SOLUTIONS FOR STANDARDIZED BATTERY PLATFORM POWER MANAGEMENT
A JOINT-DEVELOPMENT PROGRAM WITH F&K DELVOTEC

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Mersen addressable segments in battery-related market

- **E-mobility**
- **Stationary**

**Electrical Energy Storage**
- Aircraft (backup)
- Fork lift
- Mild-Hybrid car
- Scooter

**Utilities**
- Aircraft
- Railway
- E-Bus
- E-Truck

**Full-electric car**

**Environmental friendly**
- Residential

**Voltage**
- 12V
- 24V
- 48V
- 96V
- 200V
- 300V
- 400V
- 500V
- 600V
- 750V
- 1,000V
- 1,500V

**Battery energy capacity**
- 1kWh
- 5kWh
- 10kWh
- 20kWh
- 30kWh
- 100kWh
- 250kWh
- 200kWh
- 500kWh
- 1,000kWh
- 2,500kWh
- 10,000kWh

**Battery max. dissipated power (losses)**
- 1kW
- 5kW
- 10kW
- 15kW
- 30kW
- > 50kW
CONTEXT AND OBJECTIVES

- **Mersen**, expert in thermal management, overcurrent protection and laminated monitoring bus bar, and

- **FEK Delvotec**, expert in laser welding equipment and process, have joined their forces to develop a standardized battery platform enabling so many completely new benefits.

- Our goal is to enable leading $/kWh and kWh/Kg efficiency at a modular level with our 21700 module solution.
Main components of our battery platform

We don’t make modules, just to be clear!

Optimised 2:1 TAB weld interface

Laminated Smart bus bar with monitoring features

21700 Cells

DC Fuse

Fuse holder

Vacuum brazed cooling plate

Standardised parameter and weld process monitoring profile library

Any specification

...our platform is the gateway to 21700 - made easy!
KEY BENEFITS AND ADDED-VALUES

- Lowest cost
- Highest Flexibility
- Securest Process
- Safest solution
- Easiest solution
LOWEST COST

....why is it the lowest cost?

- Standardized modular components
  - Enables the optimize component supply chain for almost any module

- >4x faster than wire bonding
  - 2 in 1 TAB welding is inherently >4x faster than conventional wire/ribbon insertion & cutting.
HIGHEST FLEXIBILITY

....why is it so flexible?

- **Product Synergy**
  - Easier product development with standard components & parameters.

- **Modular configuration**
  - Enabled by standard building blocks, inc. BMS connections, sensors etc.

- **High current made easy**
  - 8mm TABs and large weld area makes high current easy

- **Monitor what needs to be**
  - Smart bus bar can monitor voltage and T° wherever you need

- **“On the fly” lot changes**
  - M17LSB programs & modules selectable on the fly
Securest Process

...why is the process so secure?

- Bus bar enables no wiring error
- The monitored perfect weld
  - Optimized weld Parameter data library of common cell types including back reflection data.
- Zero gap certain
  - The tool touches every weld in +/-1µm and feels every weld in +/- 1cN
- Gasket safe, ultimate accuracy
  - Negligible heat input with very fast moving weld spot <40µm diameter
- Contamination robust
  - Position accuracy with through bus bar scanning combined with 8mm high current TABs
SAFESEST SOLUTION

....why is it the safest solution?

- **Assembly - short circuit safe**
  - Cell holder/bus bar geometry is short safe

- **Bonding - short circuit safe**
  - Tab tool is non conducting & short safe

- **Over current protection**
  - Embedded DC fuse enables safe transportation and handling
EASY SOLUTION

...why is it so easy?

...It just is!
MERSEN TECHNOLOGY

- **MERSEN Demo module**
  - Fuse holder
  - Fuse
  - Bus bar
  - Cooling plate

- **MERSEN Concept**
  - Flexible in X&Y, P&S configuration
  - Modular solution for all sizes = low cost
  - No wiring errors
  - Simple assembly
  - Increased current carrying capability
  - High resistance to shocks and vibrations

- **MERSEN Demo Bus Bar Specs**
  - Module 13P, 24S
  - 70A continuous
  - 140A overload
  - 80V
  - Fuse protection
  - Cooling plate – vacuum brazed
  - Temp < 60°C
  - Single layer
  - Volt & temp monitoring flex integrated

- **MERSEN Demo liquid cooling plate Specs**
  - Customized liquid channeling to address battery cell homogeneity requirements
  - Large cooling plate capability (up to 650 x 2000 mm)
  - Down to 7 mm thick
  - Longer lifetime thanks to flux- and corrosion-free features

- **MERSEN Demo DC Fuse Specs**
  - Design for DC applications
  - Low watt losses / High cycling performance
  - Ultra-compact size
  - Current Ratings (In): 50 to 200A
  - Interrupting Rating: 20kA @ 100VDC, L/R < 1.5 ms
M17LSB Laser
- 1kW CW fiber 1070nm laser
- Focus spot <50µm
- LWM Back Reflection
- Ribbon <5mm/TAB interchangeable
- Touch down linear encoder +/- 1µm
- Bond force 0-60N

M17LSB Platform
- Working area 595mmx340mm
- 100mm Z
- P +/- 180°
- Linear encoder resolution 0.1µm

M17LSB Camera recognition
- Cognex PatMax System
- Sub pixel resolution to 0.1 pixel

M17LSB Connectivity
- TCP/IP/FTP data exchange
- SEMI communication - SECS/GEM
- SMEMA for in-line connections
- MES host connectivity

M17LSB Conformity
- CE & Semi S2
- SMEMA Compliant 850mm -1050mm
- Laser Unit Class 1 (EN 60825-1:2014)
Debut: APEC 2020