WESYSTEMS

WE SYSTEMS - BONDING & MORE

Mathias Niekrenz

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

YOUR SPEAKER

Mathias Niekrenz

- WE Systems Product Management
- With Würth Elektronik CBT since 2019

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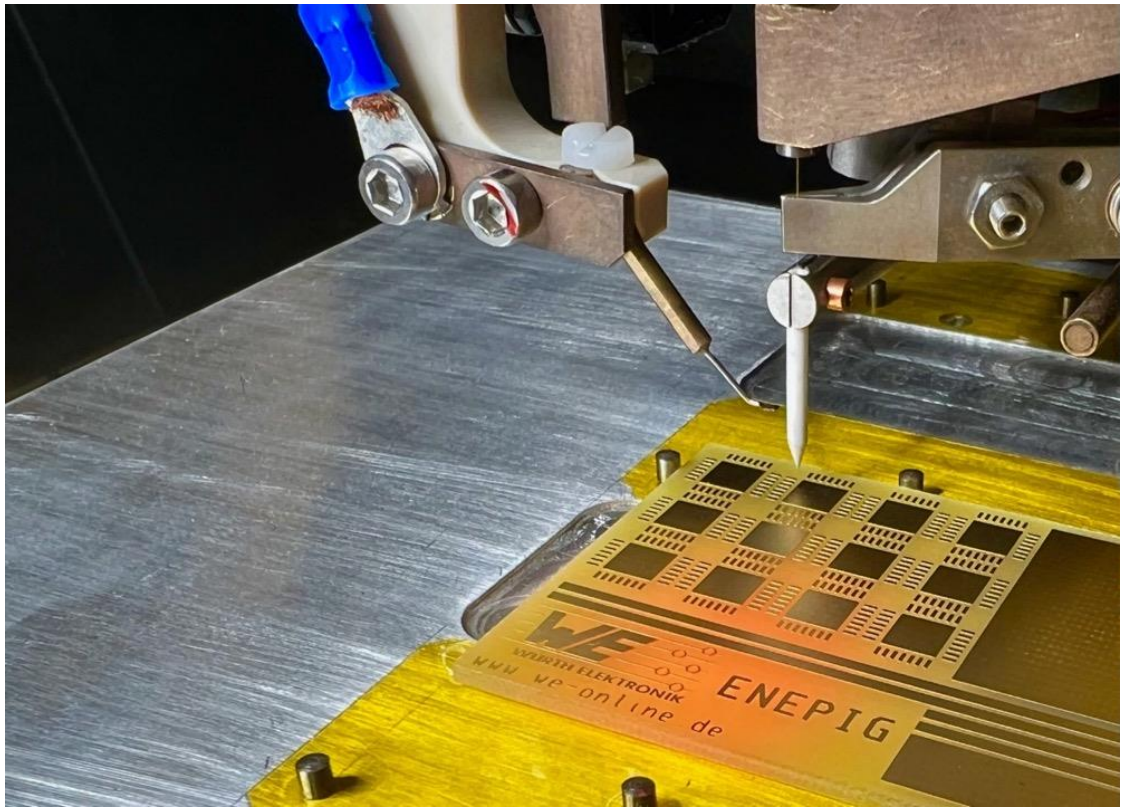
Mathias Niekrenz
Product Management

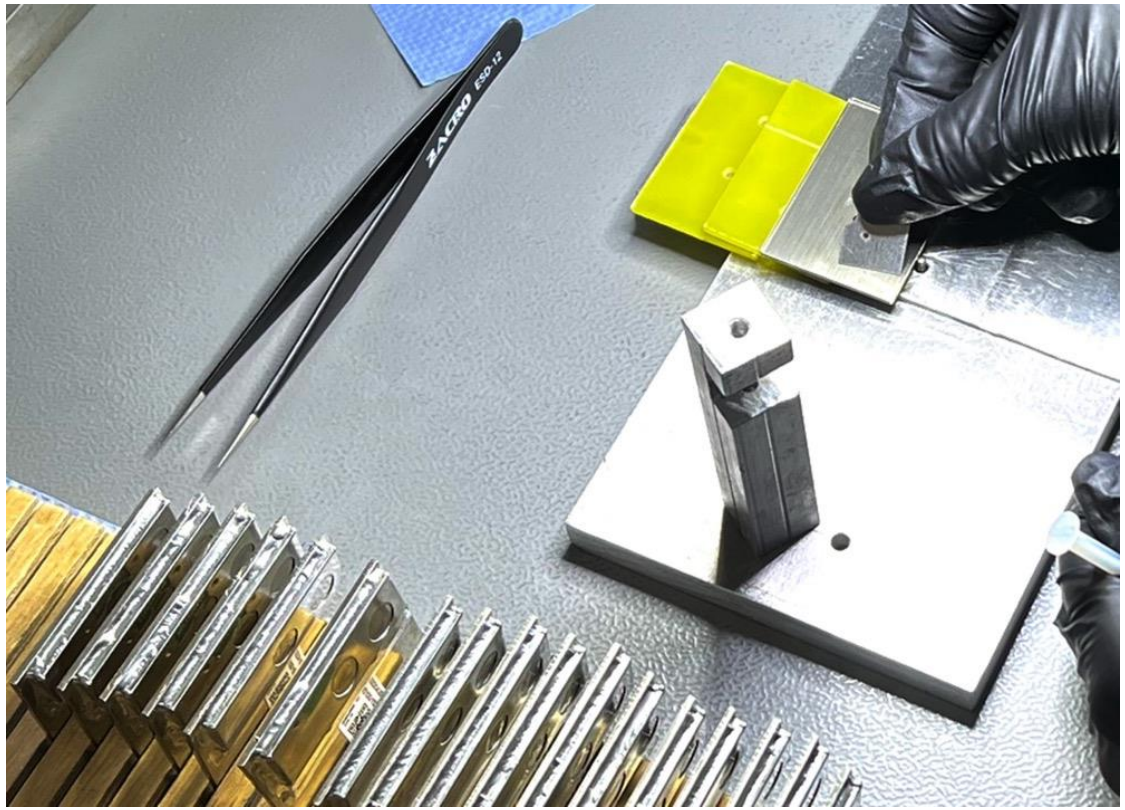
WE SYSTEMS

Who we are and what we do

Bonding



SYSTEMS



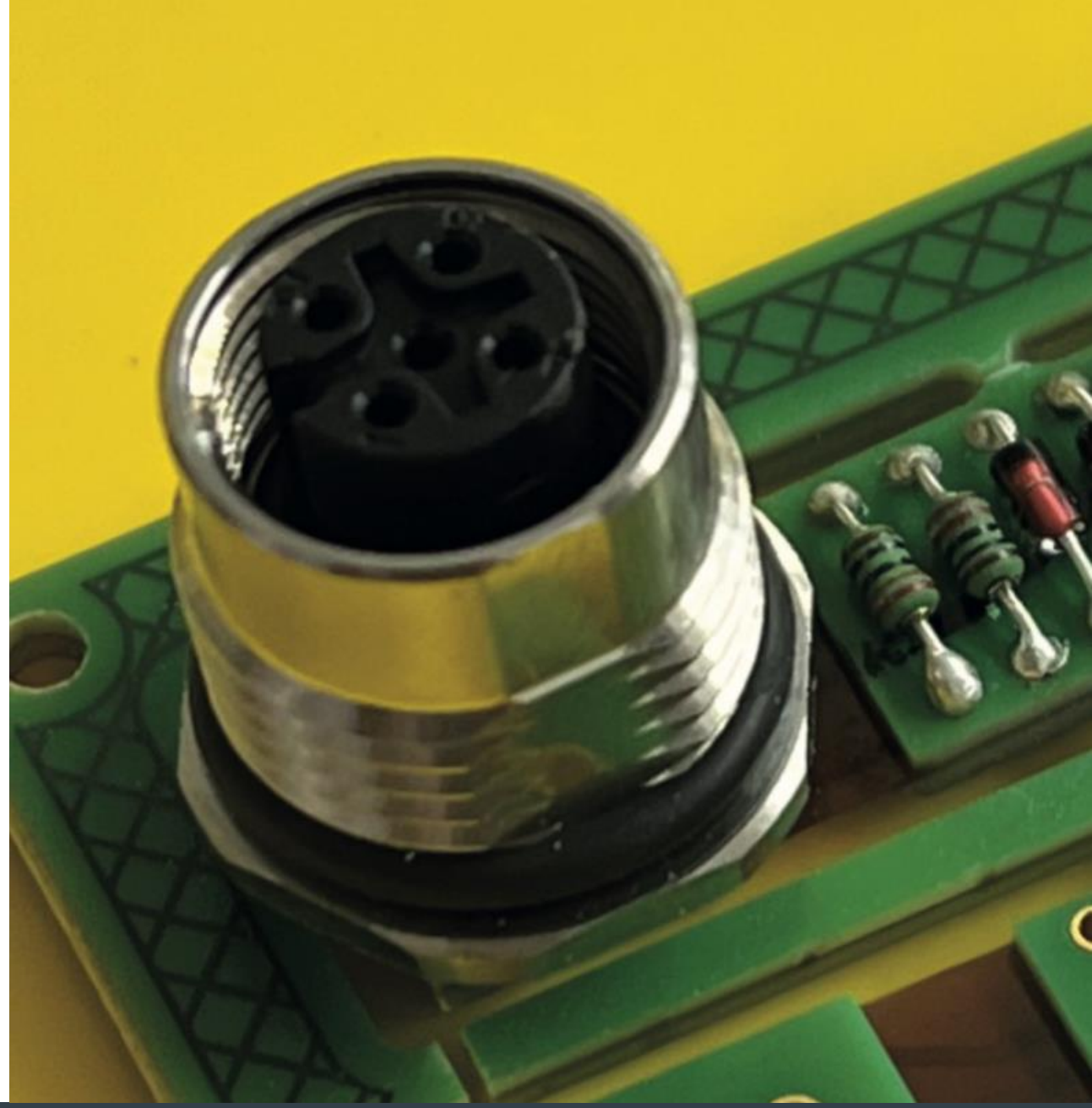
WE SYSTEMS

Services

- Die-Bonding
- Wire bonding aluminum & gold
- Glob top
- Component assembly
- Manual and automatic soldering
- Manual assembling / SMD & wired components
- 3D-printing

- Consulting
- Process development
- Prototypes & series production
- Customized packaging

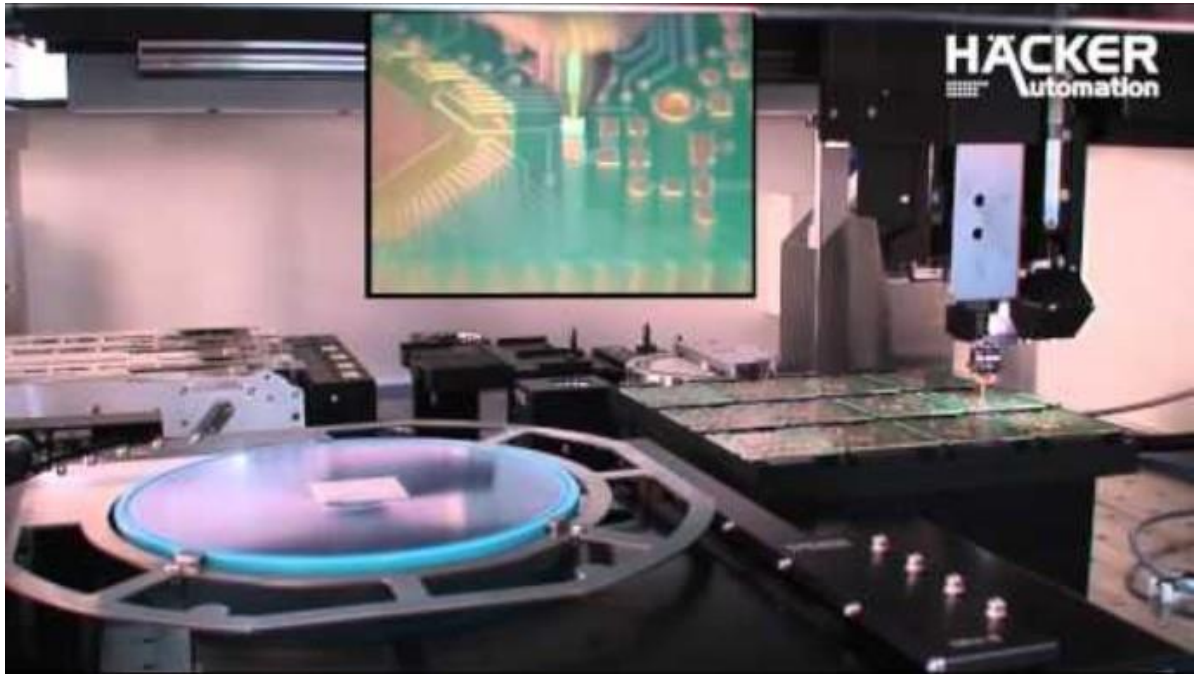
- ISO 9001 certified



DIE-BONDING – FULLY AUTOMATIC PRECISION LOADING

Technology

- Generic term for the process of permanently connecting semiconductor chips (bare dies) to a substrate
- The most common die bonding technology is the adhesive bonding process
- Alternatives would be soldering or welding die bonding processes

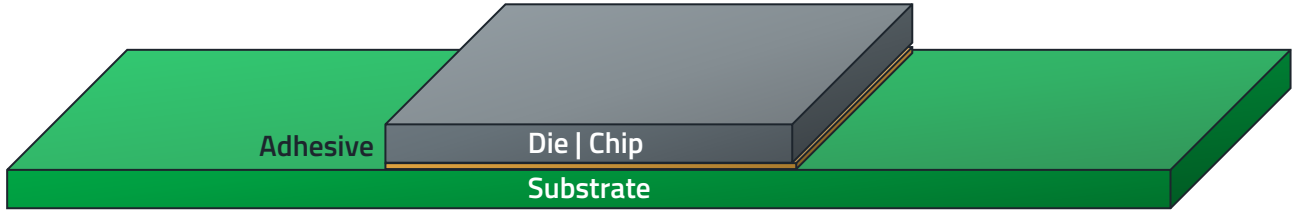


Public: https://www.youtube.com/watch?v=a2HeM0e0k1I&t=2s

DIE-BONDING

Adhesive bonding process

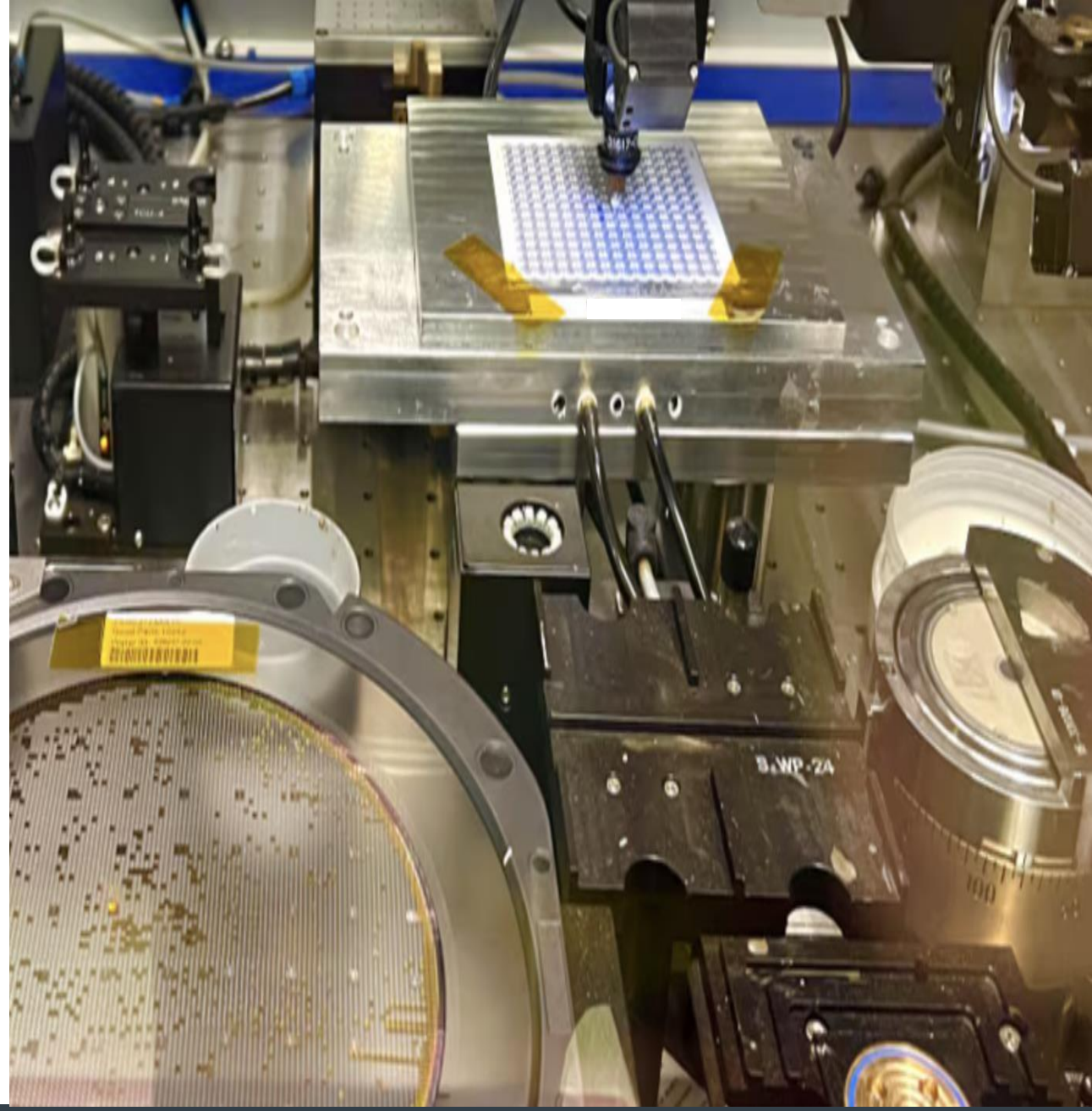
- Bonding process with electrically conductive or non-conductive adhesive
- Adhesive is applied using a squeegee or dispenser
- The die is picked up using a vacuum suction cup and placed on a substrate
- The position accuracy of the die is checked using a camera system.
- If required, the die can be placed with an accuracy of 1 µm
- Variable parameters are the amount of adhesive and the pressure with which the chip is deposited on the substrate
- Adhesive is cured in the oven



DIE-BONDING

Advantages over soldering die-bonding processes

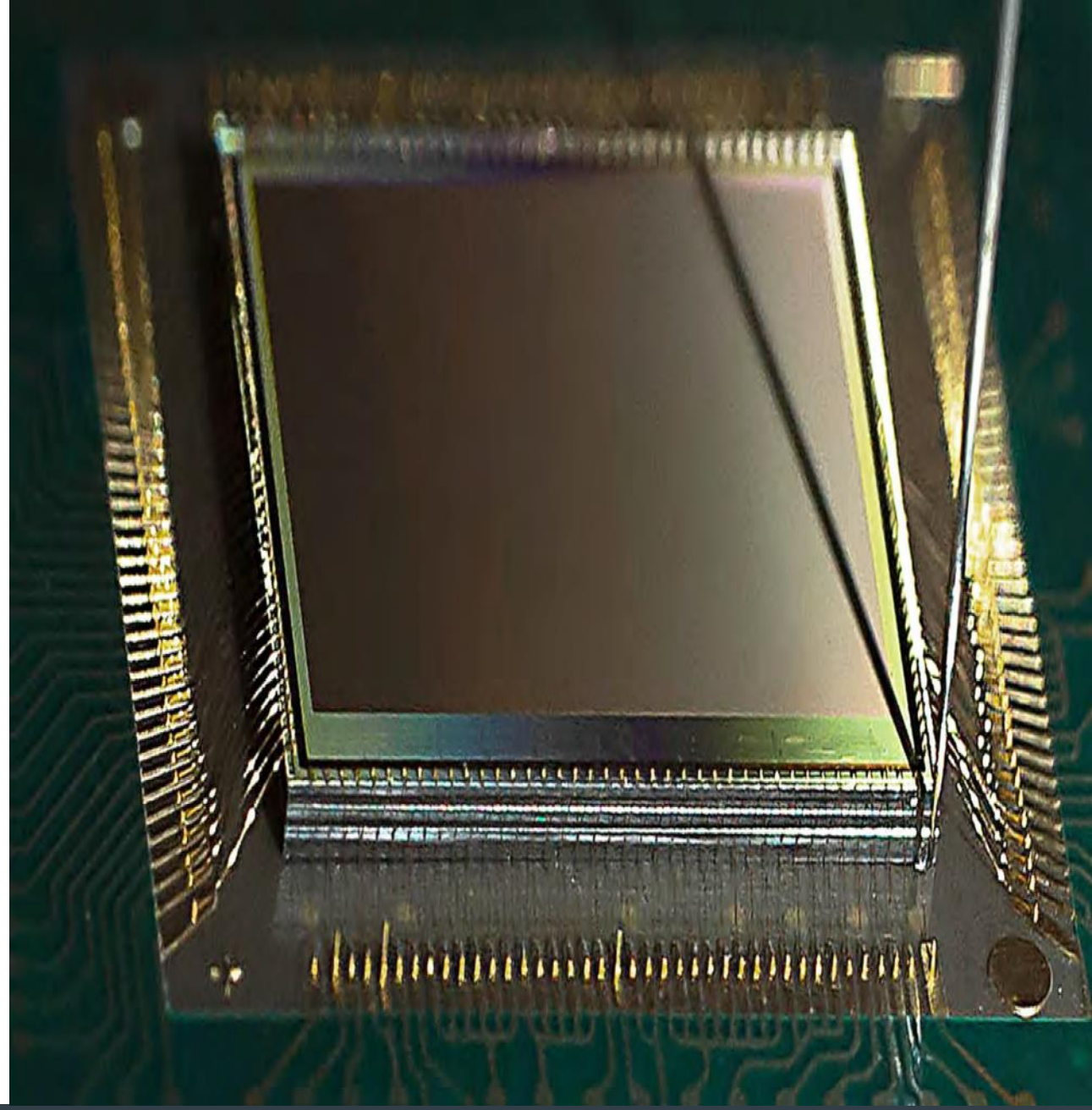
1. Simpler process requirements
2. Cost efficiency
3. Flexibility in the application
4. Thermal and mechanical decoupling
5. Simple integration of electrically insulating or conductive properties
6. Repair options



WIREBONDING

Brief overview

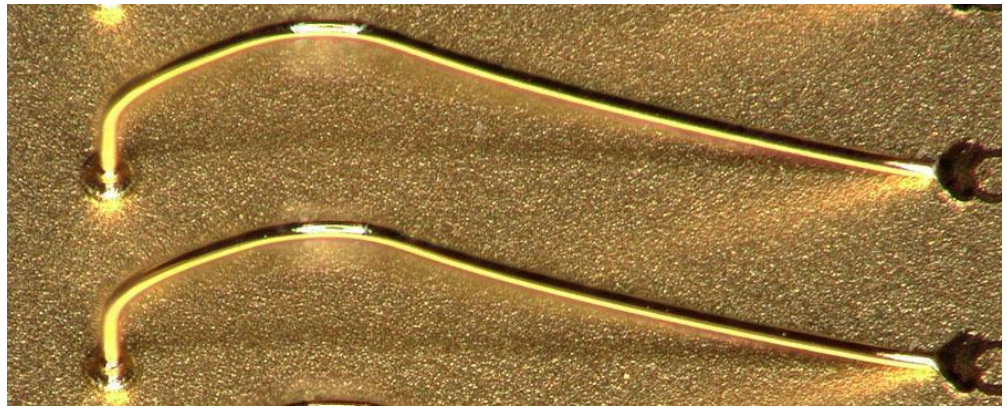
- Wire connection between carrier material and semiconductor (usually aluminum or gold wire)
- Thin wire bonding 15 - 75 µm diameter
- Thick wire bonding 100 - 500 µm diameter
- Visually and electrically verifiable contacting option
- Chip-on-board technology, power module technology, high-frequency technology or in the assembly of microsystems

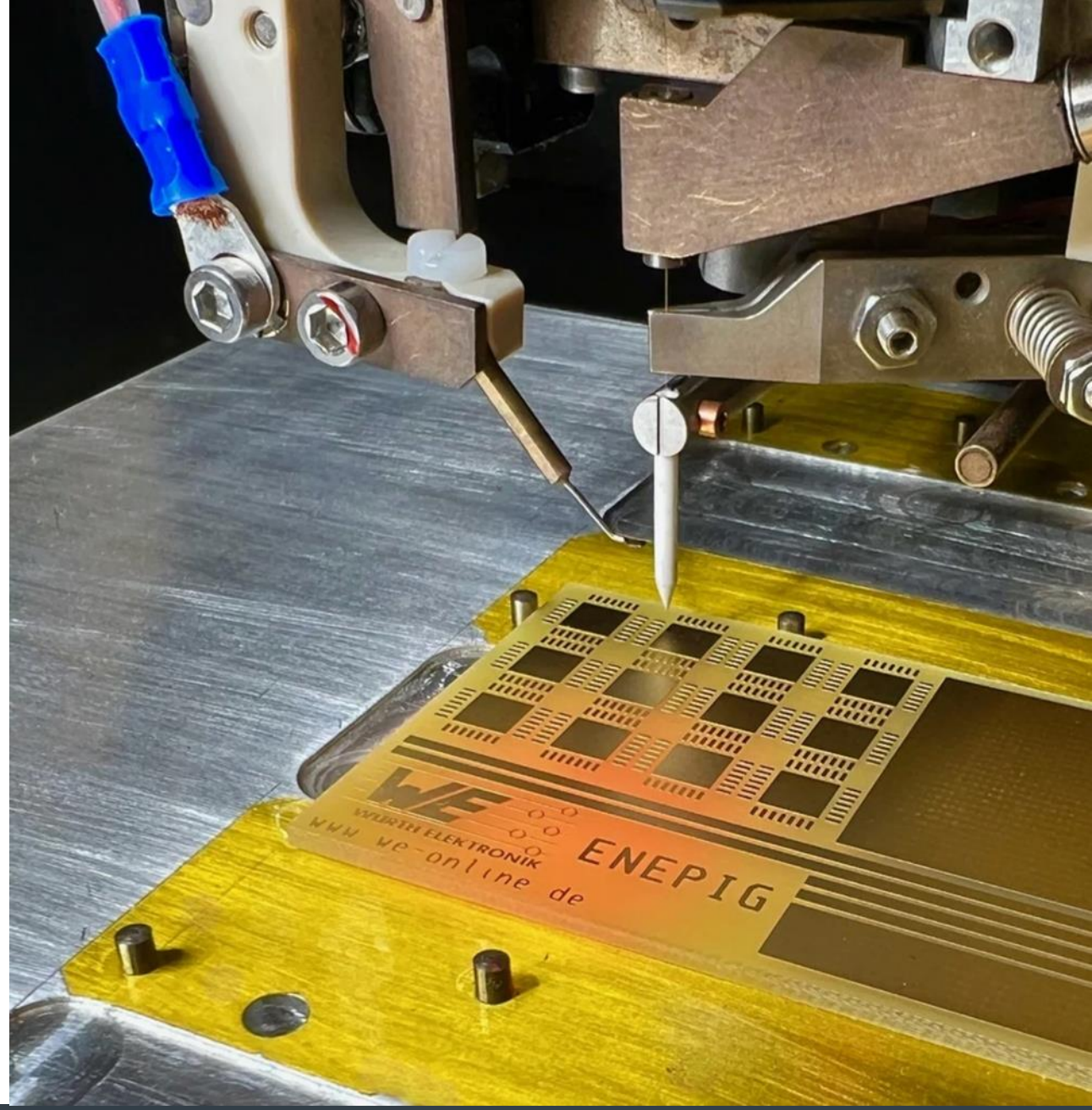


GOLD-WIREBONDING

Thermosonic Bonding (Ball-Wedge Procedure)

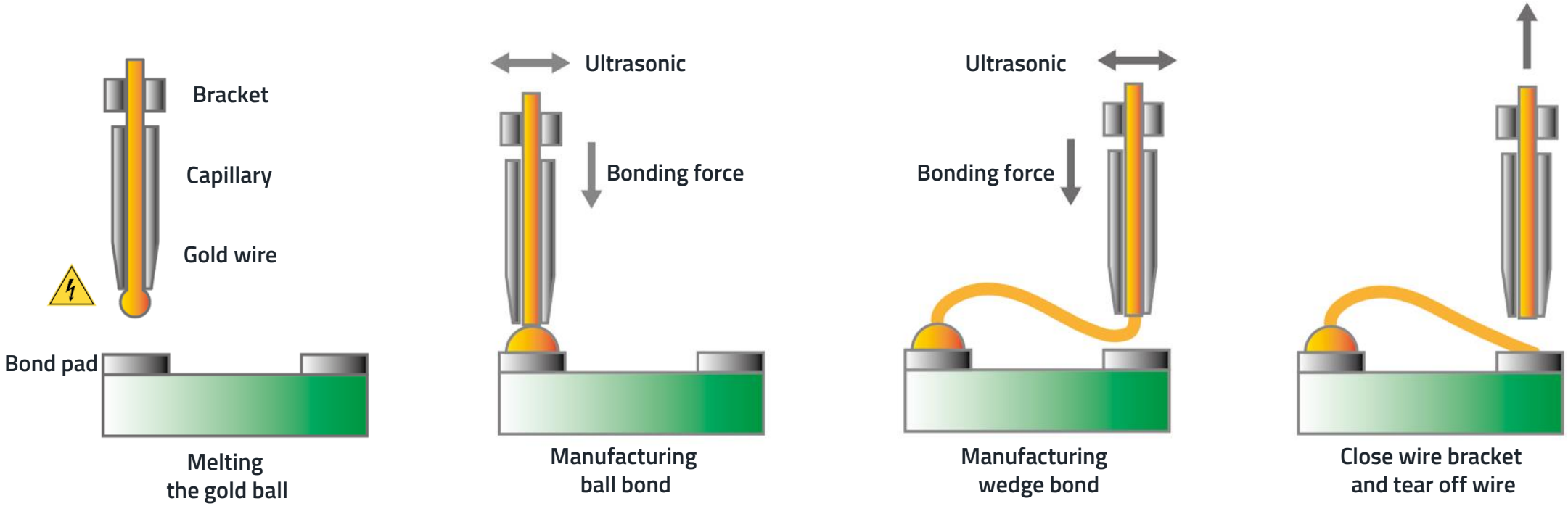
- Substrate must be heated
- Automatic process
- The geometry of the bonding wire can be customized
- For 25 µm wire, pad should be approx. 100 µm in size
- Smaller is possible, but can complicate the process
- On ENEPIG surfaces





GOLD-WIREBONDING

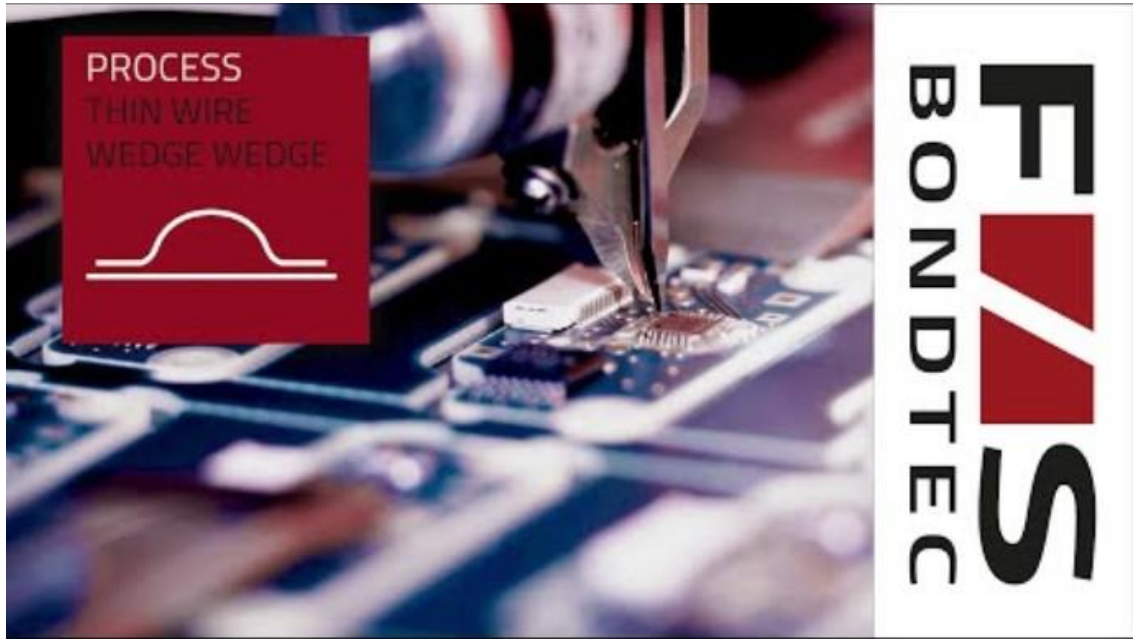
Thermosonic Bonding (Ball-Wedge Procedure)



ALU-WIREBONDING

Ultrasonic-Wedge-Wedge-Bonding

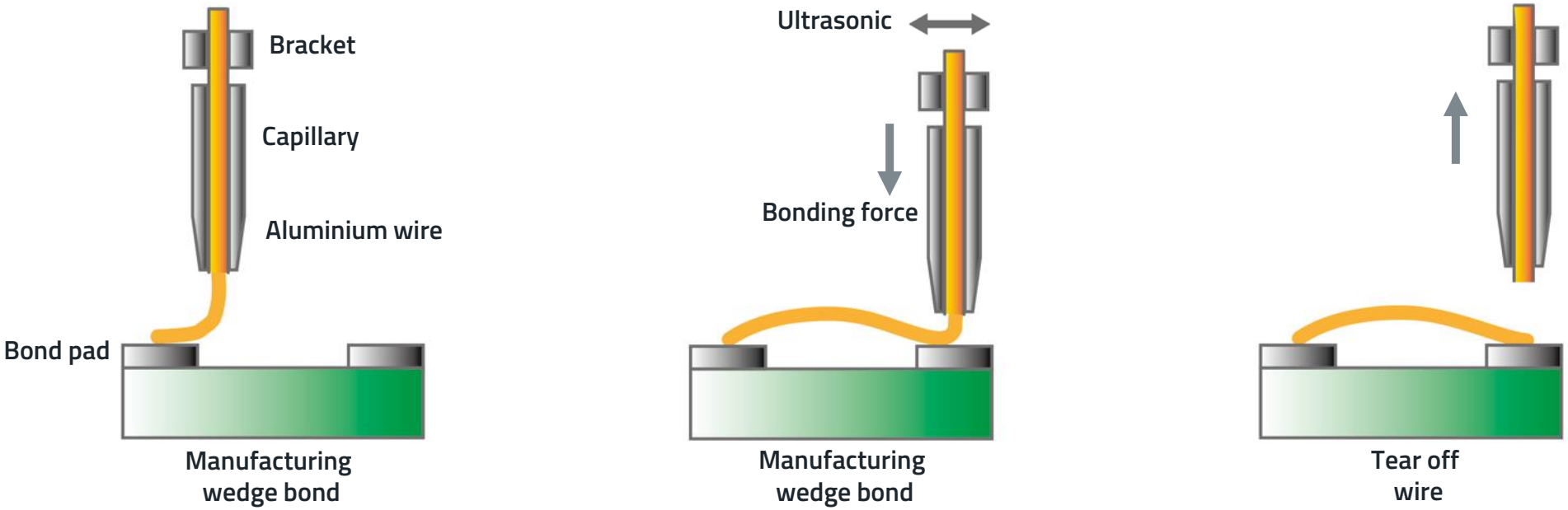
- Automatic process without heat generation
- The geometry of the bonding wire can be customized
- For 25 µm wire, the pad should be approx. 100 µm in size
- Smaller is possible, but can complicate the process
- On ENIG surfaces



Public: https://youtu.be/Fns02Cqv0cI

ALU-WIREBONDING

Ultrasonic-Wedge-Wedge-Bonding



WIREBONDING

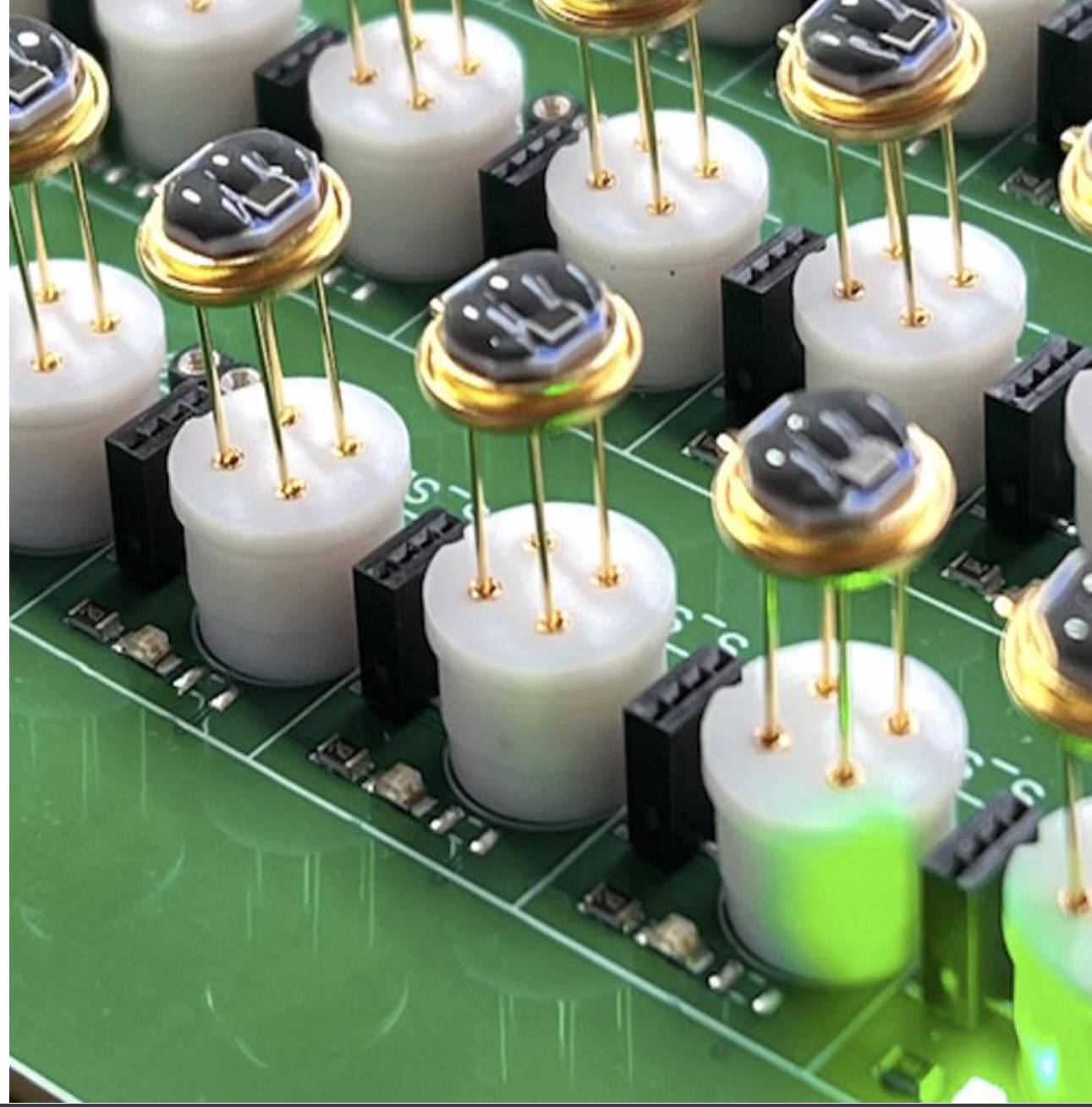
Comparison

+ Gold-Wirebonding	+ Alu-Wirebonding
Better heat dissipation	Slightly lower cost for the overall process
Better electrical conductivity	No heat generation
Higher corrosion resistance	More robust
Lower mechanical forces	Less complex process
Higher precision | smaller geometries	

GLOB TOP

Protection and stability

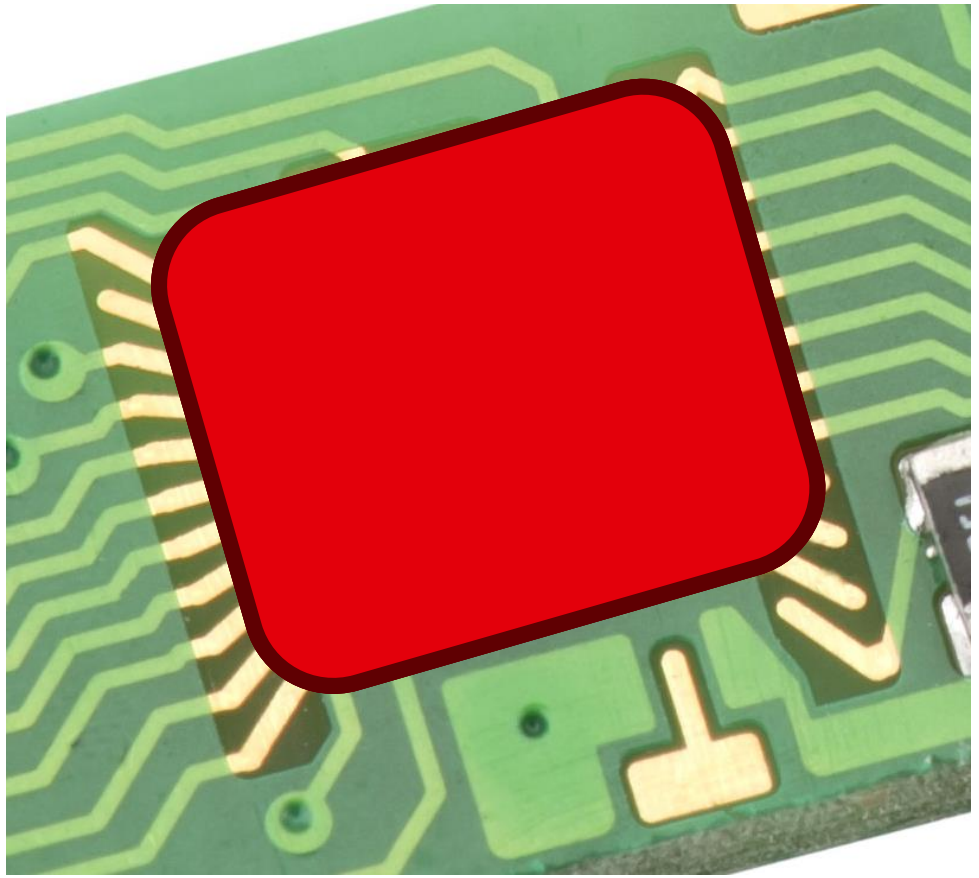
1. Mechanical protection
2. Electrical protection
3. Protection from environmental influences
4. Heat dissipation
5. Stabilization of the bonding wires



GLOB TOP

Potting options

- Full grouting
- Spot grouting
- Dam-and-Fill



GLOB TOP

Potting options

Potting materials	Advantages
Epoxy resin	▪ Mechanically stable ▪ Chemically resistant ▪ High strength
Polyurethane	▪ Flexible ▪ Shock-absorbing ▪ Good moisture resistance
Silicone	▪ Temperature-resistant ▪ Flexible ▪ Vibration-damping
Acrylic	▪ Fast curing ▪ Good for protective coatings
Thermoplastics	▪ Fast processing ▪ Easy to melt

CUSTOMIZED ASSEMBLY

We are your partner

For individual assembly and joining work, e.g. ...

- Gluing
- Filling
- Soldering
- Welding
- etc.

SOLDERING

It's getting hot...

- Reflow soldering
- Hand soldering according to IPC WHMA-A-620 / A-610
- Automatic soldering

MANUAL ASSEMBLING

We are not a classic assembler!

Larger and more complex assemblies are outsourced to external service providers

We offer:

- Special assembling
- Small series & prototyping
- Manual assemblies
- Assembly with the aid of stencil printing

WE SYSTEMS – BONDING & MORE

3D PRINTING

Tailor-made

Printing for:

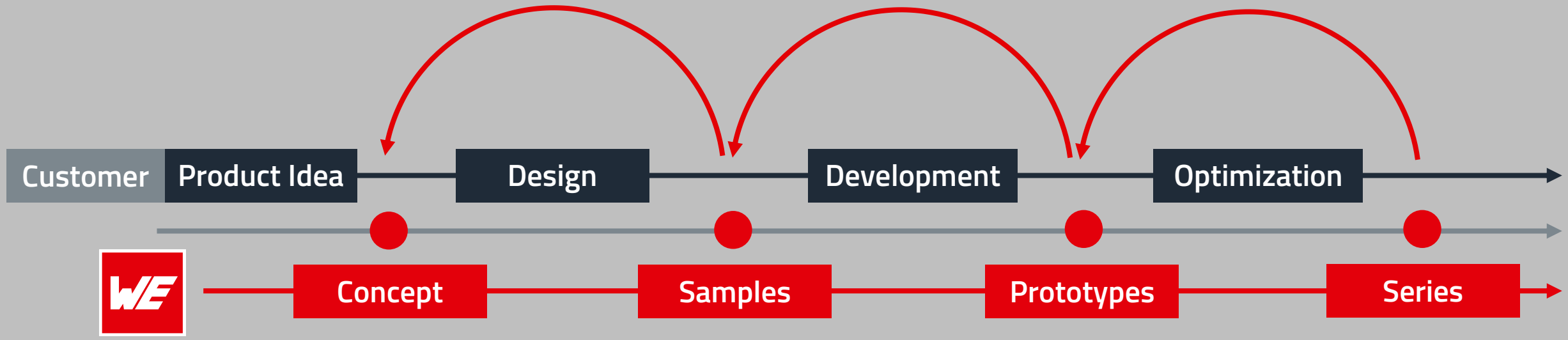
- individual returnable packaging
- Assembly components
- etc.

Use of various materials such as PC, PET…

WE SYSTEMS SERVICES

You develop the product. We develop the process.

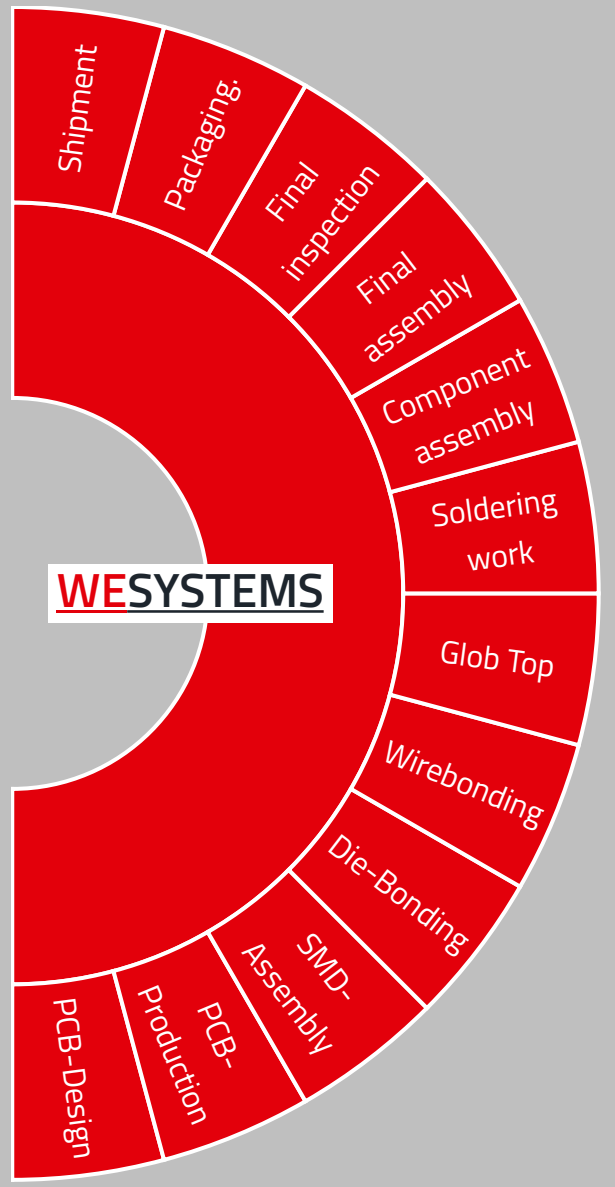
- From the product idea to series production
- From the product idea to series production
- We offer customized solutions for small, medium and series production



WE SYSTEMS SERVICES

Everything from a single source

- From the printed circuit board to the end product
- Assembly of your complete system
- Distribution
- Coordination of service providers, materials and provided parts



WESYSTEMS

THANK YOU VERY MUCH!

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