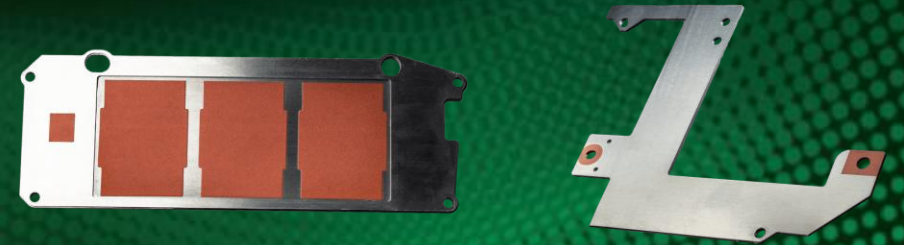


Advanced cooling of power electronics with copper cold sprayed aluminum heatsinks & busbars



Impact Innovations GmbH

LEADING HARDWARE SUPPLIER FOR
INDUSTRIAL COLD SPRAY TECHNOLOGY.

Impact Innovations GmbH

- 20+ years of Cold Spray expertise
- Global technology leader in high-pressure Cold Spray systems for industrial use
- In-house R&D and application development at our headquarters in Germany
- Proven Cold Spray solutions for coating, repair, and additive manufacturing
- 50+ dedicated employees based in Rattenkirchen, Bavaria
- Worldwide sales and service network supporting global customers



Impact Innovations Footprint

Broad industry coverage

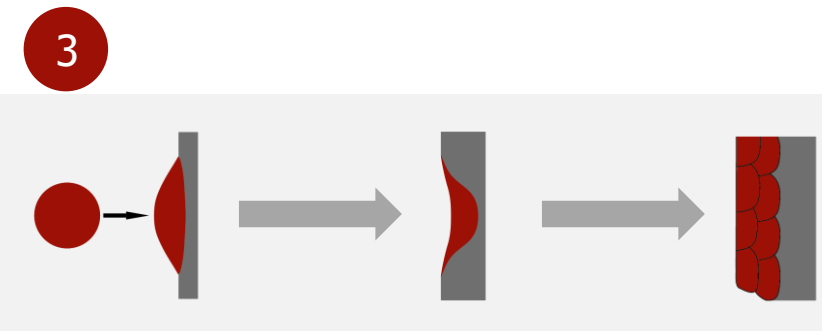
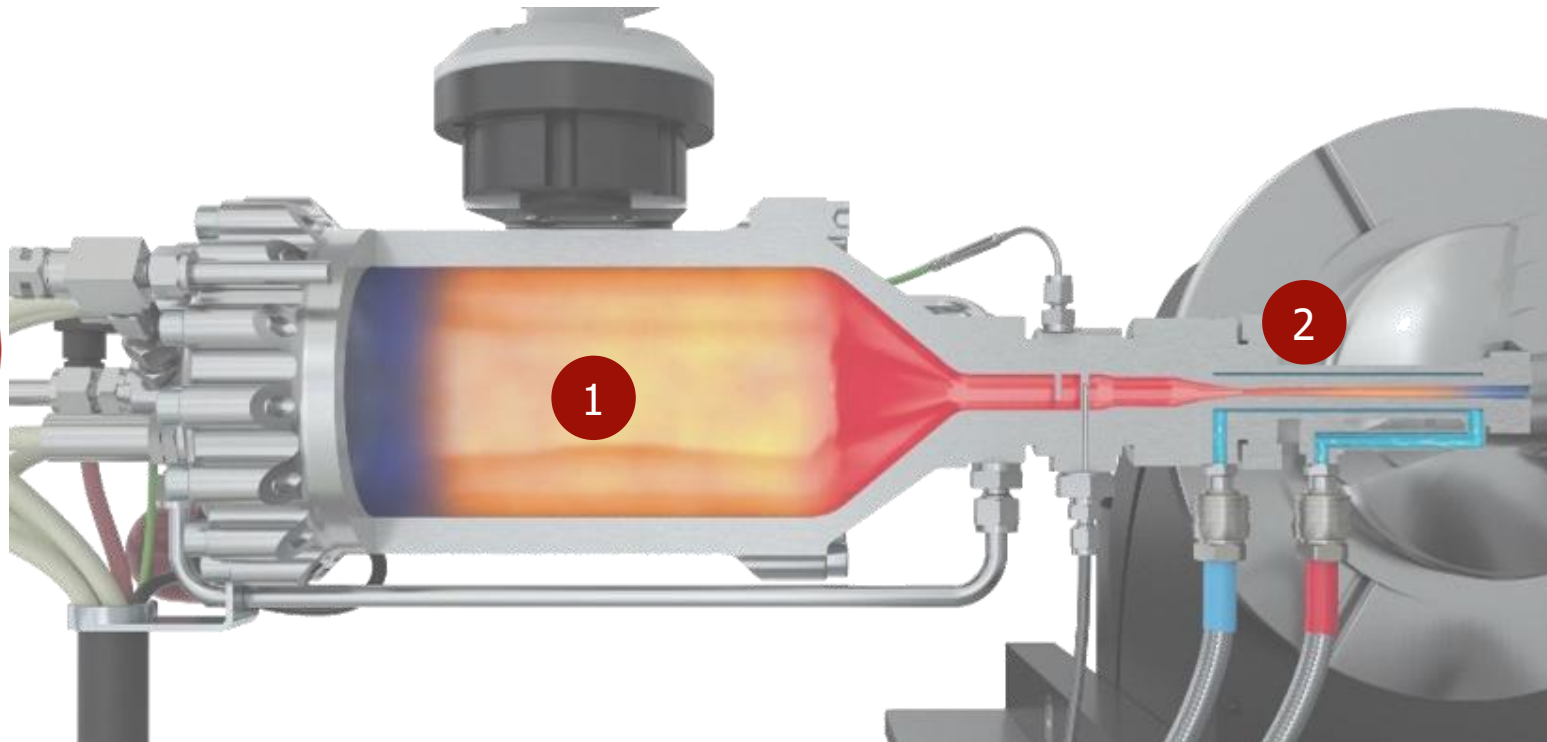
Automotive	Aerospace	Aviation
Consumer	Defense	Energy
Research	Coating Services	Electrics

100+ installed systems internationally



Cold Spray Technology to coat, repair & manufacture components

COLD SPRAYING IS A **SOLID-STATE PROCESS** THAT USES **KINETIC ENERGY** TO APPLY METALLIC POWDER, **AVOIDING THERMAL STRESS** AND PRESERVING THE ORIGINAL MATERIAL PROPERTIES



1 A process gas, typically nitrogen or helium is heated to temperatures of up to 1.100 °C

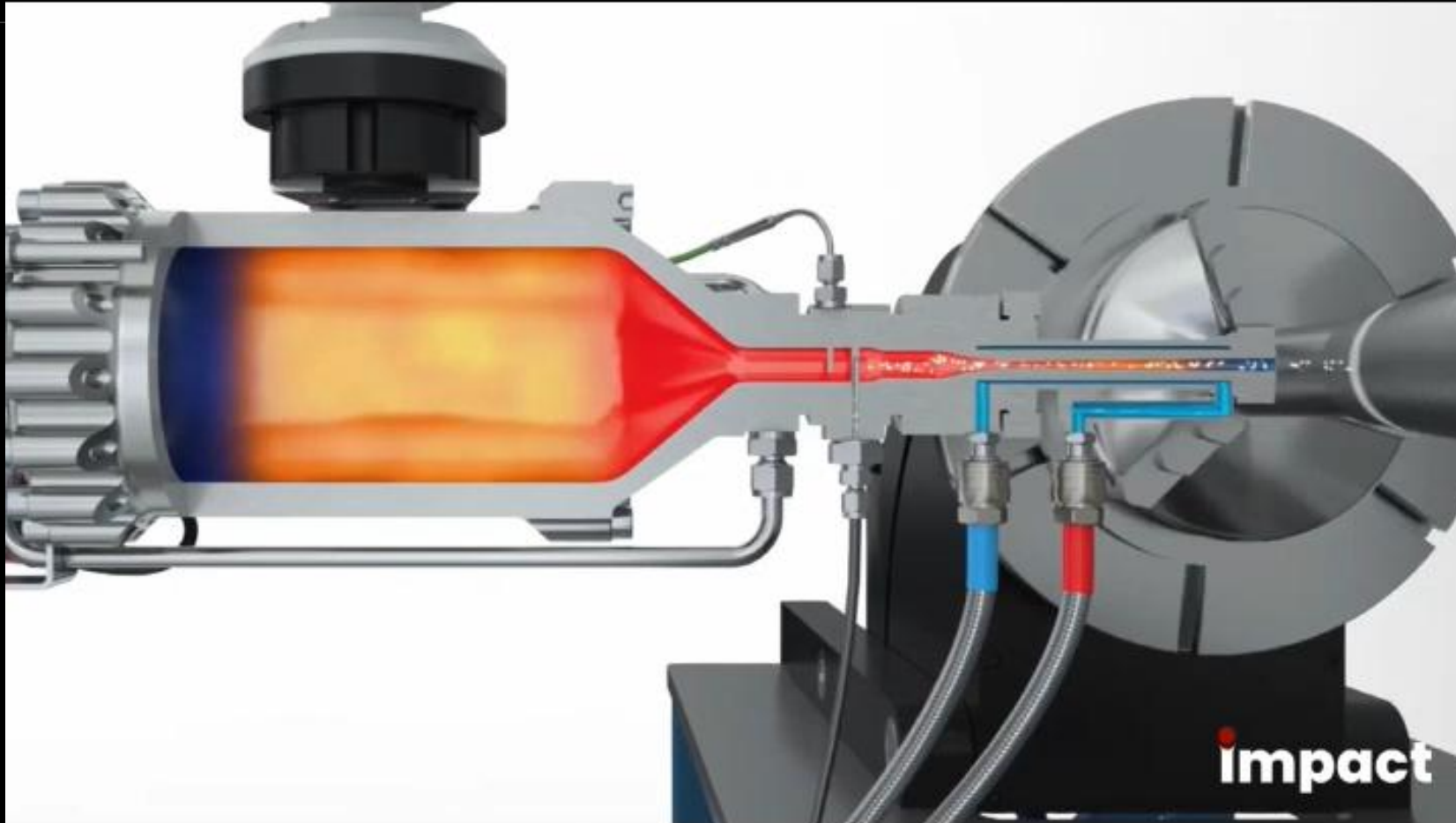
2 Powder is propelled to particle speeds of up to 1.200 m/s in the gas stream

3 Upon impact, the highly focused spray jet causes particles to deform and adhere, creating a robust and cohesive surface



We focus on kinetic energy to enable a solid-state process

HOW IT WORKS – FROM PARTICLE ACCELERATION TO STRONG, DENSE COATINGS





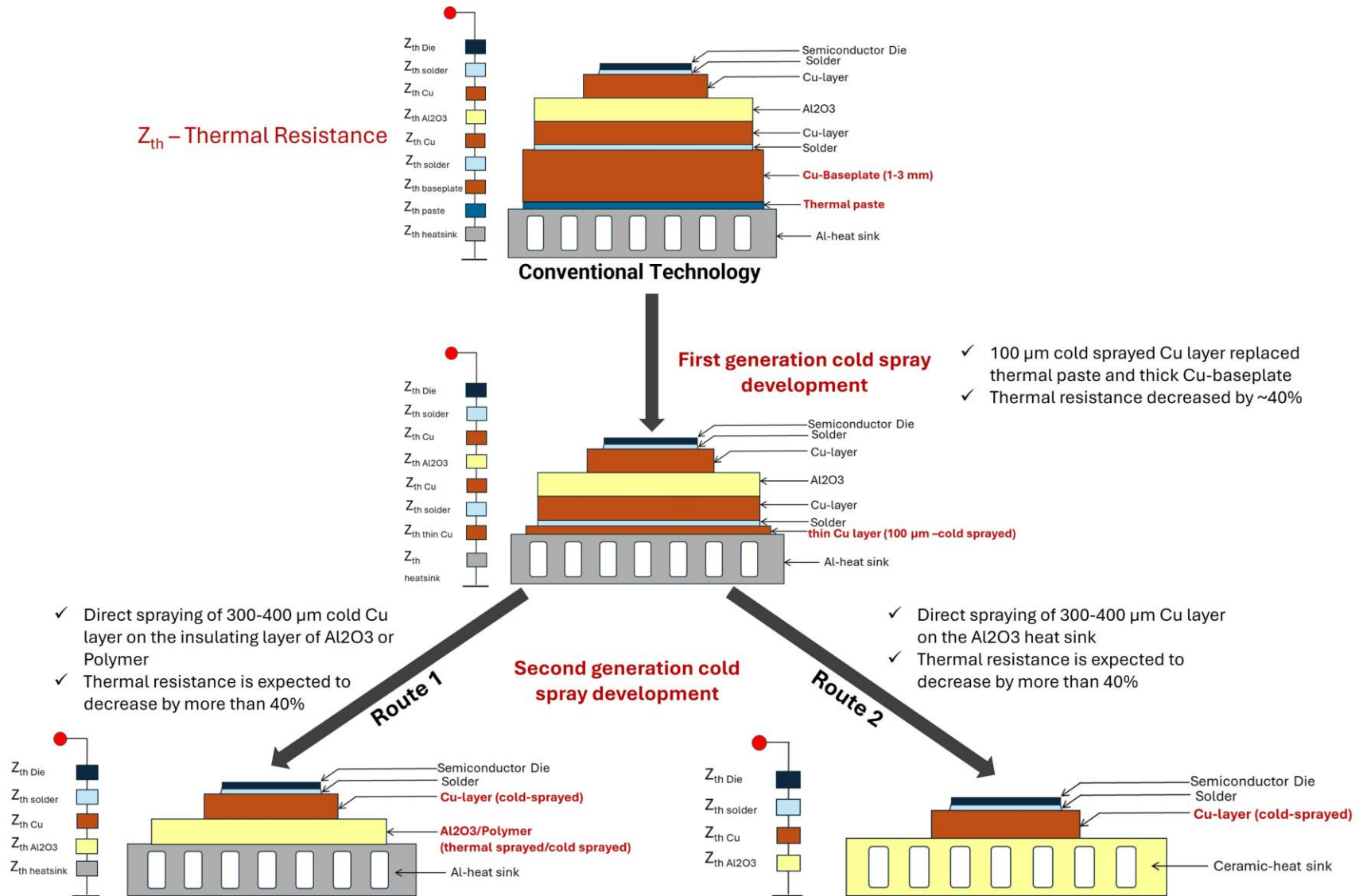
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Hybrid heatsinks & BUSBARS

Chapter 1:

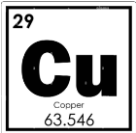
Aluminium heatsinks & Busbars with
Solderable copper coating

impact Performance, simplicity, cost efficiency

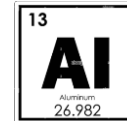


impact First generation of cold sprayed hybrid heatsinks

SOLDERABILITY, COST EFFICIENCY, PERFORMANCE

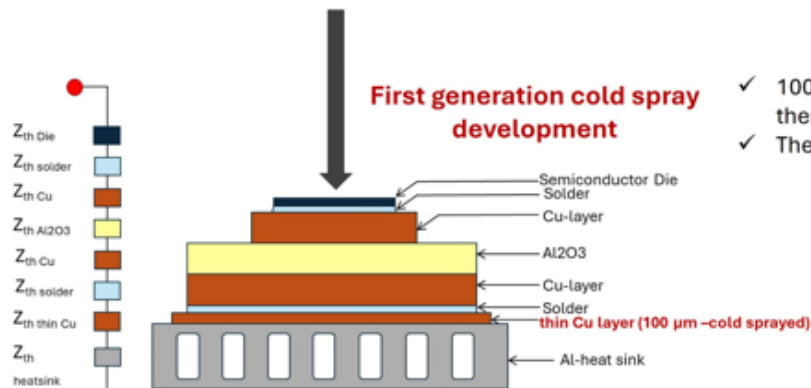
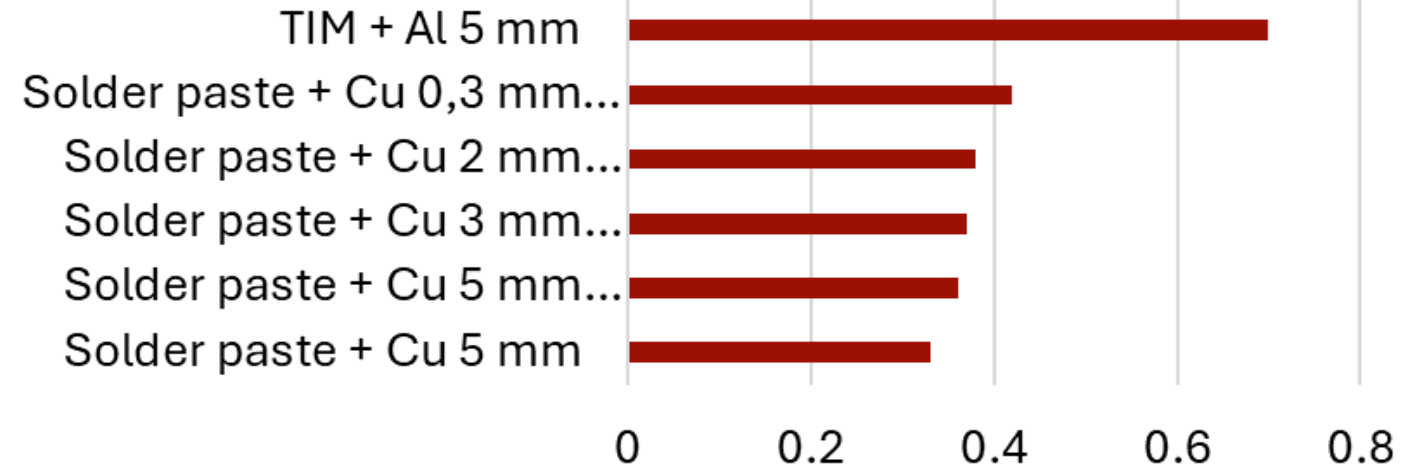
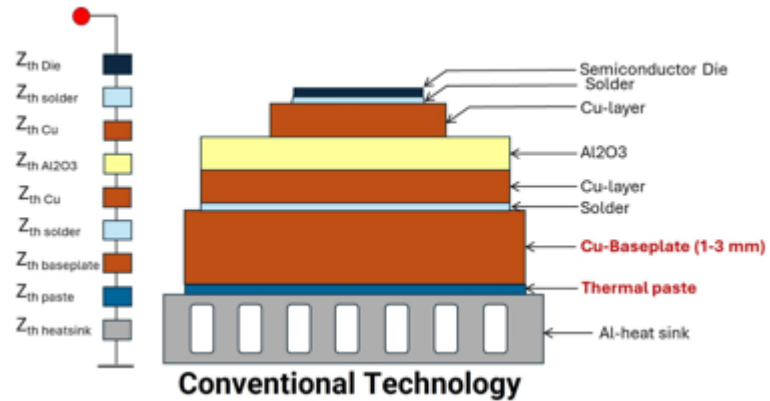


- ✓ Solderable
- ✓ Sinterable
- ✓ Highly conductive



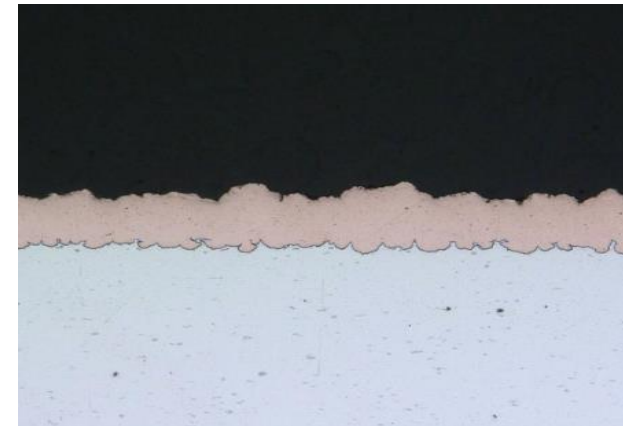
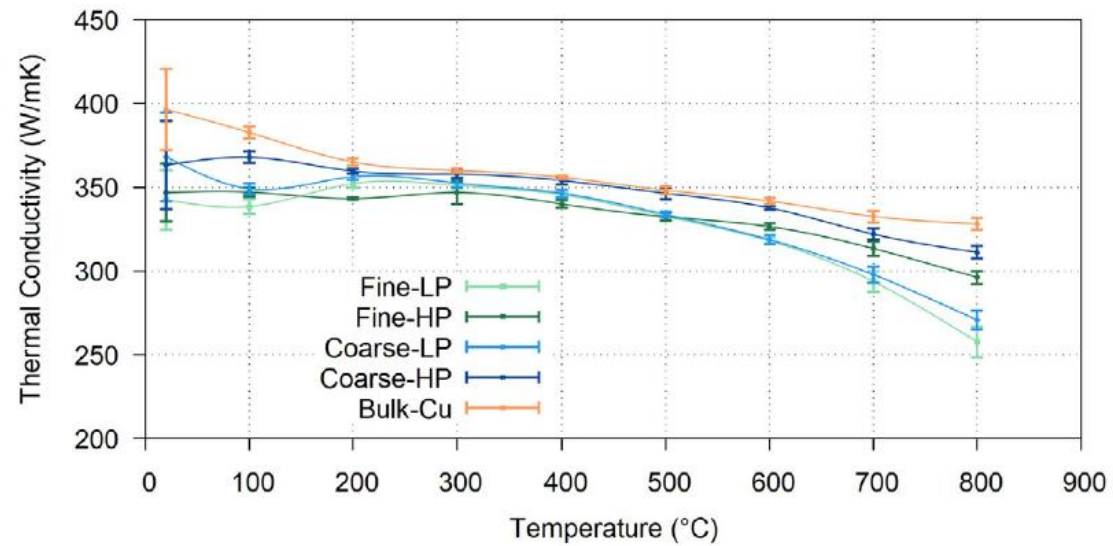
- ✓ Light weight
- ✓ Easy sourcing
- ✓ Uniform cooling circuit

impact 1st stage – substitute the thermal paste with solder paste



- ✓ 100 μ m cold sprayed Cu layer replaced thermal paste and thick Cu-baseplate
- ✓ Thermal resistance decreased by ~40%

impact Ready for High-Volume Production



Overall flatness

Tolerance

-40 / + 100 µm

Bonding

➤ 60 Mpa

➤ Copper purity up to 99,5%

impact Ready for High-Volume Production

IMPACT TURNKEY SYSTEMS DELIVER RELIABLE, EFFICIENT COLD SPRAY PERFORMANCE – BUILT FOR SEAMLESS, ECONOMICAL PRODUCTION WHERE EVERY DETAIL DRIVES SUCCESS

TURNKEY SOLUTIONS

- Homogenous coatings in under 15 seconds
- Highly solderable / sinterable
- Physical properties close to bulk material
- IACS up to 95%
- Thermal conductivity up to 368 W/mK



Automotive

Liquid-Cooled Inverter Heatsink



Trusted by

BOYD

ENPACT **VZU**
PLZEŇ

& others

Impact Innovation's solution(s)

- Selective copper coating on aluminium components
- Solderable copper coatings on aluminium heatsinks
- Solderable copper coatings on non-metal substrates (e.g. Peek, strong polymers)



Success factors

Material efficiency: Less copper, lower weight, reduced material costs

Superior Performance: Outstanding thermal and electrical conductivity

Lightweight design: Ideal for mobility and energy systems

Sustainable process: No melting, minimal waste, eco-friendly

Production Scalability: Flexible, high-volume manufacturing for automotive needs

Automotive Busbar



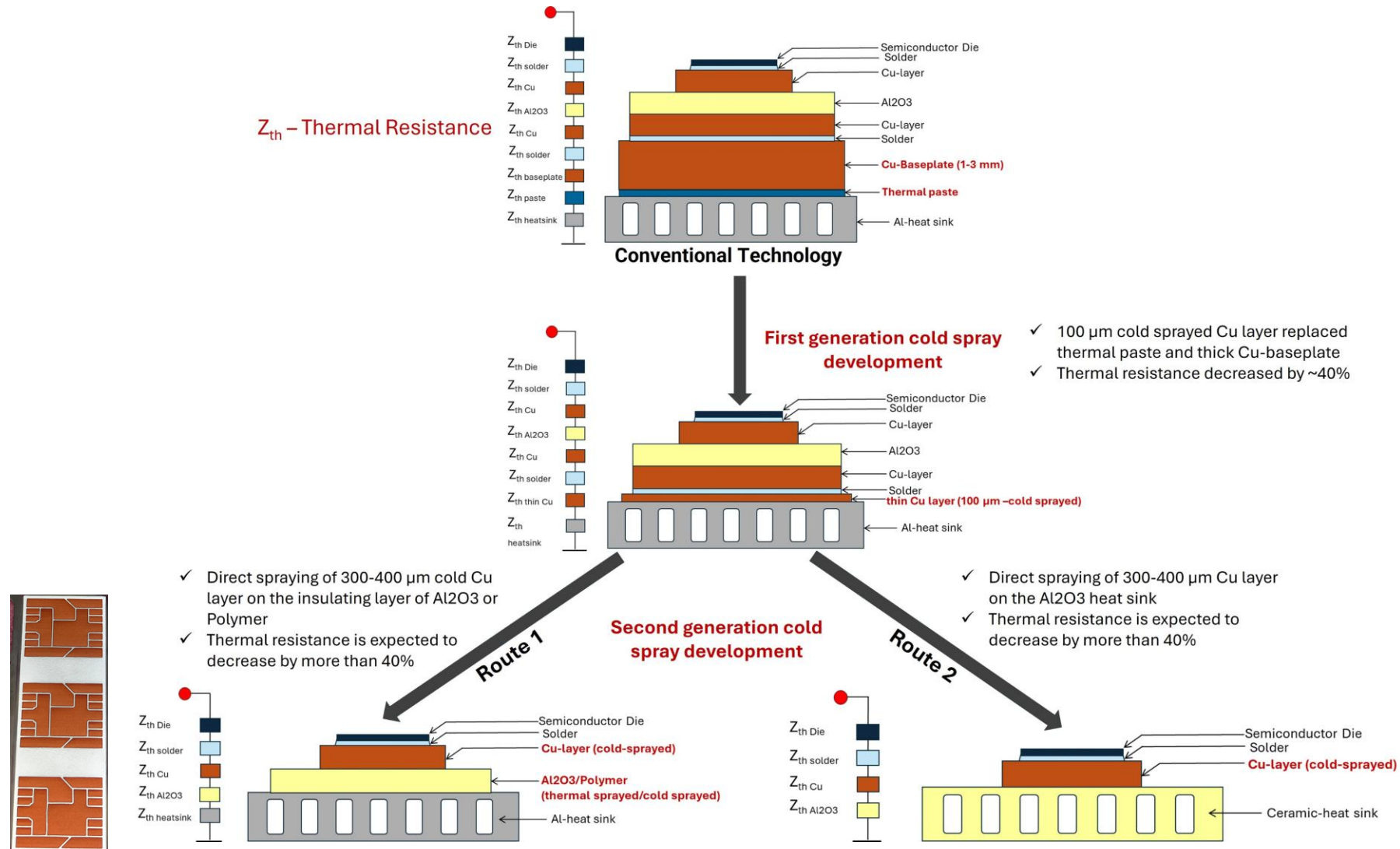
A close-up photograph of a hybrid heatsink. The central feature is a circular copper-coated ceramic layer, which is mounted on a larger, silver-colored metal base. The background is dark and out of focus.

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Hybrid heatsinks route 1

Copper coating on ceramic layers

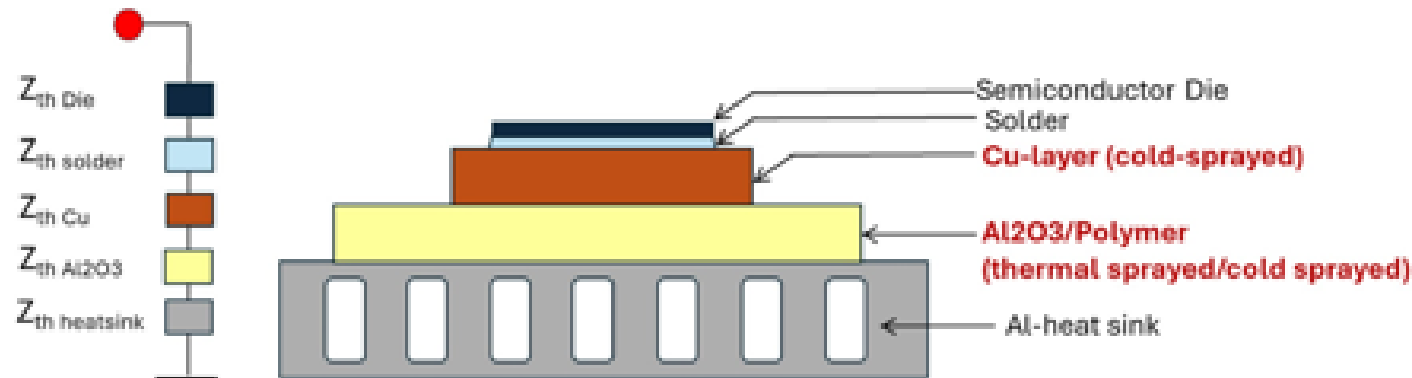
impact Route 1, eliminating layers



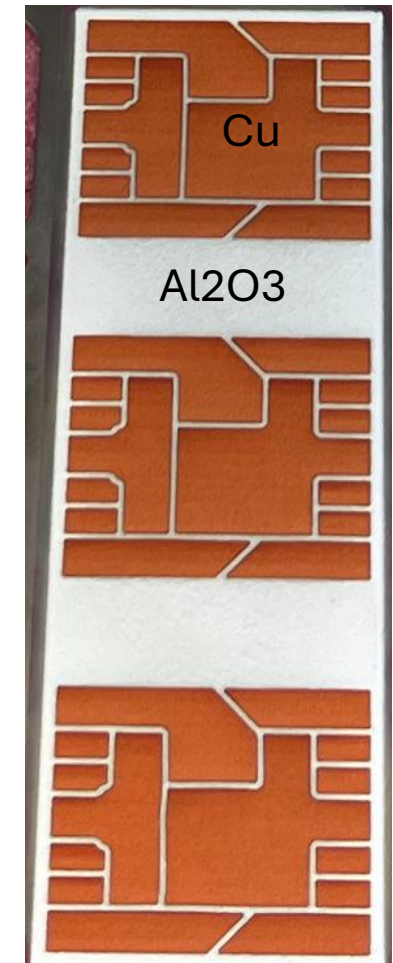
impact Al₂O₃ (Plasma Spray) + Cu (Cold Spray)

SCHAEFFLER

Project 2025 with Vitesco Technologies Germany GmbH



+



- 200-500 μ m Al₂O₃ and Cu-coating are feasible to deposit
- Further development for industrial scale is ongoing

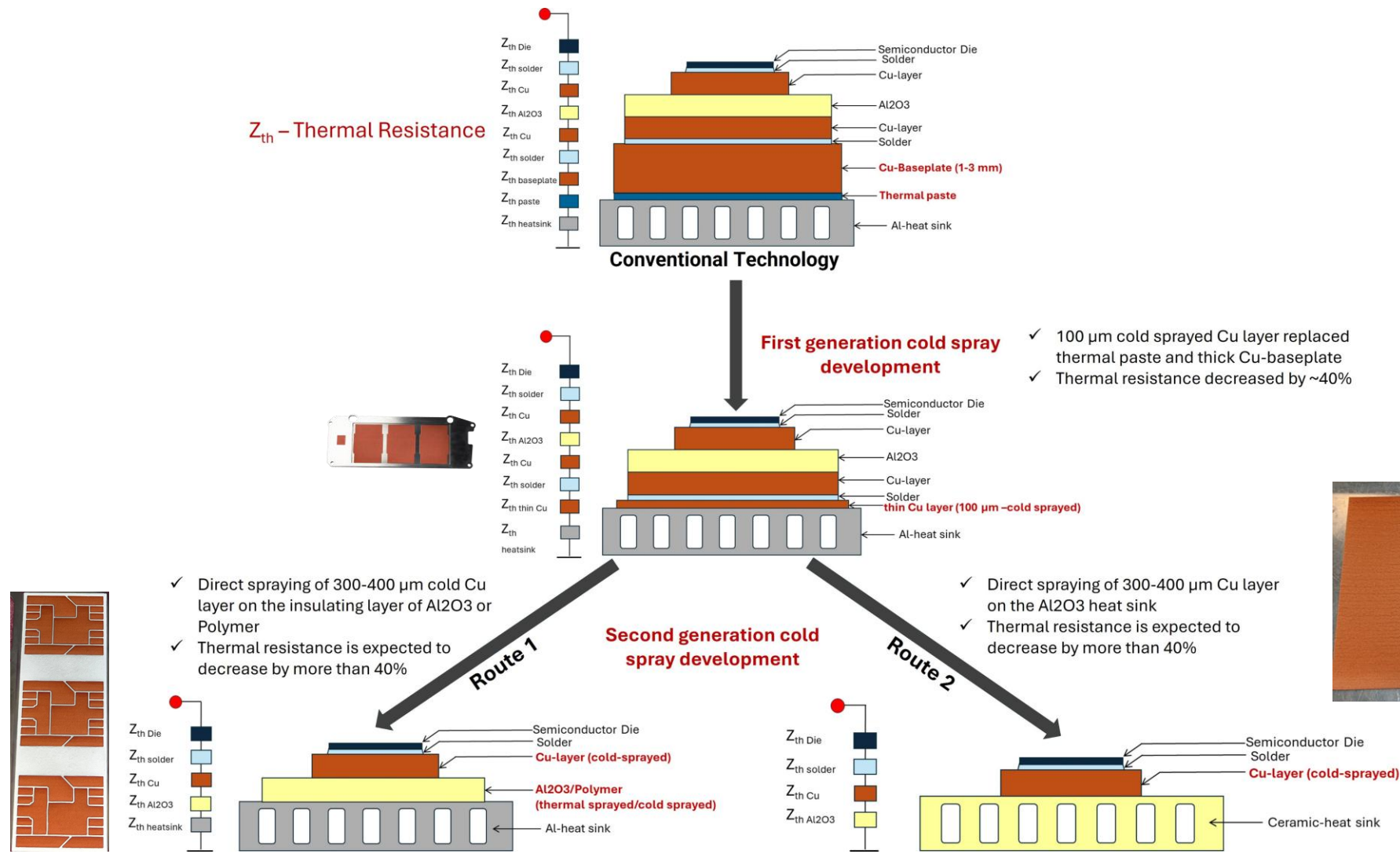
A close-up photograph of a hybrid heatsink, showing a central circular copper-coated ceramic core with a hole, surrounded by a metallic base. The background is dark and out of focus.

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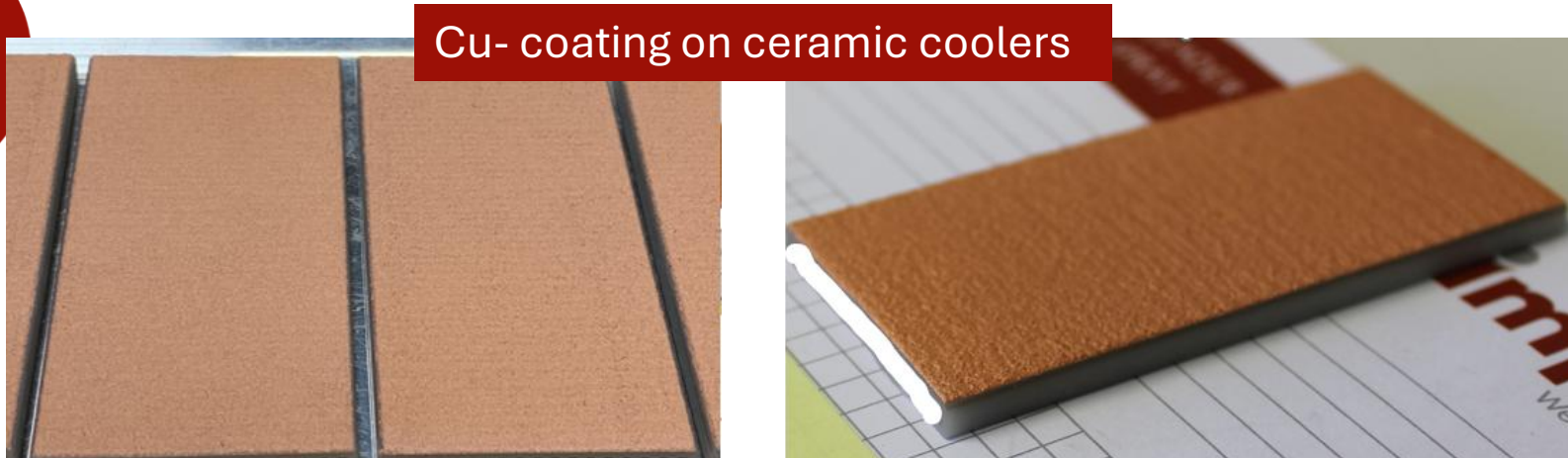
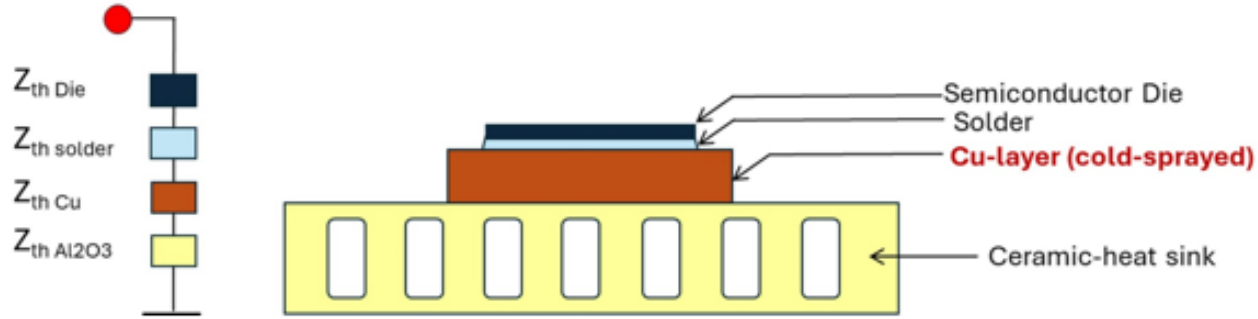
Hybrid heatsinks 2nd stage

Copper coating on ceramic heatsinks

impact Options:



impact Cu on ceramic heatsink



- No surface preparation and bond coat
- 200-500 μm Cu-coating is feasible to deposit
- Further development for industrial scale is ongoing



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HYBRID BUSBARS

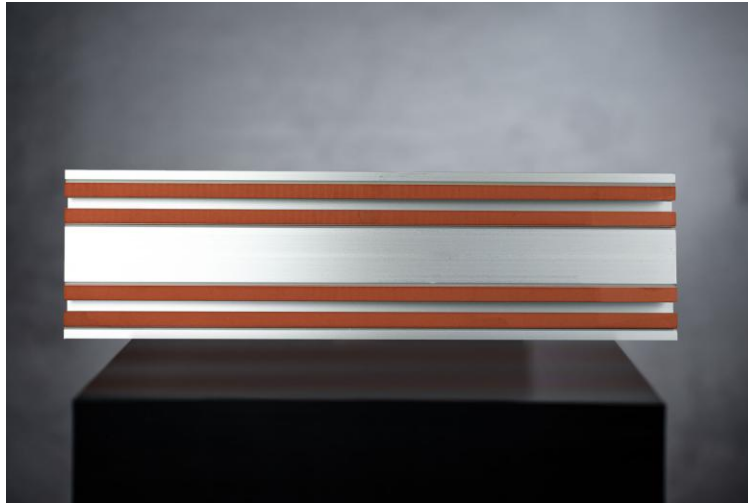
Copper coating at connection points

Energy



Impact Innovation's solution(s)

- Cold Spray coatings on aluminum busbars and conductors
- Electrically conductive coatings on CFRP substrates (e.g. Cu, Ag, Ni)



Trusted by



& others



Success factors

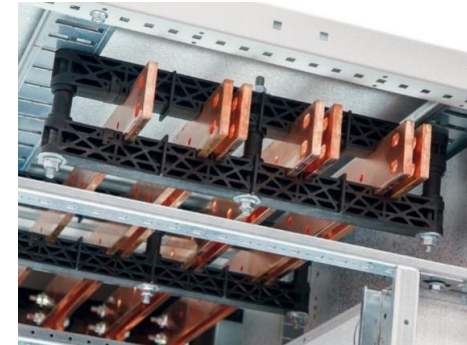
Highest Performance by low cost: Replace solid copper with functional Cu coatings on Aluminum to save cost and weight

Electrical Performance: High-conductivity coatings for efficient current transfer

Production Flexibility: Mask-free process, adjustable coating thickness and spot width

Advanced Integration: Enables conductive surfaces on non-metallic parts (e.g. CFRP)

Scalable Output: Suitable for industrial-scale production with minimal material waste



Close collaboration with customers and partners



Any Questions?



INNOVATION STARTS WITH CURIOSITY – AND GREAT CONVERSATIONS.

Whether you have questions, ideas, or bold visions – we’re here for it.

Let’s talk about your challenges, explore possibilities, and create impact – together.





THANK YOU!
LET'S SPRAY THE FUTURE TOGETHER.

Michael Dasch
International sales
md@impact-innovations.com

