

# Panel

KERAMOLD – New thinking of Thermal Management in 3D

Speaker: Wolfgang Höfer



# Agenda



Kerafol – company introduction



Electronics protection methods



Thermally conductive granulates



Processing technologies



Case studies



Take aways

# The company



Founded in 1985



Experience in technical ceramics and thermal management



R&D and production under one roof –  
100% Made in Germany

**THERMAL  
MANAGEMENT  
SOLUTIONS**



**CERAMIC TAPES  
& SUBSTRATES**



**CERAMIC FILTER**



**SOLID OXIDE  
FUEL CELLS**



# Why should electronics be protected ?



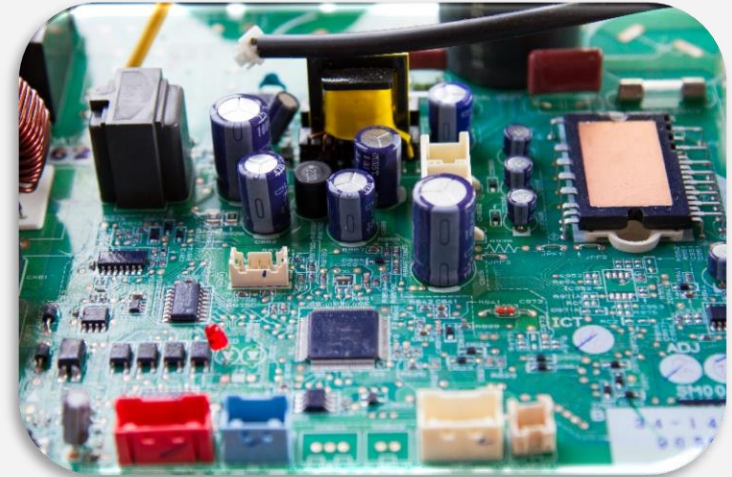
Resistance to environmental factors including cooling



Dielectrical protection

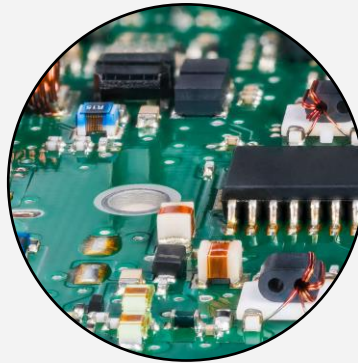


Mechanical protection



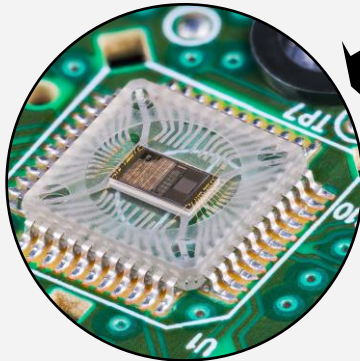
**Conformal**

**coating**

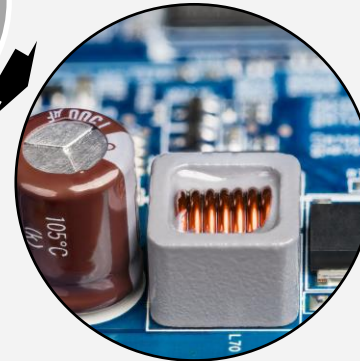


Common  
technologies  
for  
protection

**Overmolding**



**Potting**



# Thermal management important for functionality and safety of PCB



Reduced component lifetime

Degraded performance

System failures

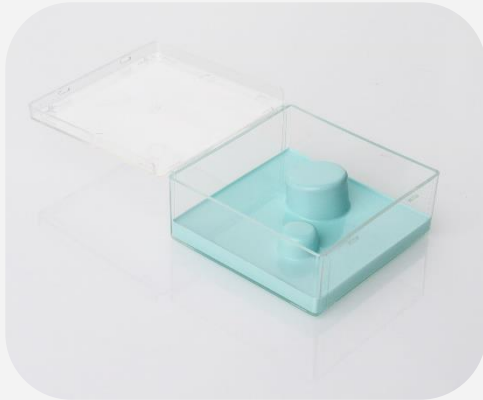
Fire risk

Loss of structural integrity

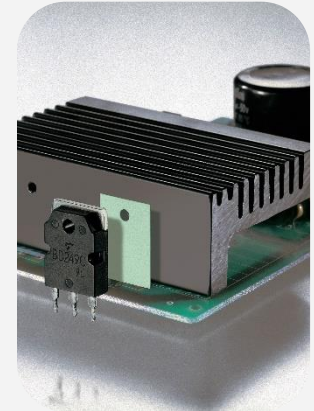
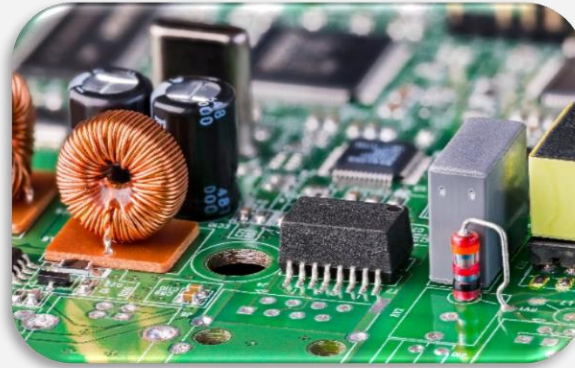


## Majority of designs is fine with common solutions

✓ PCB is protected by standard processes



✓ TIM solve thermal issues

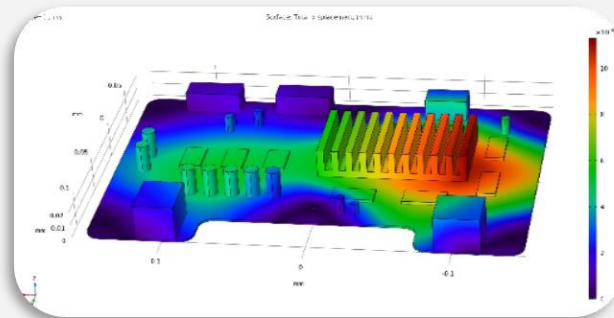




## Thermally conductive granulate as a smart „all in one“ solution



- ✓ Thermal transfer in X/Y and X/Z direction (3D)
- ✓ Thermal conductivity up to 2.5W/mK
- ✓ High electrical insulation
- ✓ Increased thermal capacity
- ✓ Protection against environmental factors
- ✓ Low Shore A hardness level: gap compensation and vibration control
- ✓ Fast production cycle

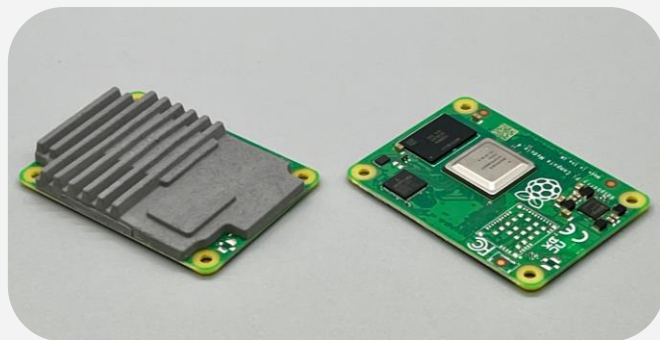




## Processing methods



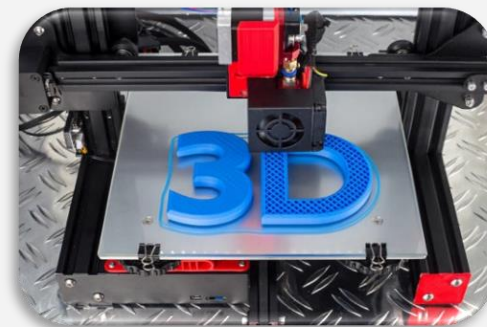
- Overmolding



- Injection molding



- Prototyping





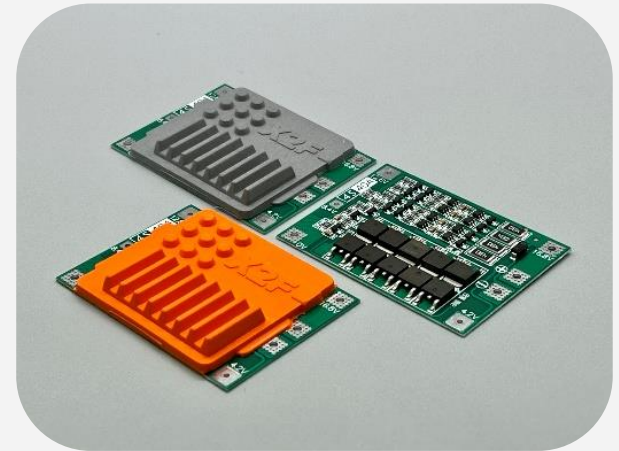
## OEM: Power tools for professionals

- OEM looking for standard BMS protection
- Kerafol proposed as alternative to coating process
- Low pressure overmolding



## Application: BMS

- Fast process
- Temperature drop down of 30°C





## OEM: Power electronics mnf

- OEM looking for TIM
- Keramold proposed for both dielectrical protection and thermal surface connection
- Low pressure overmolding due to elasticity of busbars



## Application: DC converter busbars

- Much faster process
- 2 in 1 solution
- Cost saving on material





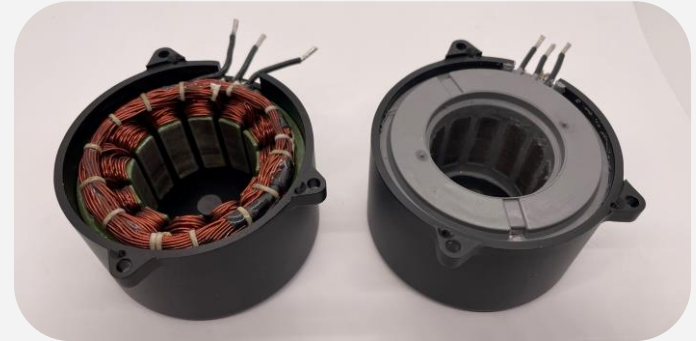
## OEM: E-Bike mnf

- Supplier struggled with complex thermal challenge
- Kerafol proposed as solution due to its properties
- Injection molding made on random equipment



## Application: e-motor

- Success on solving heat challenge
- Cost comparable to standard TIM





## KEY TAKEAWAYS



- 💡 There is a solution for thermal management as 3D part
- 💡 Different challenges solved by one material
- 💡 Tailored made solution
- 💡 Material working like typical TIM
- 💡 Heat transfer in all directions
- 💡 Increased thermal capacity
- 💡 Ordinary processing methods
- 💡 Fast production cycle
- 💡 Cost reduction

# Thank you for your attention

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