

## Battery management systems

One very important topic for battery applications is safety. To ensure a safe operation of batteries in the end application, a battery management system (BMS) has to be connected to the battery pack.

The Battery Management Systems course covers the various aspects related to a BMS and allows participants to understand how to make choices on BMS development goals dependent on the specific need of the end application and the given battery technology. Specifically, you will learn why a BMS is needed for different battery technologies and look at several possible configurations. You will also learn about the communication means and advanced features of the BMS, which provide more information about the state of the battery system and guarantee that it is used optimally.

### Learning outcomes

This course empowers learners to:

- Explain the exact need for a BMS in a battery-supported application and list the set of functions a BMS should support.
- Interpret the BMS specifications in light of the basic functionalities.
- List the most important BMS components, their requirements, and their value for the system.
- Explain the concept of State of Health and State of Charge.
- Evaluate if a string of battery cells is balanced and what the impact is of imbalance.

### Course structure and content

Battery management systems is an online course and can be taken at the learners' usual study location. The course consists of two modules. Each module includes reading materials and animations to illustrate the content.

- **Module 1:** Being introduced to the Battery management systems, understand the configuration and requirements, and what is meant by functional safety.
- **Module 2:** Understanding the concept of State of Health and State of Charge and learn what cell balancing is, why it is needed and when it is used.

### Who are the experts?

#### Dr. Jeroen Büscher

Product Manager Electrical Storage of Vito / Energy Ville. Since 2016 Jeroen is leading the VITO team working on electrical storage technologies and is responsible for the development and execution of the related activity roadmap. Since 2011, Jeroen has been coordinating several projects within Europe on electrical storage, smart grids, and e-mobility.

### Target audience

This course is beneficial for battery system integrators, battery technicians, Energy Management System developers and providers, and researchers in the field of energy willing to develop or build further on battery or energy management systems for optimal integration of batteries in an end product. But anyone interested in understanding Battery Management Systems might find it useful. In order to be able to follow and benefit

from the Battery management systems course learners would need to have a basic understanding of battery cells, system components, and their working principles.

### Course evaluation

To succeed in the Battery management systems course and receive a Certificate of Completion, a learner needs to complete at least 80% of the course contents.

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