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Raising The Bar in Human–Robot Collaboration with MELFA SafePlus

At a time when demand for collaborative and cooperation-based robotic solutions in the manufacturing sector is rapidly increasing and human–machine interactions continue to grow more complex, the ability of robots to operate safely alongside human operators in cage-free environments has become critically important.
By enabling safe, harmonious, and efficient collaboration between humans and robots, collaborative robotic solutions allow the removal of physical safety barriers, maximize the utilization of available factory space, and enhance the productivity of individual production cells.

Mitsubishi Electric's new MELFA SafePlus robotic safety solution raises the bar in human–machine collaboration through its advanced features. The solution enables more than 160 intelligent industrial robot models within Mitsubishi Electric's MELFA FR series to be transformed into safer, easier-to-deploy, and more efficient collaborative systems that do not require safety cages. Applicable to both horizontal SCARA robots and vertical articulated robots, MELFA SafePlus incorporates a range of safety monitoring functions that allow robots to adapt to varying operating conditions. Robots integrated with this solution can avoid predefined work areas when humans are present (Limited Range Control), stop safely (Safe Stop), reduce speed when operating close to personnel (Reduced Speed Control), and return to normal high-speed operation once the area is cleared. As a result, the number of emergency stops is reduced, machine uptime can be better controlled, and overall productivity is positively impacted.

Enhanced Reliability and Flexibility

The latest version of SafePlus includes not only safety monitoring and collision detection functions that are essential for collaborative operations, but also additional capabilities such as safety logic configuration, speed monitoring, and position monitoring, all of which contribute to higher safety performance. The position monitoring function tracks not only the robot's position but also external movements within up to eight predefined zones around the machine. This allows the robotic arm to adapt its behavior in real time based on surrounding activity—for example, by reducing speed, avoiding movement toward hazardous areas, or stopping entirely.

Previously, SafePlus enabled operators to define cubic speed monitoring zones with equal safety distances along the x, y, and z axes, ensuring that robot speed was reduced when operators entered these zones. With the latest version, asymmetrical safety zones with different safety distances can now be configured. By significantly reducing safety distances in directions where the robot does not move, emergency stop interruptions can be safely minimized, enabling applications in more confined spaces. This provides end users with greater flexibility to easily create and operate safety systems tailored to their specific applications. Safety monitoring conditions and operating parameters can be configured directly on the robot controller, without the need for dedicated safety CPUs. To further support the creation of more reliable and flexible safety systems, Mitsubishi Electric has also increased the number of redundant safety I/O inputs and outputs available within the system.

MELFA SafePlus employs safety measures certified by TÜV SÜD, a leading independent and impartial certification body, to ensure compliance with international IEC and EN standards, including EN 61800-5-2 for safe motion and EN 60204 for safe stop functions.