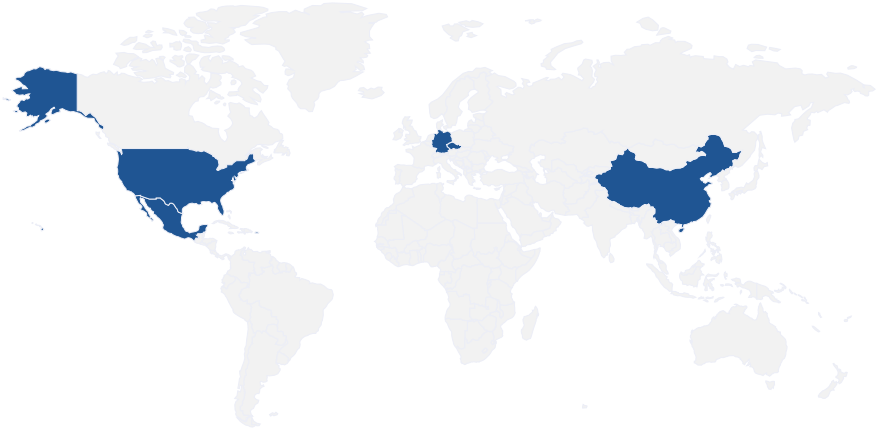


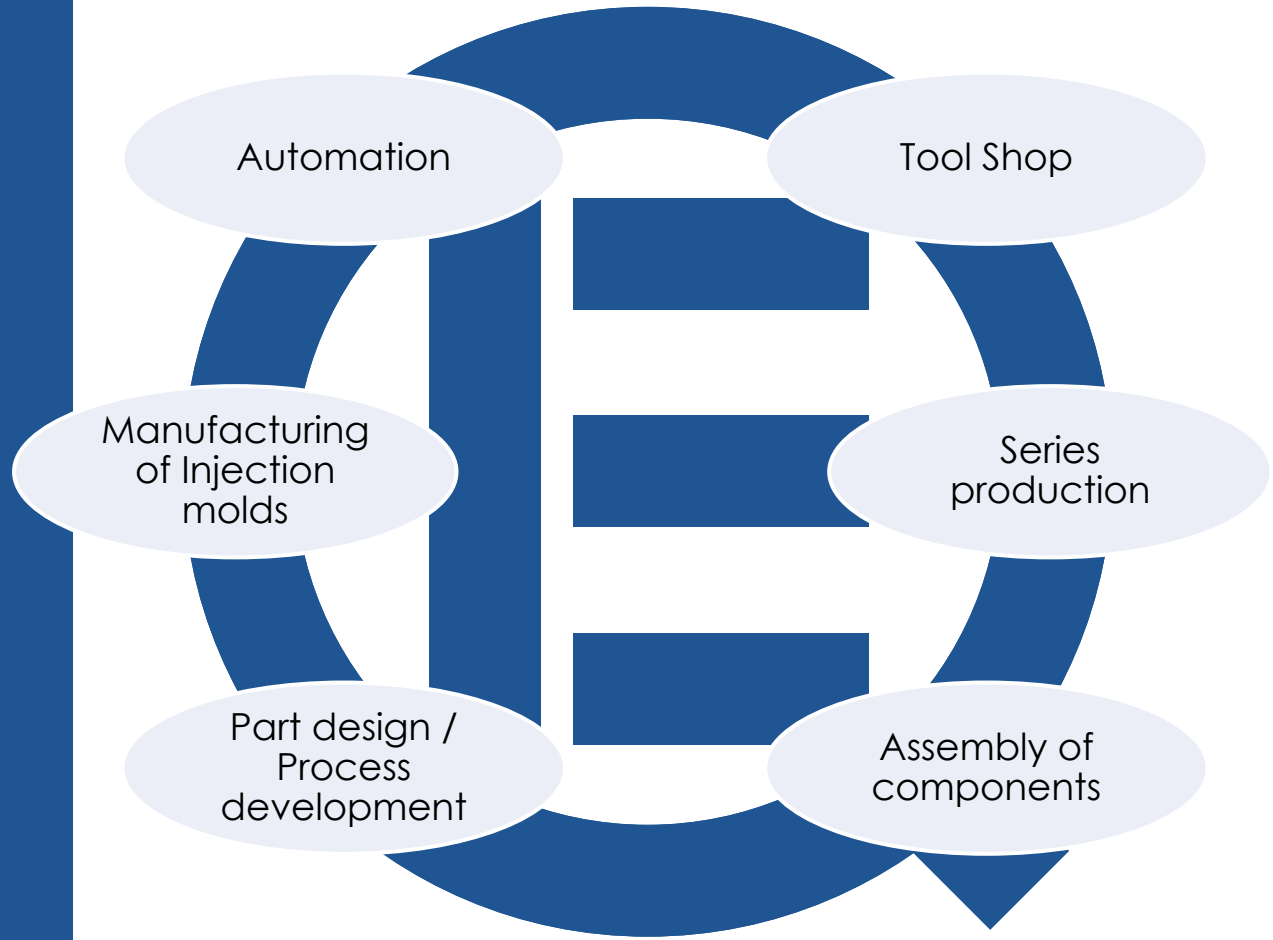
Battery Cooling
Next Generation Technology
MPDB®

Silverstone, 25.04.2024

© Quarder Group All rights reserved. Proprietary and confidential

Our business competencies

Everything out of one hand…



Introduction of EQ…

- a medium sized family-owned business
- with national and international operations
- ISO 9001, ISO TS 14001 , ISO TS 16949, ISO 50001 certified
- providing development, production and after sales services
- own tool shop and automation equipment
- rapid growing with special technologies

© Quarder Group All rights reserved. Proprietary and confidential

The Erwin Quarder Group consists of 5 locations and serves the major automotive core markets

Quarder Group HQ
Espelkamp

Erwin Quarder Inc.
Grand Rapids

Erwin Quarder CZ
Ostrava

Quarder de Mexico
Santiago de Querétaro

FEQ-Automotive S. Co. Ltd.
Shanghai 上海

Production Engineering R&D

© Quarder Group All rights reserved. Proprietary and confidential

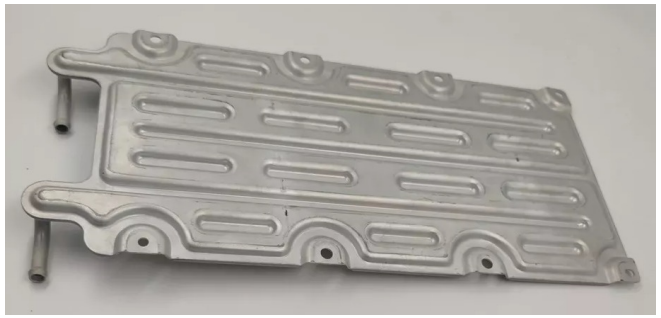
Motivation

- **State of the art:**
  - Roll-bonding
  - Brazing
  - Milled & Drilled
  - Friction Stir Welding
  - Laser Welding
  - Extrusion profiles
  - Assembled with O-ring

- **Disadvantages:**
  - Limited coolant guidance
  - Unevenness & high tolerances
  - Electrochemical corrosion risk
  - Risk of leakage
  - Heavy & Costly

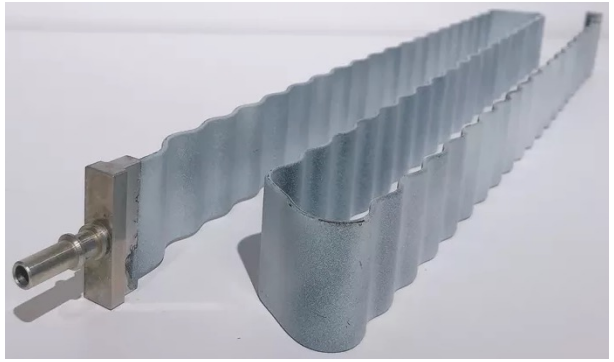
https://rjrorwxhijqili5q.ldycdn.com/cloud/ppBpmKmiRliSjkjjirlni/water-cool-plate.jpg

Source: https://sp-ao.shortpixel.ai/client/to_webp,q_lossy,ret_img,w_600,h_450/https://www.evcreate.com/wp-content/uploads/2023/01/MEB-cooling-plate-backside-rotated.jpeg



Source:https://jlrorwxhijqili5q.ldycdn.com/cloud/plBpmKmiRliSrkirnrlji/aluminum-water-cooling-plate.jpg

Source: https://www.lithium-power.com.au/product/calb-battery-module-cooling-plate-1-2-modules/64



Source: https://rjrorwxhijqili5q.ldycdn.com/cloud/pmBpmKmiRljSnjkkrrlji/snake-tube06.png

Source: https://www.sogefigroup.com/static/upload/ev-/ev-battery-cooling-plates.jpg

© Quarder Group All rights reserved. Proprietary and confidential

MetalPlasticDirectBond®

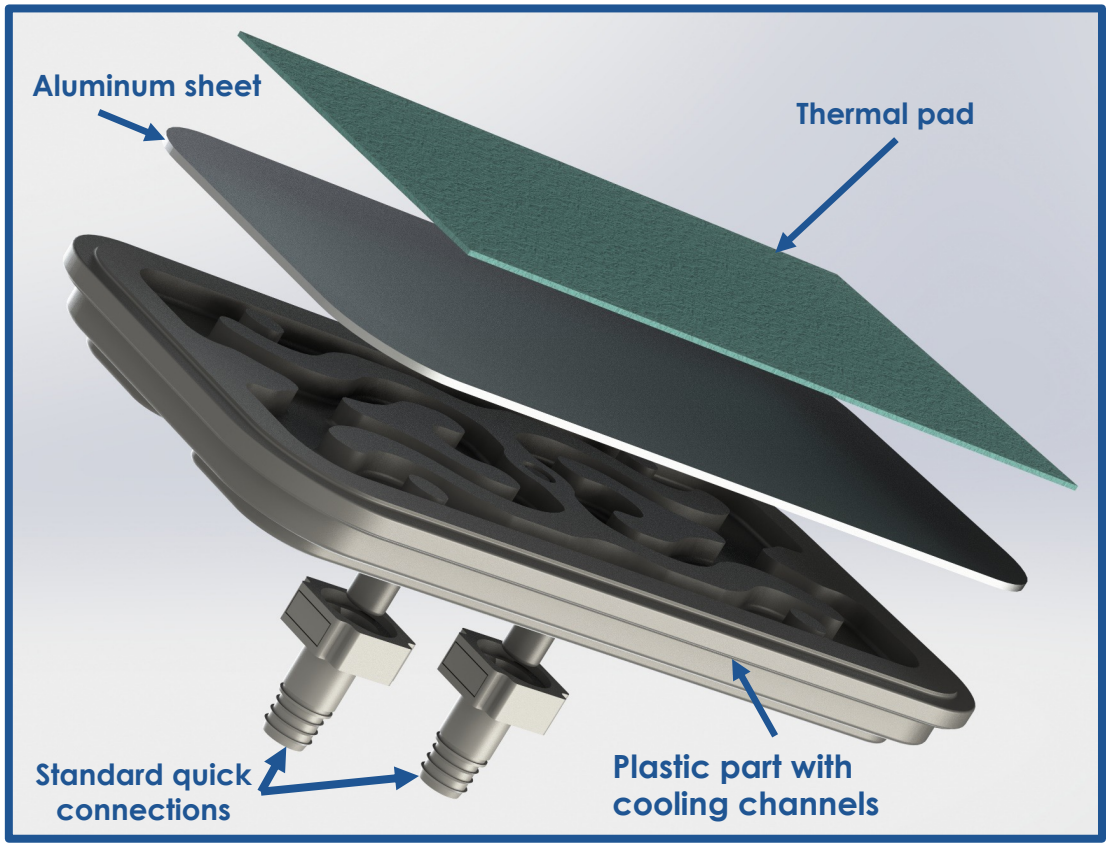
There is a strong, permanent bond between plastic and metal,

- Without sealing element,
- No soldering,
- No screw connections &
- Helium tight

We can take full advantage of plastic injection molding and combine it with metal forming techniques such as deep drawing of sheet metal, extruded profiles or milled parts.

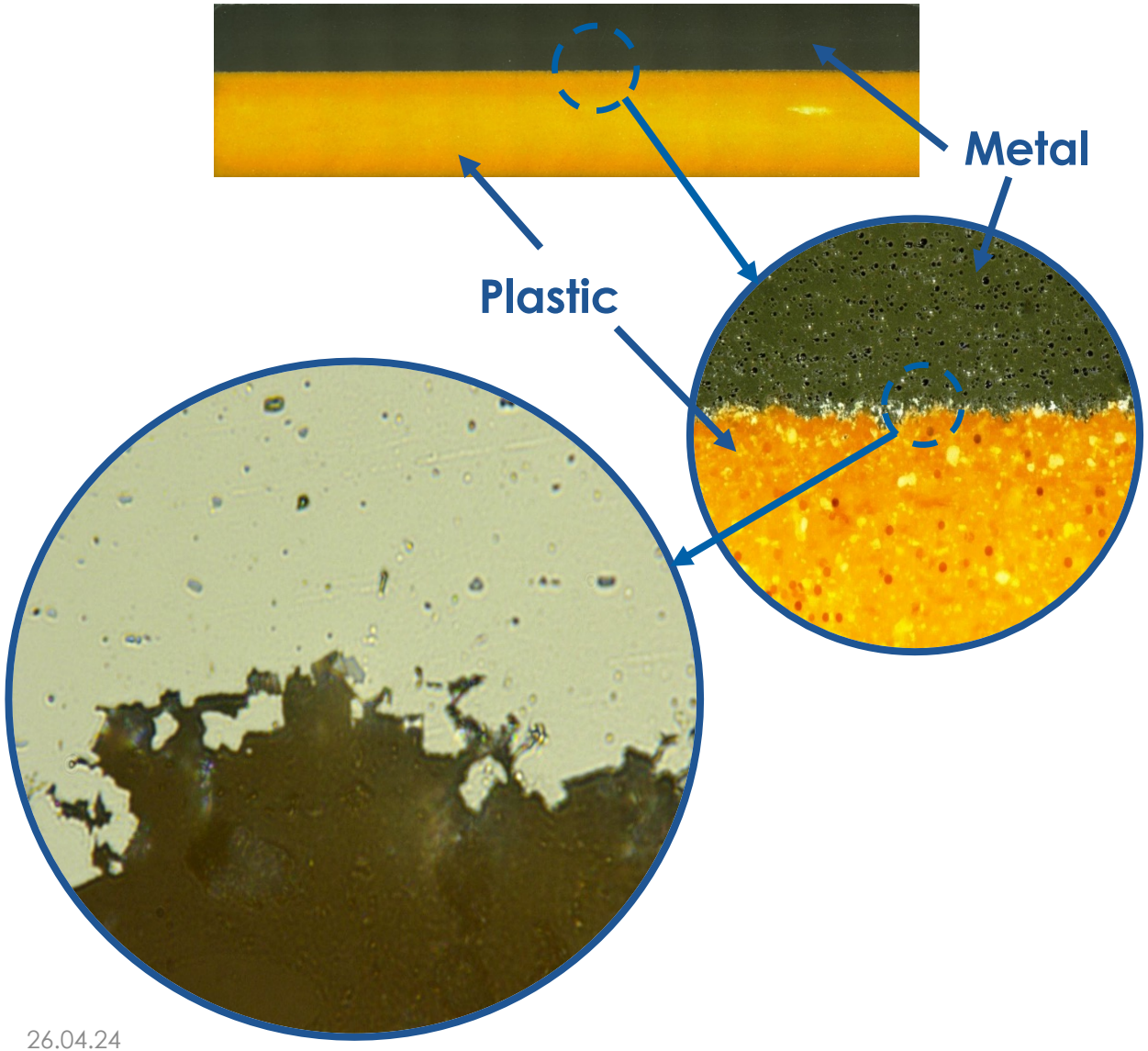
<u>Functional integration:</u>

- Metal inserts: Busbars, bushings, ...
- Port integration and balanced water flow
- Sensors for Temperature measurement



Product sample Battery cold plate

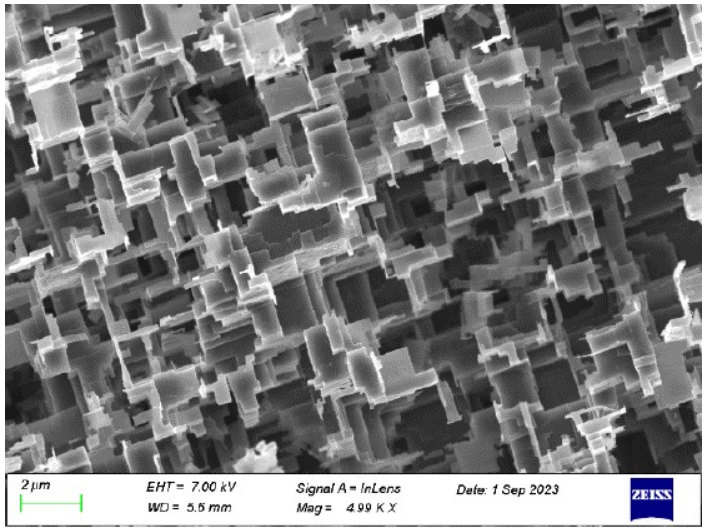
Close Up MPDBond®



Crosscut of the hybrid compound

What can you see here?

- The aluminum has a structured surface with many contours, caves and undercuts
- The liquid plastic flows into these cavities and undercuts. It fills all cavities
- The structures in the sub-micrometer range are completely wetted with plastic
- There are no air pockets and no voids in the connection



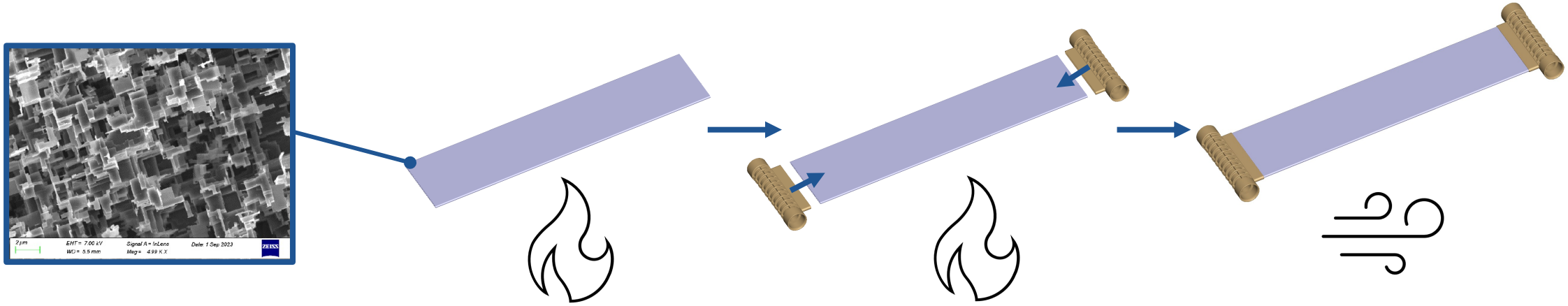
SEM image of the Mirco-Nanostructure

Manufacturing steps MPDB®

1. The metal surface is structured to create a micro-nanostructure, resulting in an extreme increase in surface area with back hook structures.

2. The metal part is brought to the melting temperature of the plastic, so that the plastic melts and can bond with the created structure.

3. After the component has cooled down, a helium-tight and long-term stable connection is created between the metal and the plastic.



Cycle time for bonding only 5 sec!

© Quarder Group All rights reserved. Proprietary and confidential

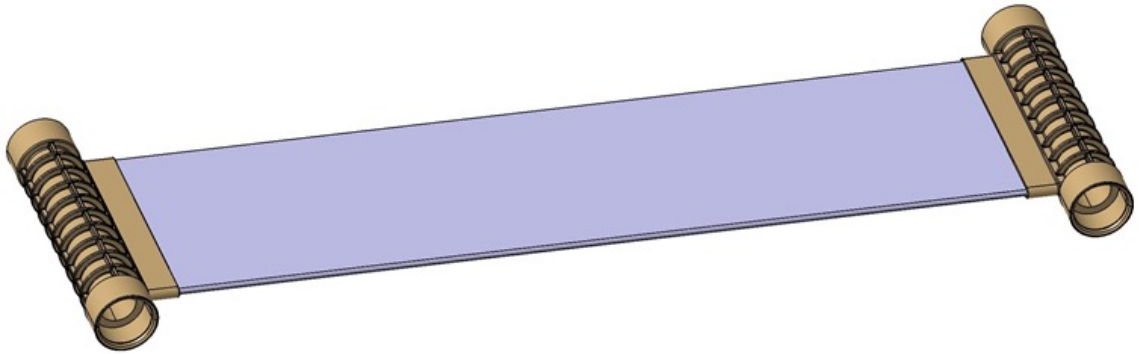
MPDB® Pocket Profile Cooling

Area of use: Round and prismatic cells

Benefits:

- Elimination of the soldering process, no risk of corrosion in the bond area
- Small length and bending tolerances
- Free design of the connection systems incl. flow optimization
- Function integration
  - Fixing points for an automated handling process
  - Sensors
- **Reduction of weight and costs**

Fully validated to automotive standards! → Ready to use



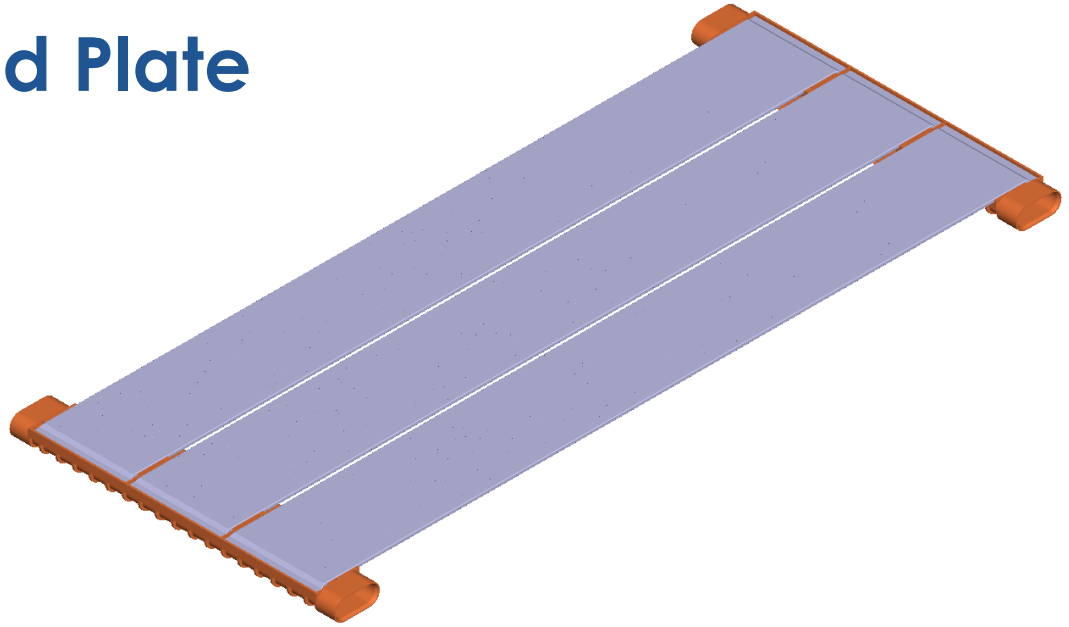
MPDB® High Performance Cold Plate

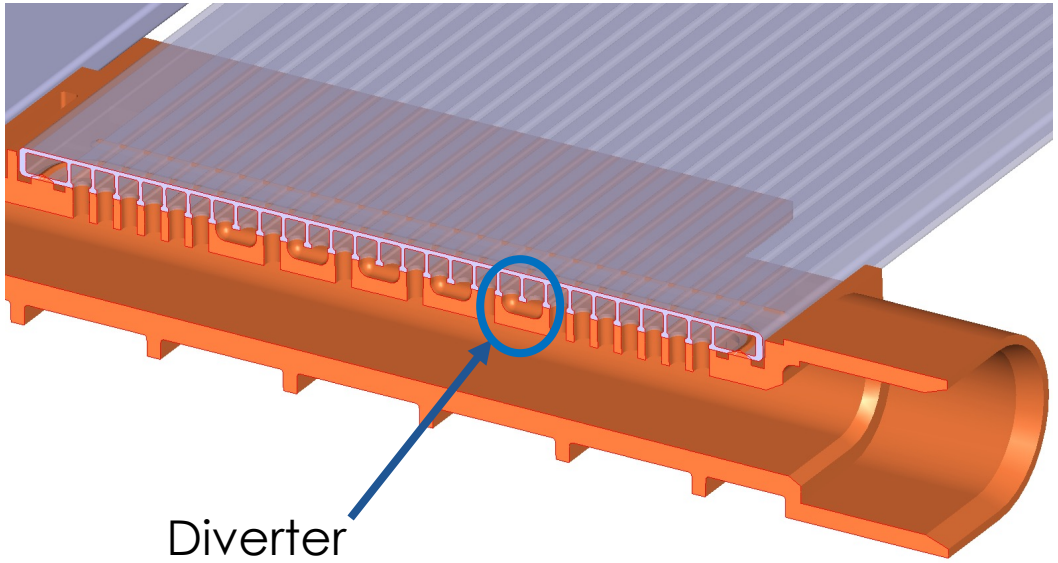
Area of use: Primary prismatic cells

Benefits:

- Single port control for perfect module balancing control
- Pack balancing by means of interchangeable inserts
- Flexible in length and width, with high flatness and small length tolerances

→ Lightweight high-performance cooling at best prices





© Quarder Group All rights reserved. Proprietary and confidential

Thank you for your attention!

Claus Mohrhoff
Business Development

Erwin Quarder Systemtechnik GmbH
Königsberger Str. 8 - 10
D-32339 Espelkamp

Tel: +49 (5772) 91 14 - 6 78
Mobil: +49 151 21897482

cmohrhoff@quarder.de
http://www.quarder.de

© Quarder Group All rights reserved. Proprietary and confidential