

The importance of thermal management in lithium batteries

HOW DO YOU CHOOSE THE MOST SUITABLE THERMAL MANAGEMENT SYSTEM TO ENSURE THE EFFICIENCY OF YOUR MACHINERY OR VEHICLE IN ALL WEATHER CONDITIONS? FLASH BATTERY HAS THE ANSWERS



LEFT: Flash Battery's customised lithium battery portfolio

▷ Have you ever asked yourself how important it is to make the right choice of thermal management system when buying a lithium battery for use on an industrial vehicle or machinery? Effective thermal management can guarantee optimum performance in the most varied weather conditions and works on a crucial aspect of a battery's performance: temperature. Indeed, this greatly influences the life and operating efficiency of the battery over time.

Optimal temperature

While the ideal temperature range for the efficient operation of lithium batteries is normally between 25 and 35°C, that doesn't mean that batteries can't operate at different temperatures. However, a temperature that is too low could reduce the battery capacity, while a temperature that is too high could, on the other hand, lead to degradation of the battery with a resulting reduction in battery life.

It goes without saying that, in a continuously evolving context such as electrification, which today includes the use of lithium batteries in a wide variety of applications - from off-highway machinery in construction to agricultural vehicles, aerial work platforms, automation, ground support equipment and marine applications - each one with specific operational requirements under different environmental conditions, the implementation of the right thermal management system becomes a practical aspect of no small importance.

Thermal management built in

In fact, lithium batteries, if used with advanced BMSs, can control heating and cooling systems, so that environmental constraints are no longer a concern. Flash Battery lithium batteries are an example of this, where the

thermal management systems are built directly into the battery system. This ensures the correct operation of the battery pack under extreme conditions, from -30°C to +45°C, without changing the life and efficiency of the lithium battery.

Heating system

But are thermal management systems always necessary? The answer to this question can be found in the type of application and in the use it will be put to. The use of a heating system is, in reality, always strongly recommended, so much so that at Flash Battery it is implemented in almost all the over 18,000 lithium batteries produced by the Italian manufacturer and used in 54 countries around the world. It's an extremely useful feature that has a low impact on the overall cost of the battery and allows the machinery to stay outdoors under any circumstances.

A rather common limit of lithium batteries is that they cannot be charged at temperatures below zero; what's more, if they are left at a temperature below 10°C, their internal resistance lowers, causing a drop in voltage and loss of efficiency. The addition of a heating system therefore overcomes this problem, ensuring that it works properly and giving the user the benefit of a battery that is always in perfect condition, even in harsh climates.

Cooling system

According to Flash Battery's experience, the addition of a cooling system, on the other hand, must be evaluated very carefully as it is not always practical and has a significant impact on the cost of the entire battery system. As a rule of thumb, if the application doesn't require fast charging or discharging times, there's no need to add a cooling system to the battery.

For example, in applications that run only a few hours a day, such as off-highway machinery or an aerial work platform used on construction sites, if the battery is cooled but the vehicle is not used for the rest of the day, the battery would remain exposed to the outdoor temperature for most of the time anyway. On the other hand, cooling systems become necessary for intensive-use applications, where battery stress levels are high due to the numerous short charges and discharges during the day, which increase the internal temperature.

The case of automated logistics

This is the case for AGVs and LGVs employed in automated logistics, working non-stop for 24 hours in countries where temperatures can reach very high peaks, such as Mexico, Brazil, Qatar, etc. Under these circumstances, a system able to cool the battery becomes a valuable ally in preserving efficiency and durability.

Temperature control and management is therefore an important aspect to keep in mind when choosing a battery, right from the prototype stage, and it's crucial to put your trust in experienced manufacturers that can assess the most effective solution for the needs of the machine or vehicle, providing the right advice when choosing the most suitable and appropriate features.

Working for over 10 years for the industrial vehicle and machinery market, Flash Battery has made technology and research its strength, developing advanced patented control electronics, able to quickly respond to specific vehicle needs, offering optimum efficiency with a view to continuous improvement of performance. **ivt**

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