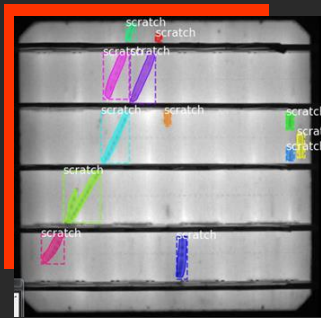


DE.N.K

DENKWEIT

Nur wer anders denkt, kann Neues schaffen.

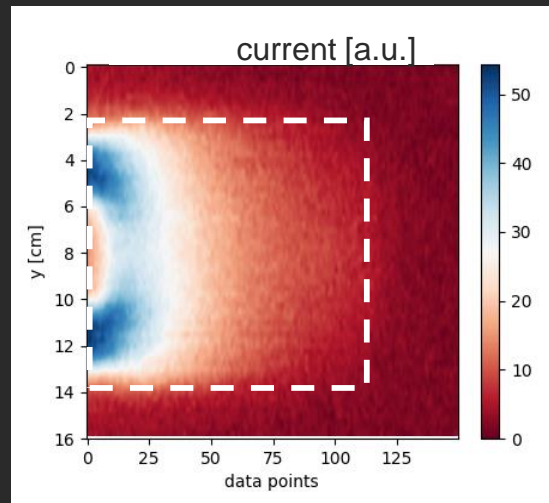


DENKweit GmbH:

- Combination of innovative sensor technology and modern data analysis for mass production
 - Direction and strength of electric currents, spatially resolved
 - Individualized, self-learning neural networks
- Fraunhofer Spin-Off
- DENKer: 9 full time, 5 students

Our unique selling points

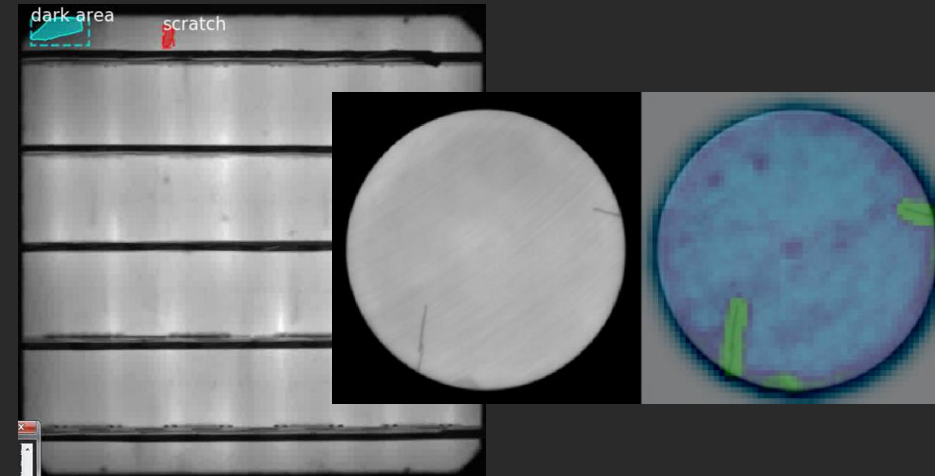
Strength and direction of electric currents



Electric current through a Pouch Cell



Classification of big data by AI



Anomalie-Detektion - self-learning neural networks for data classification

Combination of new sensor technology and self-developed data evaluation for unique solutions giving clear answers!

E-MOBILITY & ENERGY STORAGE

Growth & Challenges in the Battery Market

In production, maintenance and use



Storage of renewable energies





Challenges

- Fire hazard of battery systems
- Guarantee of specifications and reliability
- Dependence on supplier quality

→ Customer confidence!

"Battery condition must be known at all times to ensure reliability and specifications."

B-TECH

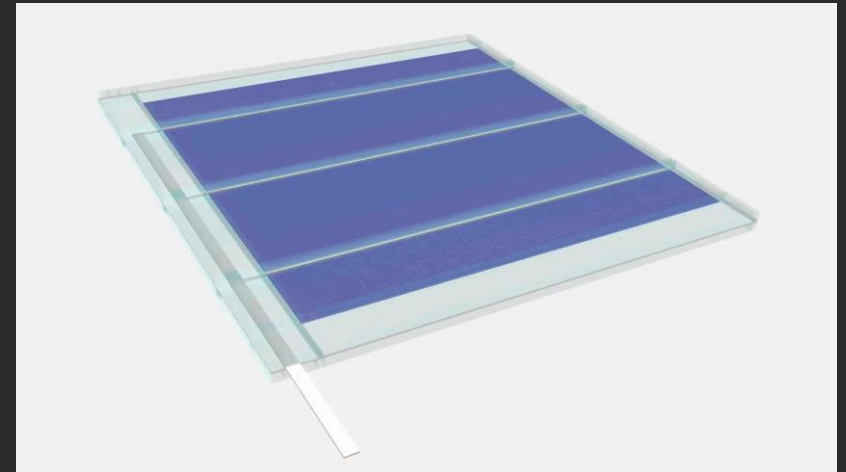
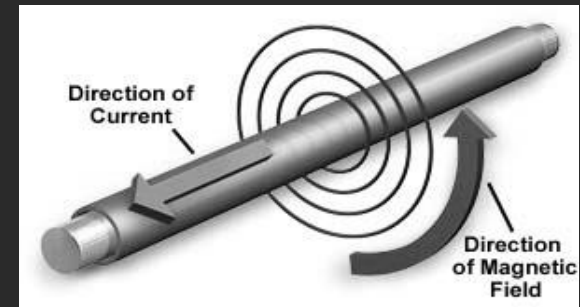
Non-contact measurement of direction and strength of electrical currents

DENKWEIT B-TECH

Direction and strength of electric current

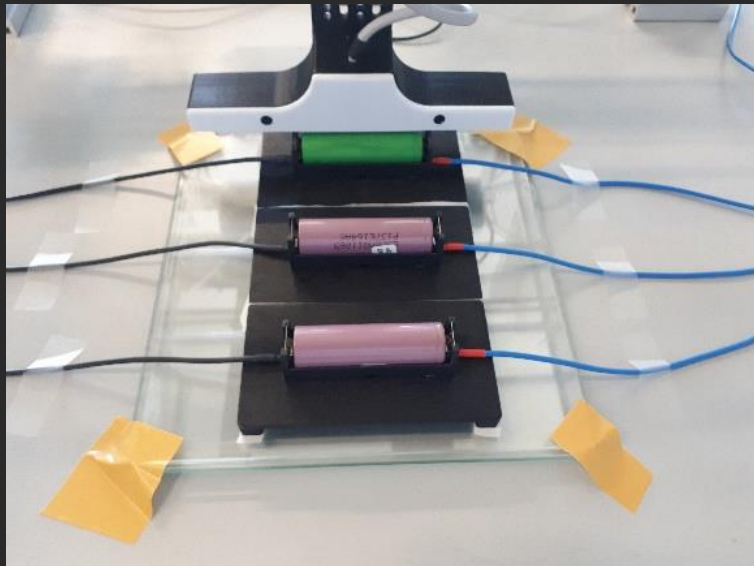
B-TECH – a new access to electric currents

- Electric currents generate a magnetic vector field
- Therefore, the magnetic vector field carries the information of current direction and strength.
- Superposition of the magnetic fields due to complex current distribution → "magnetic field fingerprint".

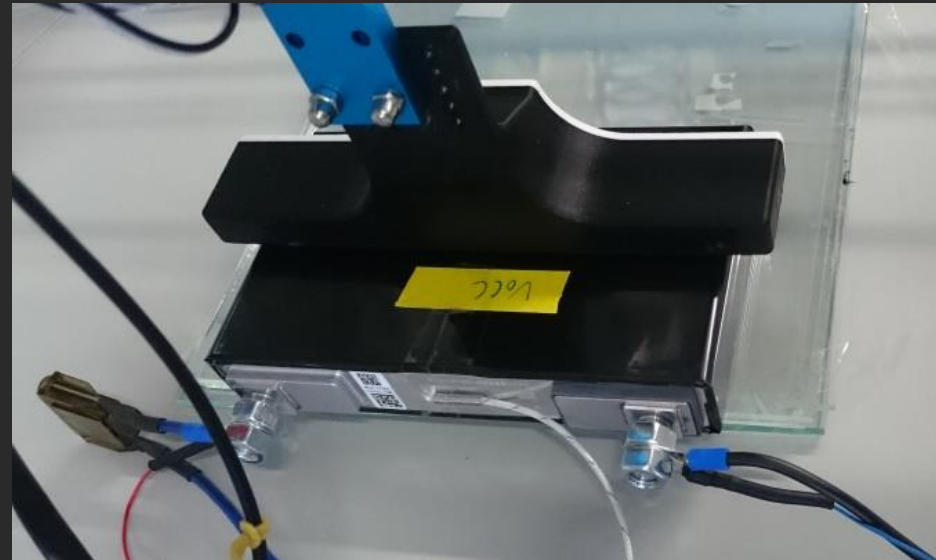


DENKWEIT B-TECH

Measurement of different battery technologies



Measurement of 3 Li-Ion batteries during discharging



Measurement of a prismatic cell during charging



Measurement by simply stroking over the battery during charging or discharging.

Quality control

- entrance tests
- long-term tests

Development cycles

- Short R&D cycles
- Meaningful results

Monitoring

- In operation - BMS
- Vehicle inspection and service

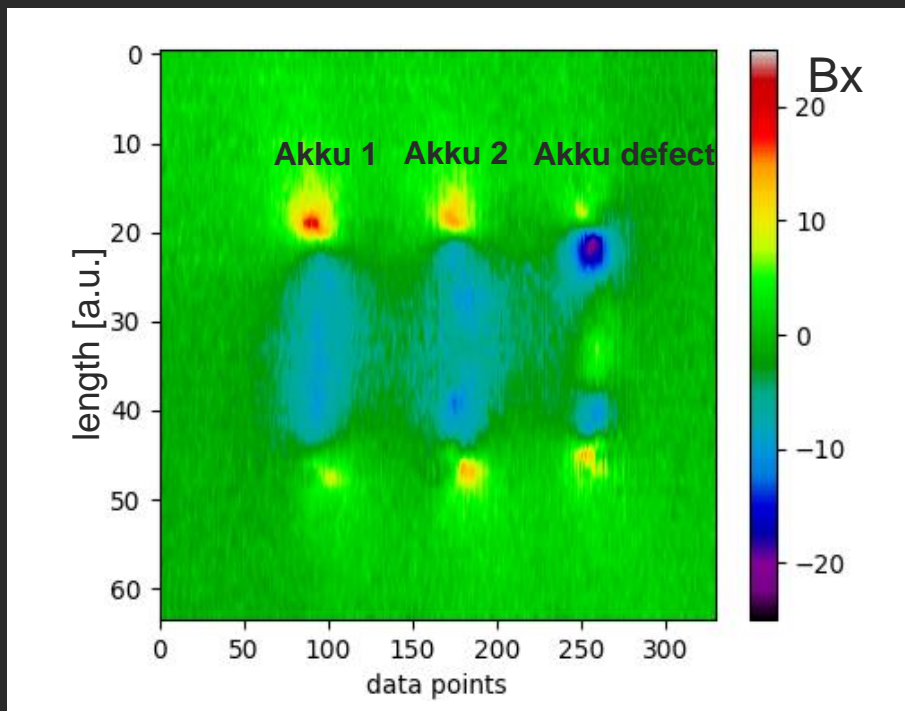
MEASUREMENT EXAMPLES

Only simple images shown



DENKWEIT B-BATTERY

Monitoring of charging and discharging cycles



■ Automated data evaluation by DENKweit AI

OK

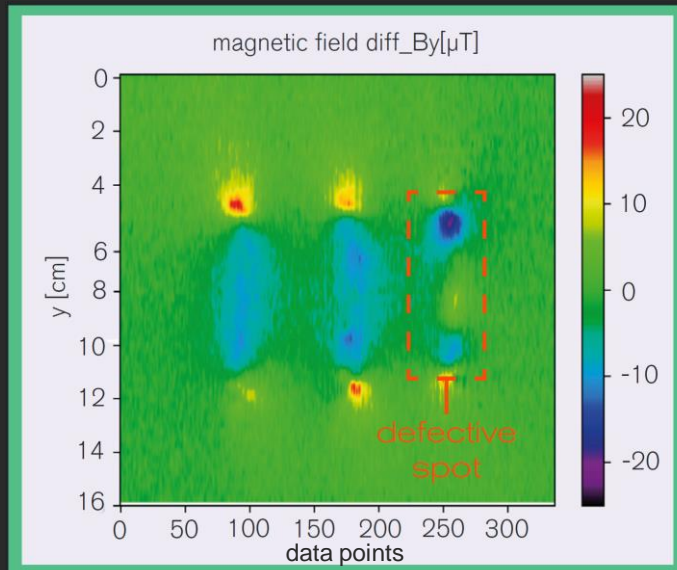
OK

Fail

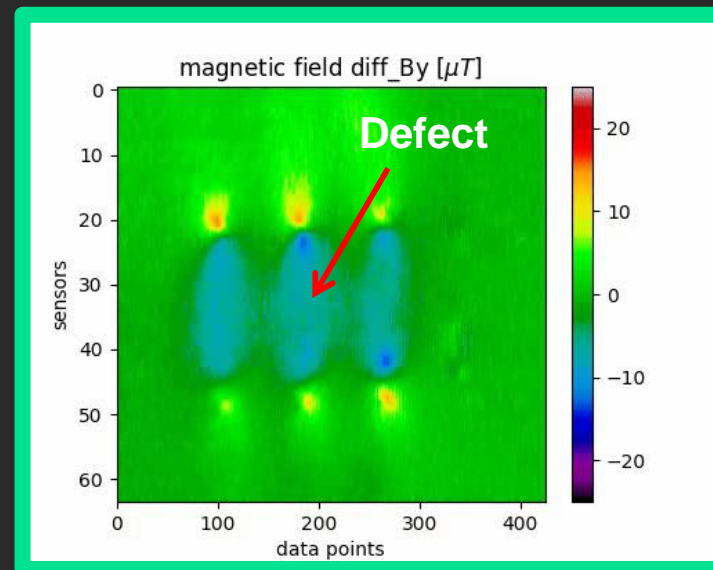
QUALITY CONTROL OF BATTERY SYSTEMS

Test of charging and discharging cycles

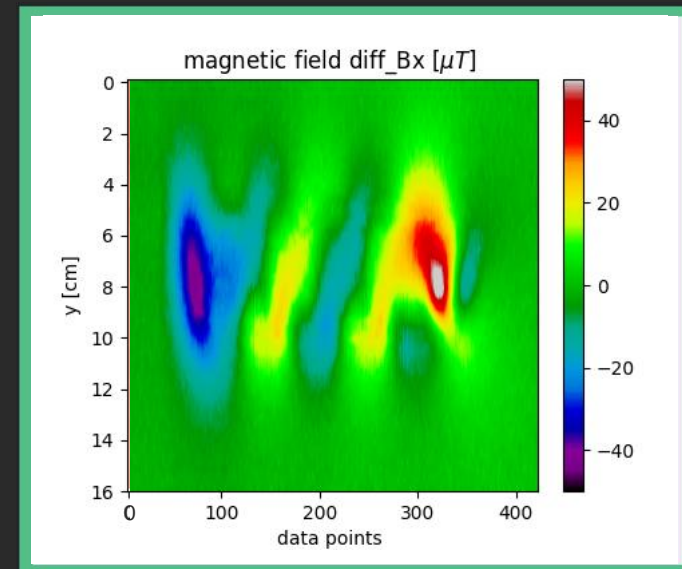
In- Outcoming inspection



Long-term tests (video)



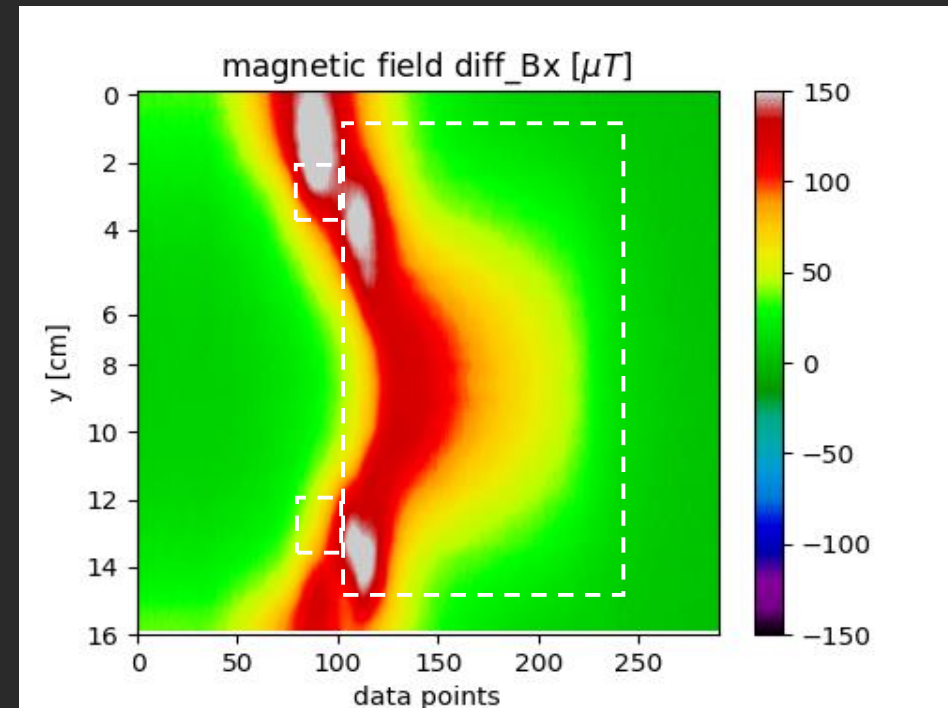
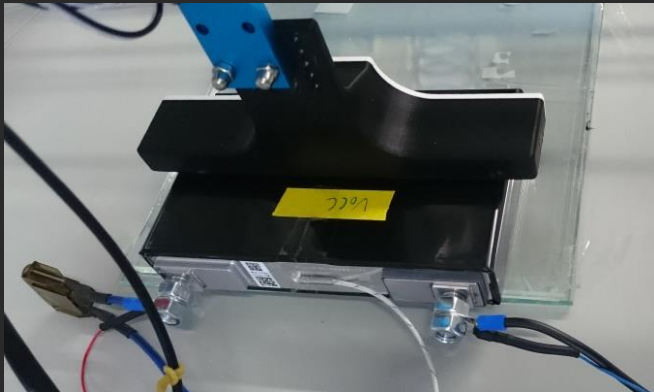
Interconnections



DENKWEIT B-LAB

Application car battery manufacturer X

- Measurement example of a rechargeable battery developed for electric vehicles (shown only x-component)
- Current distribution in the shown example inhomogeneous



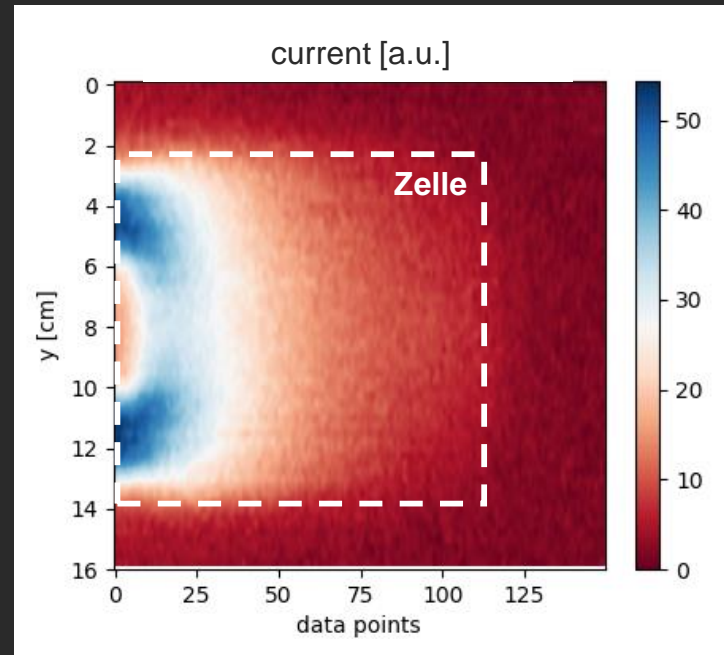
x-component of the magnetic field during the charge curtain

RESEARCH & DEVELOPMENT

Clear results and short R&D cycles



Pouch cell



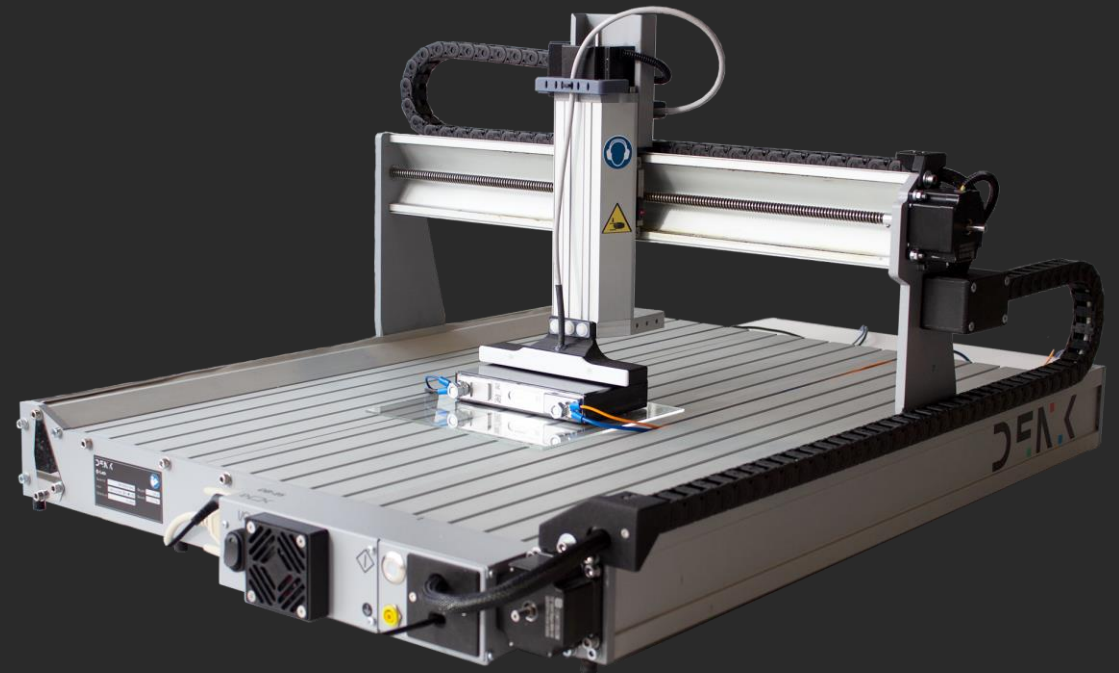
Current during charging

- world's first visualization of the current flow in a pouch cell
- Shortened development cycles through meaningful results

DENKWEIT B-TECH FOR ENERGY STORAGE

B-BATTERY

- Available in different sizes
- Adaptable to your application
- **B-Tech Core:**
 - Magnetic field resolution: $0.3 \mu\text{T}$
 - Spatial resolution: 2.5 mm (x), μm range (y, z)
 - Individual sensor length, systems up to 2 m (or customizable)
 - Power supply 230 V, 50/60 Hz, 8 A





**WE ARE PLEASED ABOUT YOUR
INTEREST. CONTACT US!**

**DENKweit GmbH
Marthastraße 13, 06108 Halle (Saale)
<http://www.DENKweit.de>**

**Dr. Dominik LAUSCH
CEO
Dominik.Lausch@denkweit.de**