Requirements for BMS

# 1. Product Requirements

There are several product level requirements for this system:

* PROD001 - System must be able shutdown in case of cell error.
* PROD002 - System must be able to inform user in case of cell error/exception.
* PROD003 - System must be able to monitor individual cells (voltage, current, temperature)
* PROD004 - System must allow the user to connect a smart device to the system.
* PROD005 - System must be able to support large format LiFEPO4 cells, ranging from 60Ah to 400Ah.
* PROD006 - System should be able to support other large format cells.
* PROD007 - Cell monitoring parameters must be adjustable from the central board.
* PROD008 - Cell boards must be able to fit between the connections of each cell.
* PROD009 - User must be able to monitor system status and cell status.
* PROD010 – Cell boards must be able to report to the central board status.
* PROD011 – System should be able to work with common EV on-board chargers
* PROD012 – System should be be to work with J1772.

# 2. Engineering Requirements

The engineering requirements are derived from the product level requirements:

* ENG001 – cell board must be able to open system stop line in case of cell error.
  + PROD001
* ENG002 – cell board must support CAN BUS
  + PROD010
* ENG003 – central board must support CAN BUS for internal communication
  + PROD003
  + PROD007
  + PROD009
  + PROD010
* ENG004 – central board must support CAN BUS for external communication
  + PROD002
  + PROD009
* ENG005 – central board must support Bluetooth for external communication
  + PROD002
  + PROD004
* ENG006 – cell board must be able to determine cell voltage
  + PROD003
  + PROD009
* ENG007 – cell board should be able to determine cell temperature
  + PROD003
  + PROD009
* ENG008 – central board must be able to record faults
  + PROD009
  + PROD010
* ENG009 – cell board should be able to record cell current bypass events
  + PROD003
  + PROD009
* ENG010 – system must be able to flag major fault without using normal communications (dedicated fault signaling)
  + PROD001
* ENG011 – system must be able to determine cell SoC
  + PROD009
  + PROD010
* ENG012 – system must be able to determine pack SoC
  + PROD009
  + PROD010
* ENG013 – must have the ability to change min/max voltage (I.e have controller set new min/max voltage)
  + PROD006
  + PROD007
* ENG014 – must have the ability to change bypass voltage (i.e. allow controller change when bypass occurs)
  + PROD005

# 3. Cell Requirements

## 3.1 Cell Faults

There are several cell faults that need to be monitored for, and alerted for.

A non-exclusive list of faults:

* Cell voltage low/high
* Cell temperature low/high
* Cell SoC low/high
* Cell current overdraw

## Cell Notifications

There are several cell situations that the central system might want to be notified of.

A non-exclusive list of notifications are:

* Cell Soc
* Cell current bypass
* Cell temperature
* Cell voltage
* Cell current delivery