# Design Portfolio: Recycled Solar Lithium Battery

*Francisco Wilken*

**Background**: This document outlines the several months of work that it took me to build my largest lithium battery yet. This is my fifth battery, built to withstand 6 kilowatts of output power.

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|  | This project began with the collection and testing of recycled lithium cells. Sourced from recycled e-bike packs, I collected and individually tested nearly 200 individual 18650-format cells. Each cell was marked for capacity and internal resistance to weed out any degraded ones, as seen in the picture on the left. This was done to make sure the battery was composed of high quality cells. |

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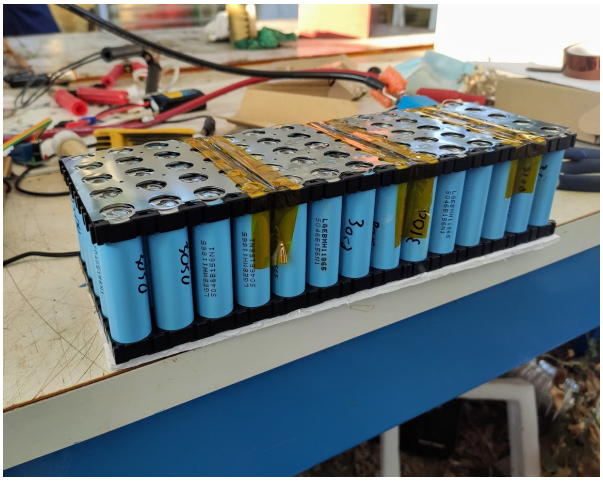
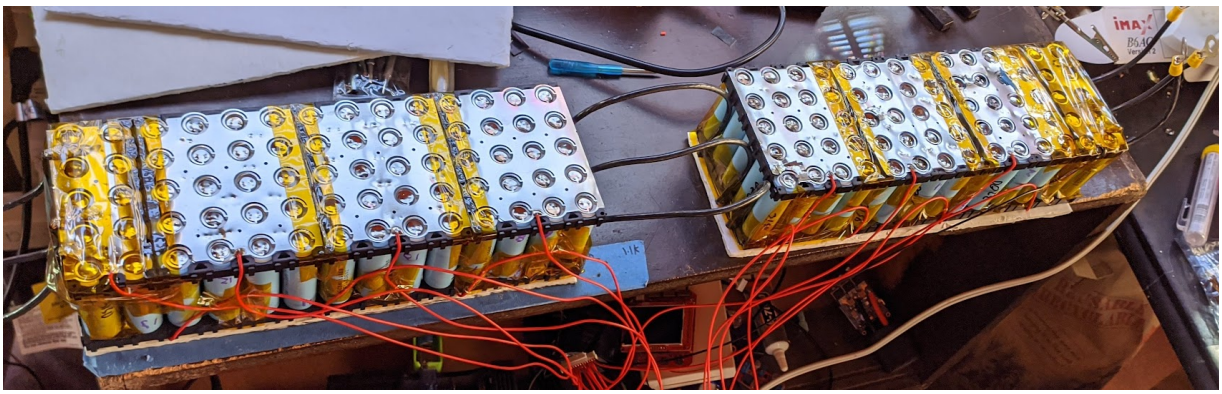
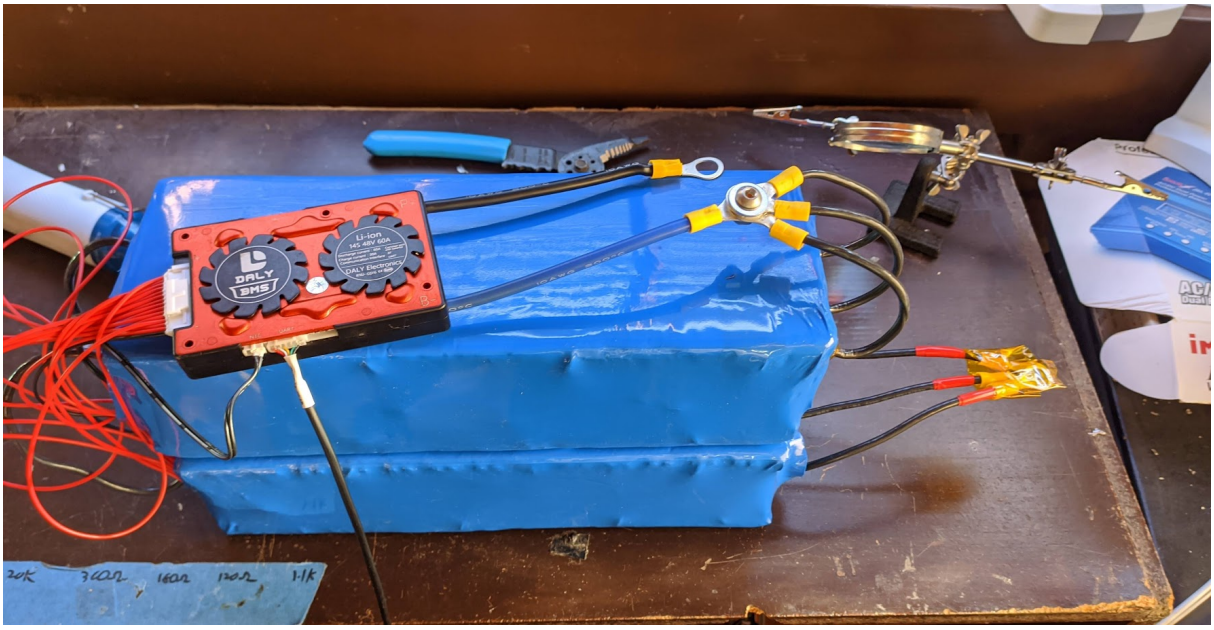
|  | With the goal of running a 3000 watt, 48 volt inverter, I chose to create this battery in the 14s10p (14 in series, 10 in parallel) combination, so that the battery would be capable of around 50 volts at 100 amps peak current. This configuration was split into two separate seven-cell packs to be manufactured individually, one such pack pictured to the left. Each pack had to be spot welded with my custom-build spot welder, using cell-level fusing that prevents potential shorts from damaging the cells. |



With the spot welding done for all 140 cells, the two halves just had to be soldered together. The red cables seen above are the balance connectors that read the voltage of every cell group, ensuring they all stay in balance. The entirety is structurally supported in heat-resistance and electronically isolating kapton tape.




After completing the wiring, the packs were electrically isolated with foam and heat shrink, keeping everything compact. This is the state that the above picture shows. The pack was also connected to a BMS that offered protections against over-temperature, over-current, and over-discharge, shutting the pack down under any problematic circumstances. It was finally installed in a case to give it a polished finish, and tested rigorously in the solar system it was designed for. My final product was able to handle the full startup current of an air conditioner, while running a refrigerator, computers, and other household devices, and is something I am very proud of designing from scratch.