Lithium-ion Battery Storage

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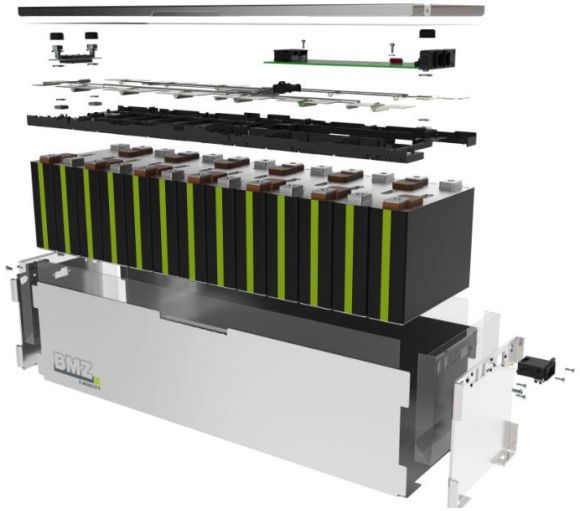

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Lithium-ion Traction Batteries

In partnership with the UK Material Handling Association and SMB College, BMZ Innovation Group has helped to create a training course for forklift technicians looking to enhance their knowledge of lithium-ion technology.
The following extract identifies key points regarding battery storage.

For full course details, dates and booking information please visit:
https://ukmha.org.uk/training-and-apprenticeships/technical-training-courses/

UKMHA
UK MATERIAL HANDLING ASSOCIATION

SMB College Group
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Correct handling of rechargeable Li-ion cells/batteries

+ When handled properly and correctly, batteries can be considered comparatively safe
+ However, technical defects or improper handling can lead to an uncontrolled release of the stored energy

  → Fire hazard!!

The manufacturer's recommendations/information must always be followed

General:

a) Do not disassemble, open, crush or manipulate

→ Batteries should only be dismantled by trained personnel

→ Battery housings should only be able to be opened with the aid of a tool

b) Do not short-circuit

→ Batteries must not be stored in a box or drawer in which they can short-circuit each other or be short-circuited by other conductive tools.

→ Only remove from the original packaging immediately before use

→ Keep away from small children

c) Do not expose to high temperatures or throw into an open fire (→ Danger of explosion!)

→ Avoid direct sunlight

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Correct handling of rechargeable Li-ion cells/batteries

d) do not expose to mechanical shocks
→ After dropping the battery/device, set aside and "observe"
→ Do not continue to use if there is visible external damage!

e) Do not use damaged or leaking batteries
→ In case of contact with electrolyte fluid, wash skin with plenty of water and seekmedical advice if necessary

f) Do not use any other chargers (→ overcharging)
→ Charger should be clearly assigned
→ Complete instructions for charging should be provided

g) Batteries may only be used in applications for which they are intended (→ overheating)

h) only operate within the specified temperature range (see cell/battery specification)
e.g. → Discharging: -20 °C to +60 °C
→ Charging: 0 °C to +45 °C

i) Do not expose cells and batteries to rain or immerse them in liquids, store in a dry place
→ Corrosion or short circuit
→ Clean the connections with a dry, clean cloth if necessary

Do not continue to use batteries if:

- these are or were deeply discharged
- the charging process was not completed within the specified time
- unusual heat, odour, discolouration, deformation during use, charging process or storage is detected

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Li-ion Battery Storage

+ **The manufacturer's instructions must always be followed**

As a general rule: store batteries in a cool and dry place

+ **Storage temperature**
  - Storage temperature 0 °C to 45 °C
  - Storage at cool temperature optimal: 0 °C to 20 °C
  - Avoid direct sunlight

+ **Storage humidity**
  - Humidity 0 to 80%
  - Bearing must be well ventilated
  - Excessive humidity can cause corrosion and short circuits

+ **Storage duration**
  - Long storage leads to permanent loss of capacity
  - First-in-first-out principle (FiFo)
  - Do not store batteries that are no longer used for longer than necessary
  - Check the battery condition and State of Charge regularly.

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Li-ion Battery Storage

- **No mixed storage**
  - Store batteries at a safe distance from flammable materials

- **Fire protection**
  - Storage e.g. in container, fire protection cabinet, hazardous materials room
  - If not possible, keep a clear distance of e.g. 2.5m to other goods
  - Each battery should be readily accessible, e.g. not stacked, not stored too high, not stored in depth
  - Security system should automatically detect fire and trigger an alarm
  - Inform your insurer that li-ion batteries are on your site and follow their guidance and advice

- **Danger of short circuit**
  - Do not store mixed with other metallic objects
  - Ensure sufficient protection against short circuit and mechanical damage

- **Labelling**
  - Clearly label the contents of the storage area

- **Loading capacity**
  - SOC {State of Charge} should be in the range 60 % to 50 %
  - High cell voltages accelerate the ageing process (SEI growth)
  - Avoid deep discharge during prolonged storage, recharge if necessary

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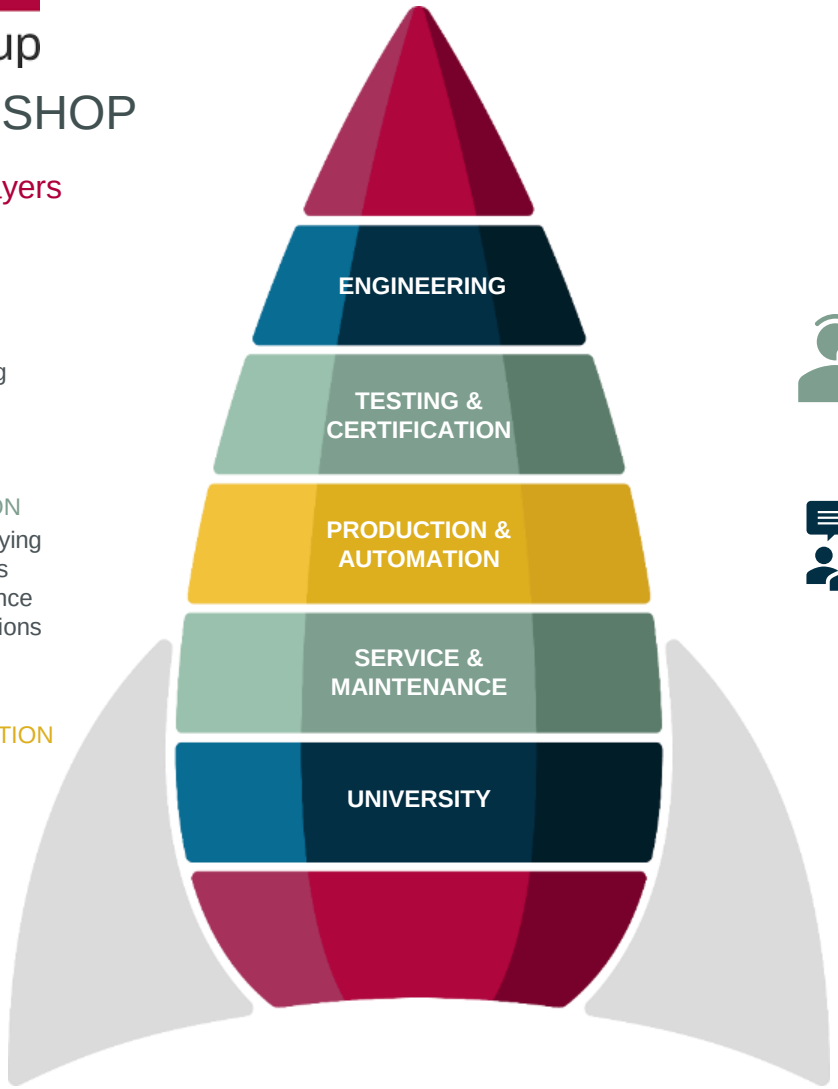
03 BMZ - ONE STOP SHOP

One of the biggest global players



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