

Use case Material handling



Supercapacitor modules help transform modern material handling



When something is to be shipped, it needs to be retrieved quickly, inexpensively and efficiently. To meet this need, automated or semi-automated warehouses are quickly expanding, along with the equipment needed to operate it, such as pallet shuttles and forklifts. As with just about all things mobile, this type of equipment is becoming increasingly electrified.

Traditionally, this meant that material handling OEMs would need to use batteries as the primary energy source. However, batteries can be problematic in frequent use material handling applications. They can store a lot of energy but are generally limited in how they can discharge without effecting lifetime. For material handling applications, a lithium-ion battery is expected to have less than 10,000 full cycle life. This means they incur

relatively higher maintenance costs due to the need for more frequent replacement. Batteries are heavier, and they contain hazardous materials that require special disposal after replacement.

Alternatively, supercapacitors can be fully charged within seconds or minutes through planned opportunity charging along the travel route. This type of charging can help reduce downtime due to long charge cycles that can be experienced using batteries. Supercapacitors can also efficiently deliver their entire charge just as quickly, operating over a wide temperature range.

Another trend is the expanding food and beverage logistics, such as meal delivery services. These services require the product to stay temperature controlled until it's delivered. With supercapacitors, pallet shuttles can retrieve products from freezers without drastically impacting their performance. Unlike batteries, supercapacitors do not require as much derating while working

in low temperatures. Eaton supercapacitors are lightweight and can operate over a wide operating temperature range of -40 °C to +65 °C.

In material handling, power is primarily delivered by lifting the material or during initial acceleration. When the equipment returns to the floor level position or decelerates, the recapturable kinetic energy is often lost. However, the long cycle life and rapid recharge capability of supercapacitors offer the ability to regenerate this energy through a recharge during load deceleration and/or transfer times of material handling.

Customizable sizing is desired to meet a wide spectrum of applications by either delivering power over a set amount of time or planning to move heavy materials over a defined distance. Supercapacitor modules are modular in nature, providing easy sizing for both situations. They are passive electronic components that have no moving parts and no hazardous materials or thermal

runaway. They can also offer maintenance free lifetimes of up to 20 years given the millions of charge/discharge cycles lifetimes

For higher power, large pallet shuttles and electric forklifts, Eaton offers its [XLR family](#) of supercapacitor modules. The XLR-48 is rated at 48.6 V and 166 F while the XLR-51 is rated at 51.3 V and 188 F. The XLR-48 and XLR-51 share the same footprint and can provide up to 118 kW and 131 kW, respectively, of peak power. Both can be wired in series and/or parallel to meet power requirements.

Eaton offers individual supercapacitors or compact modules for energy storage needs that cover a wide range of working voltages and capacitances. Supercapacitor modules help modern warehouses run consistently and reliably without maintenance downtime or replacement part costs to help meet the needs of the material handling industry.

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