

## WHY THIS MATTERS

**Aluminum lowers cost only if the joint holds.**

Aluminum is attractive because it is cheaper and lighter than copper. That creates a real cost opportunity in cables and busbars, but only if the connection stays reliable for years. In power electronic products with long service life, the commercial risk sits at the joint: loosening, creep (deformation), and maintenance complexity can erase the savings.

*The business case depends on a connection that stays tight over time.*



Example connector candidates and bi-metallic interfaces reviewed for aluminum cables and busbar connections.

## HOW IT WORKS

**Deformation risk is designed out at the joint.**

The study looks at how time, temperature, and local stress interact in aluminum joints. Around 100 °C and 30 MPa, creep can begin, so the design objective is to keep compressive stress low and stable. That brings connector geometry, torque, and Copper /Aluminum interfaces into focus. The result is a practical set of rules for manufacturing, installation, and long-term use.



Preliminary Results: Connector designed for aluminum cables and copper connections, great economic importance

## WHAT THIS PROJECT DELIVERS

**From material choice to connection instructions.**

The project identifies viable connector concepts, clarifies stress limits, links torque to compression force, and defines what should be tested next. That gives product, installation, and service teams a clearer basis for using aluminum in real applications.

## WHO IT IS FOR

**For OEM, installation, and service teams.**

The work is relevant for charger OEMs, manufacturing teams, installers, field service organizations, and suppliers. Any move from copper to aluminum changes connector selection, assembly conditions, maintenance practices, and long-term risk management.

## SNAPSHOT

**Lead**  
Dr. Juha Varis

**Focus**  
Al busbars + joints

**Timeline**  
validation path 9 months

**Partner**  
Kempower

**Primary output**  
design rules + test roadmap