Diy lifepo4 motorcycle battery

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A typical motorcycle battery costs between $100 and $250. I usually - I admit - go for the cheaper option because I always plan to drive this thing at least once in a while - which I usually don't. What thing you ask? My 2008 Triumph Speed Triple 1050. A rather hefty bike that wants to go fast in a straight line but requires some serious courage to go around corners quickly. The 1050cc engine requires a bit of oomph to be moved and as such the starter is stronger which in turn requires a powerful battery with a lot of cold crank current / cold crank amps.

A lead acid battery that's sitting around is dying. Always. Apparently, based on my brief research, sulfur deposits on the lead which eventually causes a short in between the cells. This is especially true when the battery looses charge at the same time. A sulfur overgrown battery makes die even faster and reduces the current it can put out.

DISCLAIMER: Batteries are generally dangerous to work with. Once shorted, it's easy to cause a thermal runaway which is likely going to cause a fire or worst: an explosion. This is equally true for over-discharging as well as over-charging. And the latter is one of the primary considerations when putting LiFePo4 batteries to work in an automotive environment: A car generator's charge controller assumes the battery is fully charged at 14.7 Volts but a 4S LiFePo4 battery's max charge voltage is 14.6 Volts. Doesn't sound like much but could present a hazard.

I have a spotwelder that I built a few years ago which thankfully still works. I already made a few tests during shaver-repair and plan on spot-welding the new pack together over the weekend if I find the time. All cells are still very well balanced (down to 0.01V) and can be welded together without any additional balancing action on my part. I'll double check each cell again, though, just to be safe. LiFePo4 won't burst into flames but hot wires are also not needed here.

Once I have the cells welded and the pack somehow stabilized, I'll try and solder the power cables to the nickel strips and run the wires through the hole in the top cover straight to the screw terminal. I did it this way so that the power doesn't go through the bolt but instead connects directly to the leads to the motorcycle. I hope this will generate less heat, stressing the PLA less. Honestly, this is going to be an issue. I'm aware of it but I don't like it either. But it was the material I had available at the time of printing.

After (maybe before) the power cables are attached, I'll solder the 4S balancer into place. It says it doesn't like high capacity packs but since it's probably analogue it will just take longer to balance. And since I don't draw much continuous current from the pack and also have the pack sitting for long periods of the time it will (hopefully) eventually balance.

Then, I'll run the ground wire to the pack and the positive lead from the pack to the battery shut-off switch and from there to the positive lead of the bike. All this, in theory, should be pretty straight forward. There will be a bit of improvisation and probably incorrect terminals but that's an issue for a later day.

Most people would just add a trickle charger. Okey, so I bought a 7.5 watts solar panel with charging cable for my bike. No idea how to mount it, yet, but that's probably gonna end up like a removable rear spoiler or something silly like that.

But I also want to stop the leak current altogether, so I purchased a 200A starter battery shut-off switch that I'm going to mount under the seat. So when I'm not using the bike, I'm gonna kill the main switch. It's at least very unlikely that it's gonna open by itself to burn out the alternator as well as charging circuits so it's worth risking.

Then, I also decided to continue the actual project: Making a better motorcycle battery. As you know, I ordered parts. These have arrived a long time ago and have been patiently sitting here to be put together. The main blocker I had was the enclosure. There is not much space in the battery compartment. Especially on the long edge, it's only 150mm total. If you want the 3D printed battery case to have any strength at all, it's not a lot of space to work with considering the 26650 batteries that I going to use for this.

Then, there was the second big issue: How do I get the power from inside the pack to some type of terminal. I'm not sure I found a good solution, yet. I'm sure it's a pretty bad one since I printed the case in PLA and the terminal won't be as tightly screwed together as on a regular battery. So this is a risk I have to evaluate under test and under different temperature conditions.

I printed the entire case in matte black PLA at a 0.33 layer height to reduce print time. I am also beginning to like the esthetics again as it really has its own charm after printing lots of 0.1mm parts "because it looks like Markforge3D parts".