

Title: Research and planning

Research was done onto the most viable power sources for an Ebike may be including Lithium ion, Lithium iron phosphate, and sodium ion.

Lithium Ion was chosen due to its greater market abundance, higher significantly higher energy density and greater access to premade cell designs

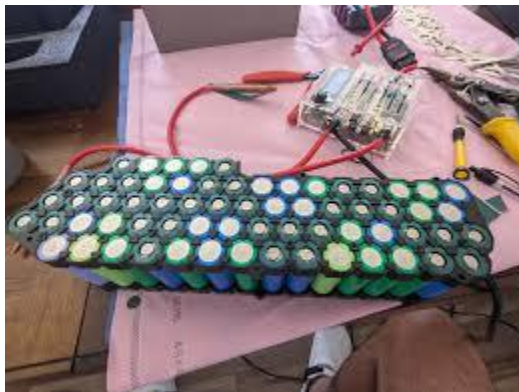
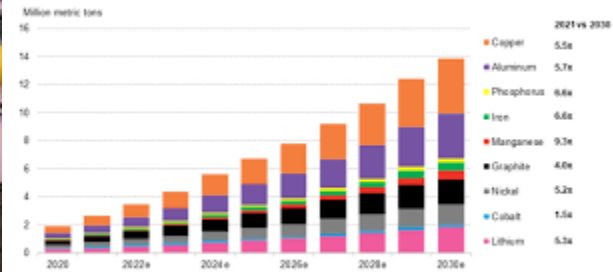


Figure 1: Metals demand from lithium-ion batteries



Source: BloombergNEF. Note: Metals demand occurs at mine mouth, one-year before battery demand. All metals expressed in metric tons of contained metal, except lithium, which is in lithium carbonate equivalent (LCE).

Date: Aug 5th - Aug 20th

Title: Cell reclamation

Now in possession of 25 used modem backups I began to sort by voltage and further breakdown modems backups into their individual cell components.



Date: Aug 30th - Sep 10th

Title: installing of Panier rack, hub motor, and ESC

With parts now available I installed a rear rack for the battery pack to be located on top of along with a rear hub motor which was first spoked onto a new rim and installed to propel the bikes movement.



Date: Sep 15th - Sep 16th

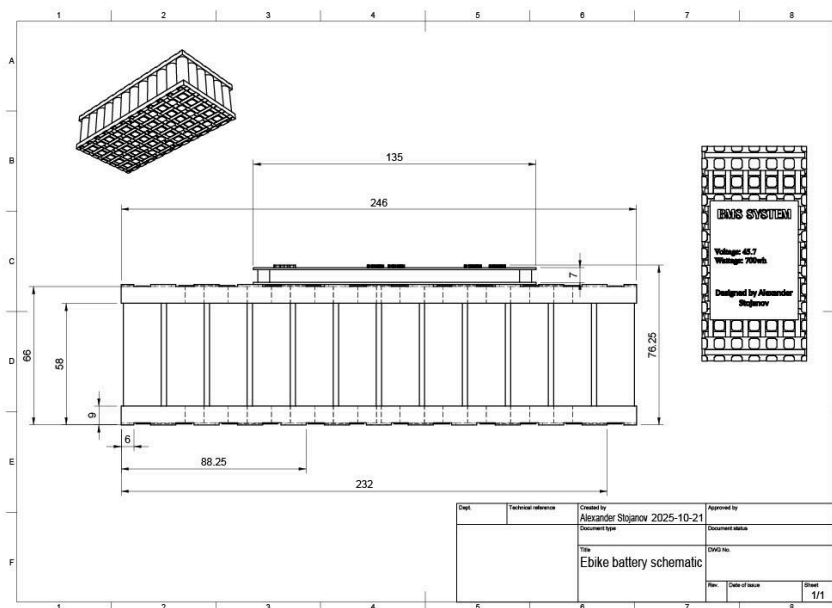
Title: Cell spot weld cleaning

With the cells needed for the Mk:1 power pack extracted, cells needed to be cleaned of previous welds before they could be installed, welds were removed using sandpaper, metal files, and a dremel.

Date: Sep 20th - Sep 27th

Title: Mk:1 power pack fabrication

With cells cleaned and wiring components available, fabrication has begun to create a 12s6p format power pack using a spot welder, electrical pliers, soldering gun, nickel connectors, BMS controller, cell holders, Kapton tape, electrical tape, temperature sensors.



Date: Oct 1st - Oct 10th

Title: Critical power pack construction failure

During welding of series connections on the nearly complete power pack I made a critical error by misplacing a series connect between cells leading to the nickel connector electrically welding itself to 2 cell rows and subsequently melting at temperatures exceeding 1600 C and a small plastic fire.

All fabrication will be halted until newer safety measures can be put into place, the damaged cells must also be removed from the configuration to mitigate any risks of thermal runaway and potential explosion in use.



Date: Oct 4th

Title: Mk:1 pack completed and installed on Ebike

The Mk:1 power packs fabrication has been successfully completed with final modifications being made to power on the bike for use.



Date: Oct 20th

Title: First successful motor test and BMS connectivity to iphone

To great surprise the Ebike has successfully been powered on and motor run at maximum speeds, with further refinement the bike is expected to be rideable in the near future.

The BMS controller has also been successfully connected via bluetooth allowing significantly greater insight to the power packs condition regarding capacity, range, power output along with allowing the modification of countless customizable features related to power output and cutoffs.

Date: Oct 29th

Title: First successful test ride

The bike has far surpassed expectations, accelerating to top speeds of 50km/h during a 1km test run with the sole power source being reused batteries, with further

Date: Nov 15th

Title: throttle failure

Following another test run the bike's throttle was cut out preventing further movement by the motor.

By splicing a replacement throttle to the previous throttle wires I have successfully repaired the bike, the motor has full functionality and can be used once more.

Date: Nov 20th

Title: Mk:1 power pack failure

Following extensive testing it has been determined that the Mk:1 power pack has a flaw in its designed voltage output preventing the motor to be run when pack voltages register below 46v, a new power pack is likely needed to fix the low voltage, fabrication will begin in the following weeks as time permits in a 14s6p format.



Date: Dec 10th

Title: Mk:2 power pack fabricated and installed

With design improvements and a renewed cell format the Mk:2 battery pack has resolved the lower voltage issue of the Mk:1 and structural quality greatly improved through added fasteners and insulation.

Date: Dec 20th - Jan 8th

Title: Range test

Using the Mk:2 power pack new range records and speeds have been set at 24km and 55 km/h using an iphone speedometer and google maps tracking to determine distance.

Date: Jan 10th

Title: Capacity and voltage testing

Using the integrated BMS bluetooth software I was able to gain a variety of electrical data on the batteries capabilities and performance statistics showing an average cellular internal resistance of 150 mΩ, voltage of 54.3 and capacity of 814.8 Wh.

Date: Jan 18th

Title: Test stand designing

The motor test stand designing has begun and will be ready by March 15th with construction following shortly after.

Date: Feb 20th - Mar 15th (estimate)