

Power and Control Applications for Stacking and Welding Machinery

Battery Manufacturing



Are you looking to build or upgrade control systems for stacking and welding applications in battery manufacturing?

ABB can assist in enhancing equipment performance, safety, and efficiency. We can help you find the control and protection solution that's right for your stacking and welding machinery.

What are stacking and welding applications?

In the battery manufacturing process, stacking involves layering individual battery components, such as electrodes and separators, to form a cell. Welding joins these stacked components together through the application of heat or pressure to create a complete battery unit. ABB's versatile product line adapts to the dynamic stacking and welding processes to aid in efficiently manufacturing any battery size, shape, or chemistry.

Why is power and control necessary in stacking and welding machinery?

Stacking and welding processes require highly precise and consistent operation to yield high-quality batteries. Efficient controls help regulate the precise movements of this machinery, and power protection helps safeguard the equipment from electrical surges or fluctuations that could damage sensitive components or disrupt production.

Main benefits



Continuous operation

Equip your system with circuit breakers featuring advanced trip units or contactors with smart modules to detect voltage instabilities, enhancing system reliability and power quality.



Energy-efficient system

Boost control panel energy efficiency with our AF coil technology, which reduces energy consumption and dissipates less heat, leading to a reduction in temperature rise and increasing panel density.



Compact and easy to install

Save space in the control panel, thanks to narrower designs in MCCBs, mini circuit breakers, and contactors. Simplify installation using our starter connection kits, push-in spring terminals, and snap-in accessories for compact, efficient connections.



Safety and protection

Enhance safety and thermal management, reduce hazards and fires, and prevent downtime using circuit breakers, surge protection devices, relays, or Jokab safety components.

Stacking and welding overview

Stacking and welding processes are essential steps in battery manufacturing, crucial for producing batteries with consistent performance and reliability. When precision and speed of production matter, it is imperative to ensure uninterrupted operation and prevent costly downtime.

Cutting:

- The unwind roll releases the anode, allowing it to move along the conveyor.
- The laser beam cuts the anode into sheets, which continue to move along the conveyor and are fed into the paddle wheel.

Separating and handling:

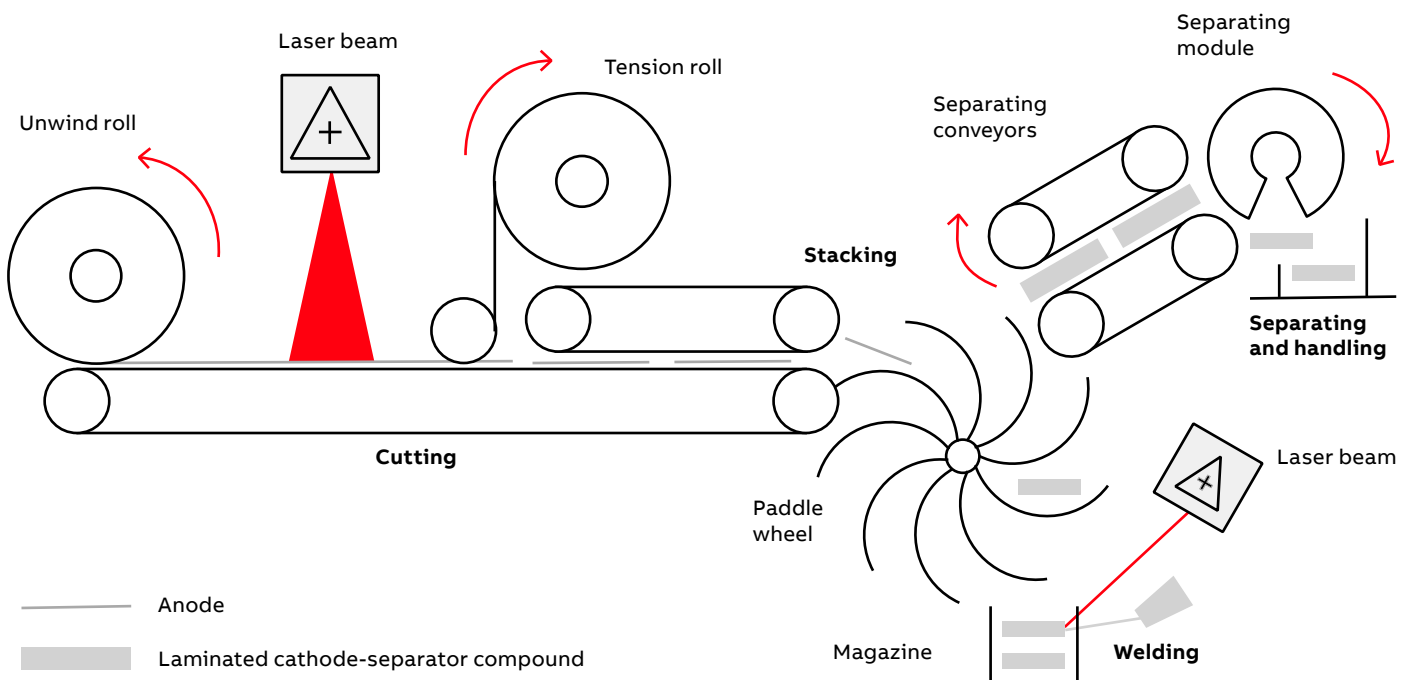
- Then, the separating module sorts the electrolytes (laminated cathode-separator compound) to feed into the paddle wheel.

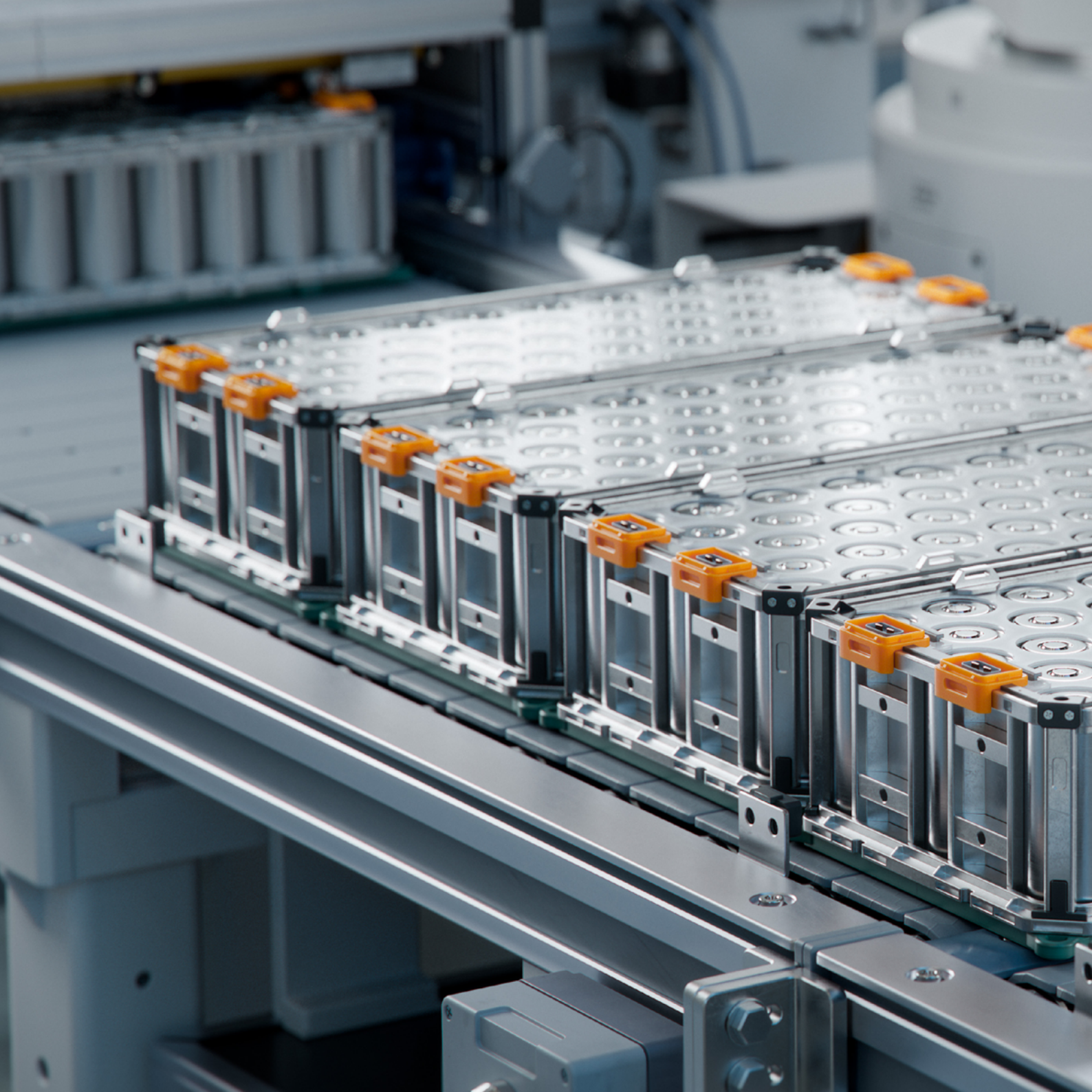
Stacking:

- The anodes and electrolytes are fed into the paddle wheel in an alternating pattern.
- These stacked components are then placed in configuration according to the battery design specifications and placed into the magazine.

Welding:

- Once everything is positioned in the stack, the components are welded (via either ultrasonic or laser) together in configuration.

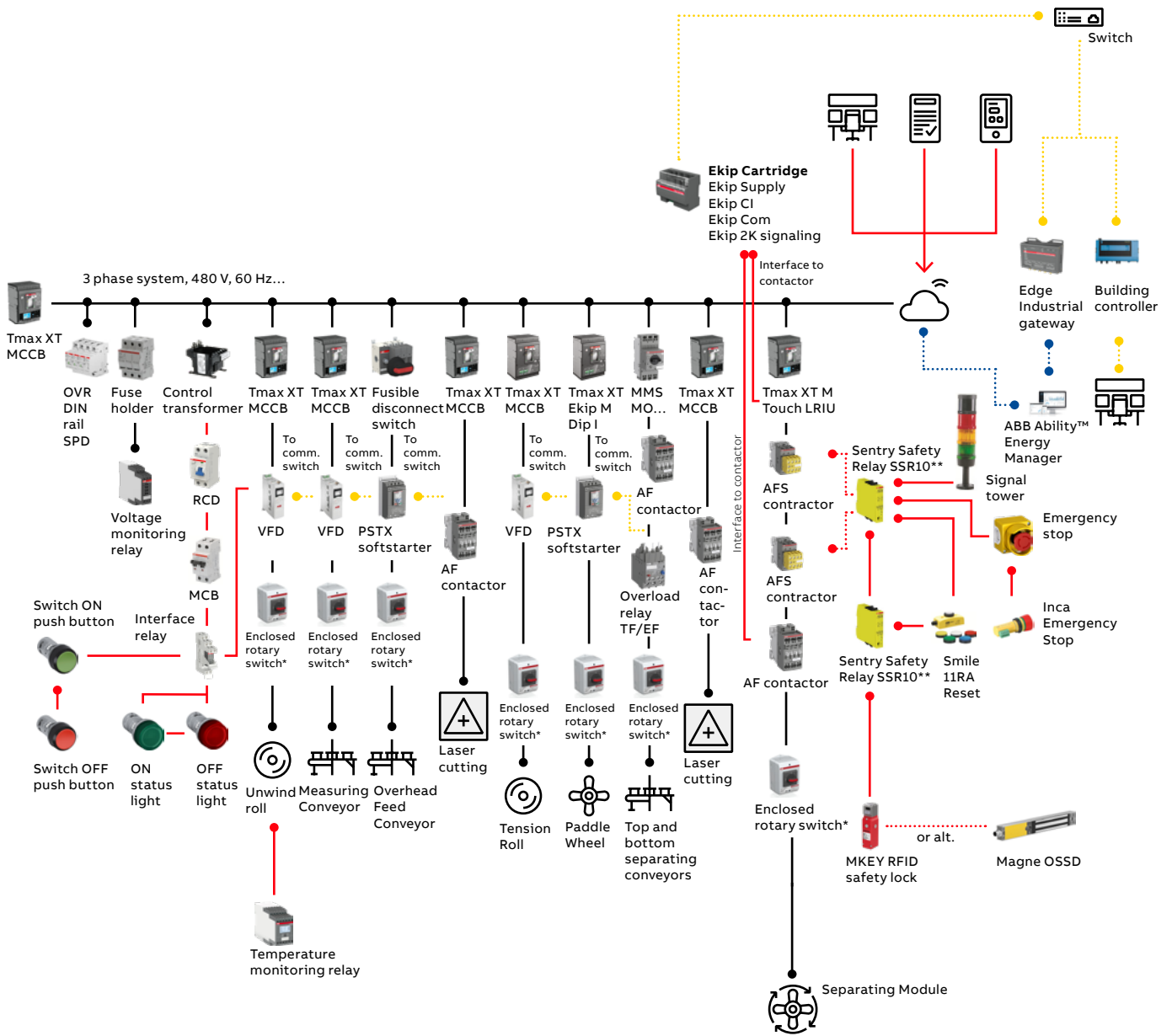




Control and power protection solutions are essential for stacking and welding processes in battery manufacturing to ensure precision and consistency in component placement and bonding. These solutions help accurately regulate the movements of machin-

ery, minimizing errors and maximizing productivity. Additionally, power protection safeguards equipment from electrical fluctuations, reducing the risk of damage and increasing machine uptime.

Power and control solutions for stacking and welding processes

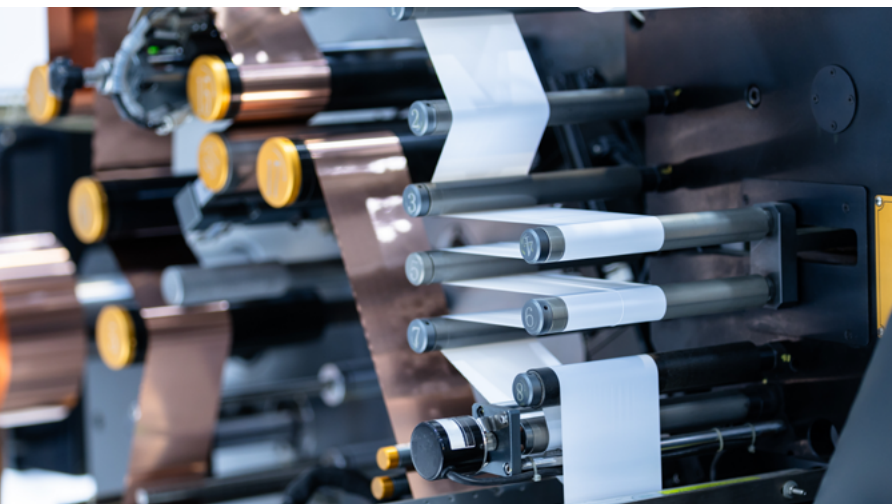


- ABB Ability EAM
- Modbus TCP
- Power circuit
- Control circuit

* The type of enclosed switch used depends on the application and environment.
 ** The safety circuit can be used to stop multiple motors in a machine. For advanced safety protection, a Pluto PLC can be used instead of the Sentry Safety Relays.

Note: this configuration is for a generic system and is not representative of existing manufacturers.

Main components and functions



Primary Functional Requirements

- Circuit breakers, surge protectors, residual current devices, and fuses to prevent equipment damage or fires
- Machine safety, including safety relays, emergency stops, signaling devices, door sensors, and light curtains for users and service personnel

Secondary Optional Requirements

- Metering and temperature monitoring to track motor performance to prevent overheating and other issues
- ABB Ability offers remote and condition monitoring to allow for troubleshooting and maintenance

Stacking and welding

Power and control components & functionalities

Application	Electrical Components	Functional Description
Power circuit	Circuit breaker	Overload and short circuit protection
Power circuit	Surge protection device (SPD)	Prevent damage from electrical surge
Control circuit	Residual current device (RCD)	Ground fault protection
Control circuit	Circuit breaker	Overload and short circuit protection
Control circuit	Push buttons/pilot lights	Provide visual status and remote control
Control circuit	Voltage monitoring relay	Monitor for over/under voltage
Control circuit	Temperature monitoring relay	Monitor the temperature of the rollers/environment
Unwind roll	Circuit breaker	Overload and short circuit protection
Unwind roll	Variable frequency drive (VFD)	Prevent motor damage and control speed
Measuring conveyor	Circuit breaker	Overload and short circuit protection
Measuring conveyor	Variable frequency drive (VFD)	Prevent motor damage and control speed
Overhead feed conveyor	Fusible switch	Short circuit protection
Overhead feed conveyor	Softstarter	Prevent motor damage by ramping up/down
Laser cutter	Circuit breaker	Overload and short circuit protection
Tension roll	Circuit breaker	Overload and short circuit protection
Tension roll	Variable frequency drive (VFD)	Prevent motor damage and control speed
Paddle wheel	Circuit breaker (Instantaneous only)	Short circuit protection
Paddle wheel	Softstarter	Prevent motor damage by ramping up/down
Separating conveyors	Manual motor starter (MMS) Magnetic only (MO)	Short circuit protection
Separating conveyors	Contactora	Operate the motor
Separating conveyors	Overload relay	Overload protection
Separating module	Circuit breaker (Instantaneous only)	Short circuit protection
Separating module	Contactora	Operate the motor
Separating module	Overload relay	Overload protection
Laser welder	Circuit breaker	Overload and short circuit protection
Safety circuit	Safety contactors	Redundant connection for fast reliable motor control
Safety circuit	Safety products	Prevents people from machine hazards (i.e., monitor door, machine status, emergency stop)
Digital circuit	ABB Ability Energy Manager	Remotely monitor machine status and troubleshoot

Product offering

Tmax XT MCCBs



Miniature circuit breakers



Softstarters



AF Contactors



Residual current devices



Surge protection devices



Jokab Safety Products



Measuring & monitoring relays



Product offering

Interface relays & optocouplers



Control transformers



Disconnect switches



Assorted pilot devices



Enclosed rotary switches



Fuse holders



ABB Ability™ Edge Industrial Gateway



ABB Ability™ Energy Manager





CONTACT US

Do you have a similar project and are you searching for the right Application configuration? Contact us and talk to our experts!

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