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## **Saying goodbye to weak batteries: new charging process extends battery life considerably**

**ETA-Leveling, a novel charging process, extends battery life considerably, irrespective of the hardware, cell chemistry or type of application. The patented algorithm was developed by the Benning CMS Technology GmbH team. Licences for the process, which is suitable for battery blocks of all kinds, recently became available for purchase.**

Over time, the efficiency levels of the individual cells within a battery block change to varying degrees. This causes minute differences in state of charge as early as within the first few charge cycles and accelerates individual cell ageing; however, these effects are not noticeable in the application until much later. Efficiency within a block will become more and more unbalanced in the long run until it is not able to serve its purpose. Generally, this happens long before the individual cells reach their predicted lifespan listed in the cell manufacturer's specifications. A battery block is usually considered to be "defective" once the unbalanced efficiency levels cause individual cells to exceed a defined cut-off limit in the upper or lower voltage range. Depending on the application, this can happen at different levels of remaining useable capacity. However, the battery is in fact not actually defective but has reached a state that is performance critical due to the unbalanced levels of efficiency across individual cells. This is where ETA-Leveling comes in, as it prevents this very effect from happening.

### **No hardware changes needed to use algorithm**

The new charging process can be used without having to make any changes to existing hardware. The algorithm ensures that the individual cells are handled and controlled as specified when being charged, something that ordinary charging processes fail to achieve. Consequently, ETA-Leveling prevents premature cell ageing, enabling cells to last for their predicted lifespan. The clue of this technology is that despite cells being connected in series, efficiency leveling handles each cell as if it were a single-cell battery. The resulting long-term gains in lifespan for the entire battery block is significant.

### **Reanimating "defective" batteries in the Battery Leveling Laboratory**

A very convincing way of demonstrating the effectiveness of the new technology to potential customers is asking them to supply a "defective" battery and reanimating it using ETA-Leveling. "We've just dealt with a traction battery that had been charged a little over 500 times and had less than 70% of useable capacity left, prompting our customer to dispose of it. Once we had leveled it, it was back to a capacity of around 90% and is fully functional again," reports Managing Director Frederik Fuchs. "This way we were able to demonstrate that the battery was not defective but had simply been treated the conventional way – and in our opinion the wrong way – from the very start." ETA-Leveling "cures" defective batteries so efficiently, this in itself would be a powerful business model. However, reanimations in the Battery Leveling Laboratory are only used for demonstration purposes – the reason being that any batteries

operated with ETA-Leveling from the start will never reach this state of apparent deficiency in the first place. This is why the goal is to apply the algorithm as widespread as possible through corresponding licences.

You can find more information at <https://cms-technology.de/en/>.

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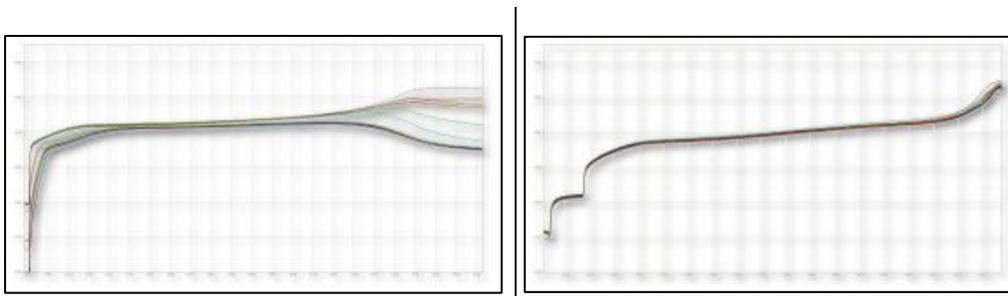
**About Benning CMS Technology GmbH:**

BENNING CMS Technology considers itself a battery system thinktank. Founded in 2017 as a start-up called Sybac Systems GmbH, the company has specialised in new developments of power electronics and charging processes for battery systems. All employees could already look back on a number of years developing and operating electricity storage systems when they founded the company. Industrie automation Energiesysteme GmbH has held 50% of company shares since spring 2019. It was within the framework of this cooperation that Q-Leveling became ready for series production. Its successor, ETA-Leveling, has been a marketable product since 2021, with the development team labelling it as disruptive technology due to it being the very first charging process tackling efficiency levels (hence the name ETA-Leveling – derived from the Greek letter “ $\eta$ ”, used in physics to denote efficiency).

You can find more information at <https://cms-technology.de/en/>.

**Images:**

(Please note, this is screen resolution only. To request print resolution quality, please contact [batterie-leveling@pr-hoch-drei.de](mailto:batterie-leveling@pr-hoch-drei.de).)



**Caption:** The charge curve of the same battery consisting of 32 individual cells, left-hand side before/right-hand side after applying ETA-Leveling. On the left, you see considerably varying voltage curves, with only one cell reaching plateau voltage; on the right, voltage curve and plateau voltage are practically identical for all cells thanks to ETA-Leveling.

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