At ABB, automation safety does not take a backseat to performance. The company’s introduction of Active Safety based on advanced software is a case in point. By being able to predict what lies around the corner, even heavy robots can make split-second adjustments that ensure the safest, most efficient production possible.

**ABS on ABB robots**

Thomas Gunnarsson, Product Manager at ABB Robotics, knows what kind of damage big machines with heavy payloads can do. He’s currently working closely with clients in the automotive industry. The job involves press automation of the various parts that make up a carbody, as well as the numerous processes behind the assembly. The main processes are spot welding and material handling – including a heavy involvement of powerful robots. “Braking a high inertia and heavy payload at high speed can be a dangerous operation with very real collision risks, unless you’re in 100% control,” says Thomas.

**Safety first**

ABB decided to equip its robots with an Active Brake System, which lies at the heart of the company’s safety and performance philosophy. As Thomas points out: “Even though you’ve hit the emergency stop, a big, powerful robot will still brake along its programmed path.” Which is vital since most tools and fixtures in this industry are very expensive – and, on occasion, even unique.
Giving robots a brake

For ABB customers, the downtime involved in the event of a damaging collision doesn’t even bear contemplating.

Braking at the raceway

Here’s where Thomas, who has a passion for American muscle cars, compares ABB robots to drag racing. “The racing car has to take off immediately when the light turns green, but equally important is to handle the braking energy required to halt it at the end of the drag strip.” "Brake too hard or too soft,” Thomas goes on, “and you’re off the track. You’d better know what you’re doing when racing side by side with an opponent who’s doing over 200km/h.” Naturally, the same applies to a robot, which operates in an environment where everything around it is costly and can’t afford to be damaged.

The knowledge

According to Thomas Gunnarsson, the key to ABS is knowledge. Knowledge of the load parameters of the part and gripper being handled – which the IRC5 controller receives via Load Identification. Knowledge of the load data for the manipulator arm, which for the controller system becomes dynamic and varies depending on the position in the working envelope. This input is received via ABB’s Mechanical Supervision feature. Knowledge of the friction in bearings, gearboxes and motors, and the fact that gravity sometimes assists the braking procedure – and sometimes doesn’t.

Knowledge of the centrifugal forces, along with complete data about the manipulator with its payload, while also factoring in the specific programmed path. In short, by keeping an “eye on the horizon” – the route where the robot is headed – the very best path following is ensured.

Insurance all the way

A closer look at the technology reveals that the ABS is active during all stop modes, braking the robot to a stop with the power of the servo drive system along the programmed path. After a given time, the mechanical brakes are activated, thereby ensuring a safe static holding brake. The stopping process is in accordance with a so-called class 1 stop, which means maximum torque on the axis with the heaviest load determining stopping distance. While operating in teach mode, however, only the mechanical brakes are applied. In this case, the robot would need to be jogged manually back onto the path. This is time-consuming and requires trained personnel on site. Since the servo drive and motors are active during the complete braking sequence, the motors can either push or pull to ensure that braking time is optimised while also maintaining the programmed path – at all times. Another obvious benefit of ABS is that, following a brake operation, the Power Robots always remain on the programmed path. This enhances restarting speed.

Clients who are better safe than sorry

Thomas reveals that ABB has demonstrated the new solution to a number of European, Asian and American automotive manufacturers. To all of them, ABB’s Active Brake System is an indispensable feature when it comes to keeping production on track.

FACTS

Active brake system, ABS
Controlled braking along the programmed path – regardless of load and inertia.
Active during all stop modes, braking the robot to a halt with the power of the servo drive system.
Minimizes the risk of collisions – the robot remains on its programmed path during all stop modes.

ABB Robotics

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