

## Customer Application #10

# Lightweight Superstart Battery

Conventional lead motorcycle batteries exist in various technologies. All these technologies have a common bad characteristic. They are heavy and in most cases the endurance of the battery is not satisfying.



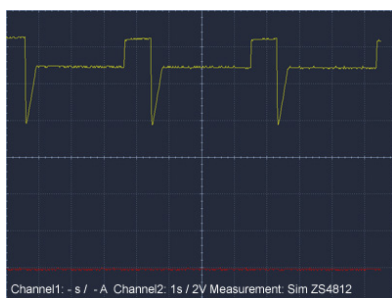
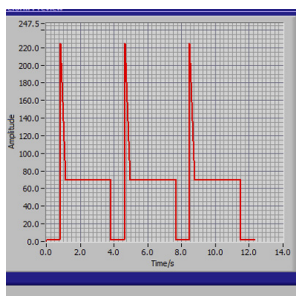
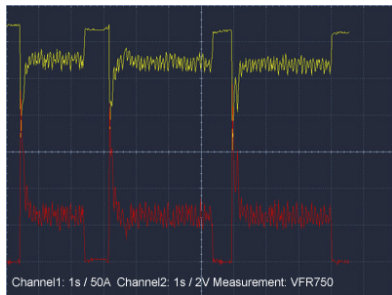
The goal of "Akkuservice Niederrhein" is to develop innovative, long-living lightweight batteries consisting of lithium iron phosphate (LiFePo4) cells for series production readiness. Simultaneously they want to establish the LiFePo4 technology in racing sport and in the daily traffic under the label MBF-Racing.

The challenge is to develop a portfolio of motorcycle batteries which replaces all the different lead batteries on the market by the new LiFePo4 technology. This is not trivial although the lithium iron phosphate batteries can get along with a lower capacity because of their high energy density (lead batteries provide only down to 50% depth of discharge enough start power).

However, they must provide the same high start currents. Further on, the monitoring electronics of some modern bikes proved as a kind of problem. Since the battery voltage is actively monitored during the start-up procedure the start can be aborted at an undershooting of the threshold value of the battery when it switches power off too soon.

**Akkuservice Niederrhein**

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At the start-up procedure of a motorcycle engine different physical and electrical effects become important: The resistance of the starter is very small at start-up, the viscosity of the oil is very low when the engine is cold, the inertia of rotating parts like the generator and the starter with freewheel has to be overcome. Therefore, the measurement with the aid of a DC current clamp is only conditionally meaningful. Problems with some motorcycle types necessitate advanced measurements. In the field the voltage and current gradients at the start-up of the engine are captured with the aid of a Fluke DC clamp adaptor and a storage oscilloscope. It comes immediately clear that the relatively low current of about 80A at slipping engine lags after a current peak of 225A. Therefore the resulting short voltage breakdown can force the battery to switch off. Furthermore, a load profile is generated from the captured measurement data which is transmitted to the electronic load ZS4812 from Höcherl & Hackl via USB.

Thus the measured voltage response of various DUTs can be captured for simulated start-up procedures and be stored in a database. It becomes immediately clear how similar the real measurements and the responses of the simulation are. Therefore it is possible to measure various batteries in the laboratory close to reality without having a test set-up directly on the motorcycle.

The H&H ZS4812 is a programmable electronic load which is designed to fulfill the highest demands but which is also easy to handle and protected against many application errors. This allows an efficient work which helps us to speed up our project progress. A huge reference data pool is generated very quickly which can be consulted for comparative measurements even years ago.

A unique selling proposition of the company H&H is the comprehensive software to control the electronic loads which can be downloaded free of charge from the H&H website.