 predefined points in a hoist system, analyzes the data, and then provides a comprehensive, prioritized report with details on what must be done to improve hoist operations. This service provides fast detection of abnormal conditions and operational anomalies that could impede operations or impact safety and health.