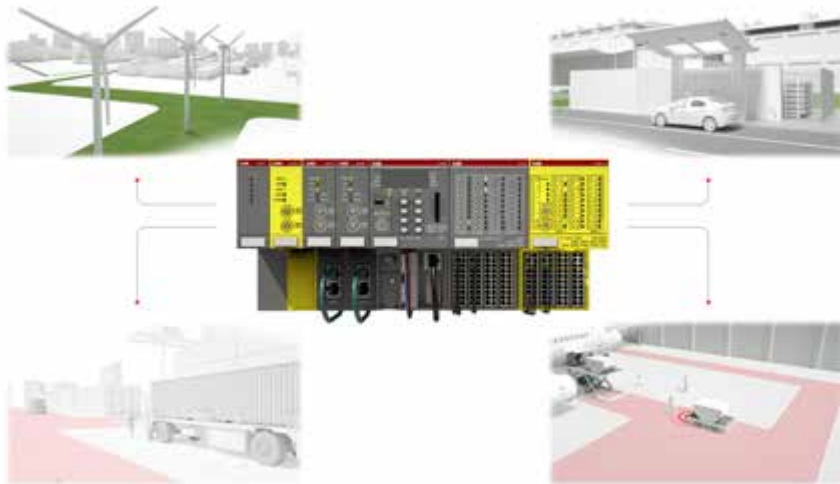


Safer, greener and more productive

Renewable energy applications with AC500-S



PLCs with in-built functional safety and fail-safe condition monitoring are the unsung heroes of many renewable installations like wind turbines, electric battery-operated AGVs and hydrogen tank stations.

A safety PLC plays an important role in renewable energy applications

Using programmable logic controllers (PLCs) to control wind turbines or direct solar arrays has been a common solution for many years. What is not yet fully appreciated is the failsafe condition monitoring and advanced functional safety capabilities built within today's PLCs and how they can be applied to renewable applications. Not everyone has grasped the importance that functional safety plays in renewable energy applications and the influential role that a safety PLC can play.

Renewable applications often require complex safety calculations driven by the need to process vast amounts of information to safely supervise the permissible range for temperature, pressure, charge rate, vibration level or position and speed tracking in real-time. Simultaneously, there is a need to safely monitor these complex renewable processes and/or machine characteristics. Ideally placed for this are safety PLCs, with support for trigonometric functions, floating-point calculations, PROFINET/PROFIsafe communication and structured text (ST) for safety programming.

Wind turbines

Wind turbine safety is becoming increasingly important. In many countries, regulations stipulate that safety during wind turbine operation is critical to prevent accidents due to potential wind turbine collapse.

In addition to a state-of-the-art wind turbine safe control, the ABB AC500-S safety PLC with condition monitoring provides fail-safe condition monitoring of vibrations within the turbine's tower. This enables advanced safety functions to be implemented within wind turbines to avoid structural damage which could lead to accidents.



Automated guided vehicles

Airports and harbors are becoming the epitome of green design, with shore-based wind turbines powering, for instance, the charging stations used to replenish electric battery-operated automated guided vehicles (AGVs) transporting goods.

The safety PLCs can restrict battery-operated AGVs to designated areas creating safe zones where workers can move about freely. Unable to enter these restricted areas, safety barriers no longer need to be able to withstand the full-force of an AGV, leading to a more open collaborative environment. In areas where the two must mix, the PLC can take input from the AGV's laser-scanner to safely stop the vehicle if it detects a worker or other object in its path.

The safety PLC provides floating-point calculations and trigonometric functions to implement even the most complex mathematical calculations in real-time. These include safely monitoring restricted safety areas for battery-operated AGVs and collision detection.

Hydrogen tanks

To go further afield, people are increasingly turning to hydrogen fuelled vehicles to provide easy long-distance travel with much lower emissions than with conventional fuel like gasoline, gas, etc. Hydrogen is seen as an alternative to electric vehicles, featuring smaller batteries and generators, yet able to be used for longer distances. The key to this ease is the speed at which a vehicle can refill its tanks with this zero-emission fuel.

Critical to the safe operation of a hydrogen fuel tank is the need to precisely control the pressure and temperature. The tanks are packed with sensors monitoring these parameters and the PLCs provide fast processing speed to handle the large range of pressure and temperature calculations including safety functions like hydrogen leak detection, smoke detection, high pressure protection of inlet and outlet, etc. The fuelling stations use safety PLCs to precisely monitor the pressure, temperature and tank integrity, whilst providing controlled shut off of the safety valves in the event of a problem.

Please watch our videos on our ABB PLC YouTube channel:



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