

Selective plastics metallization using primer technology

Nürnberg, 08.05.2014



Table of Content

- **Company**
- Main Markets
- Product Portfolio
- MID Technology
- Primer Technology
- R&D activities

Locations



Nuremberg Headquarter



2-D,3-D Production - Weiden



3-D Production - Sonneberg



Trading office - Shenzhen

History – Milestones

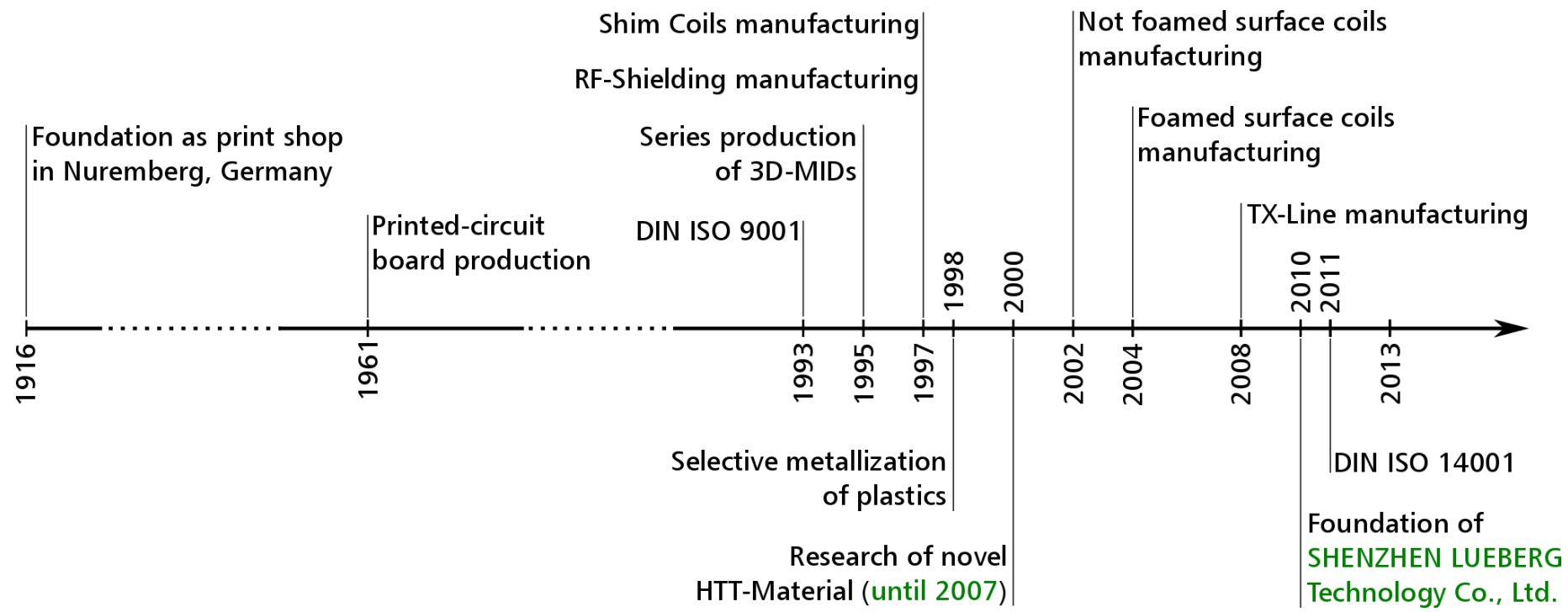


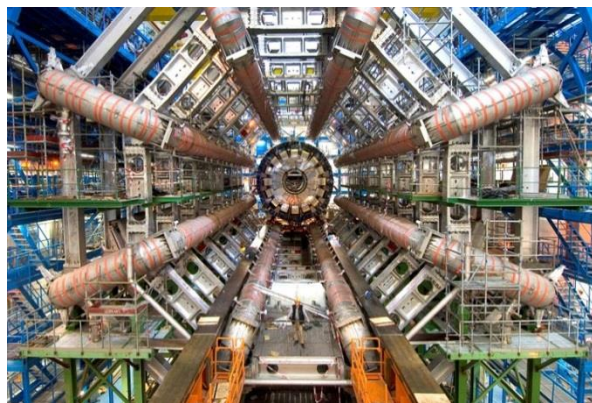
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Main market areas



Healthcare



**Physics & Telecommunications
(Large Hadron Collider)**



Automotive

Additional future market areas



Space



Aerospace

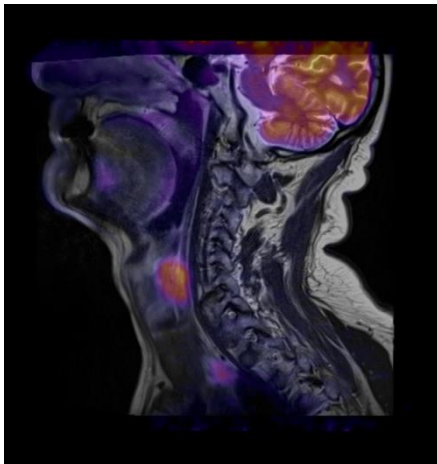


E-Mobility

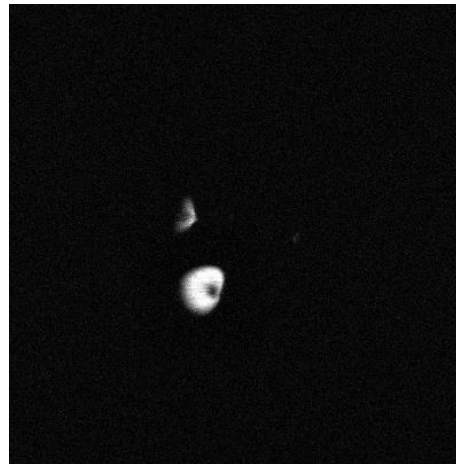
Medical applications

For the healthcare sector Lüberg Elektronik develops and manufactures high-end components that can be found in a variety of applications.

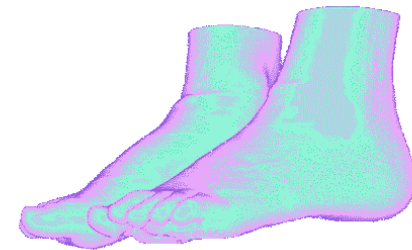
The three main areas of medical applications expertise are:



PET/MR



MRI



CT

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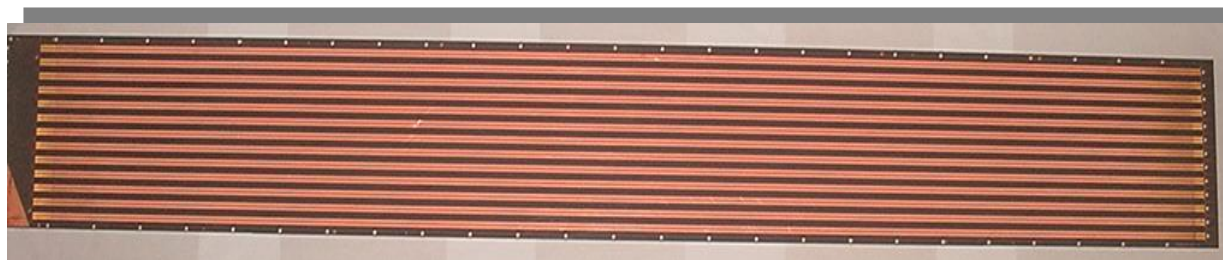
Examples of XXL Boards



XXL Board:

175 μ m Cu on FR4 substrate

1220x1080 mm



XXL PTFE Board (length = 2750 mm) for CT application

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Molded Interconnect Device (MID)



- MID are injected molded thermoplastic parts with integrated circuit traces.
- This technology combines plastic substrate/housing with circuitry into a single part through selective metallization.
- Idea of MID going back to 1980s with great improvement of manufacturing capabilities since then.
- Very dynamic market growth with 10.7 million € in 2004, 14.1 million € in 2005 and 56.2 million € in 2008



Source: www.3d-mid.de

Advantages of MIDs

DESIGN FLEXIBILITY

- Integration electronics-mechanics-optics
- High shape flexibility
- Miniaturization
- New functions

ECONOMIZATION

- Less number of parts
- Shorter process chains
- Reduced use of material
- Increased reliability

ENVIRONMENTAL COMPABILITY

- Reduction of material mix
- Recycling of materials
- Decreased use of material
- Uncritical disposal

Source: www.3d-mid.de

Advantages of MIDs

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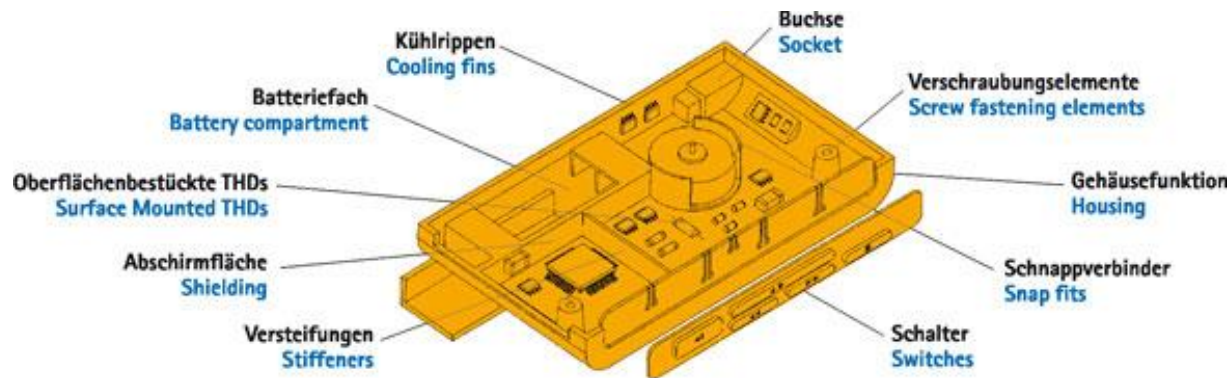
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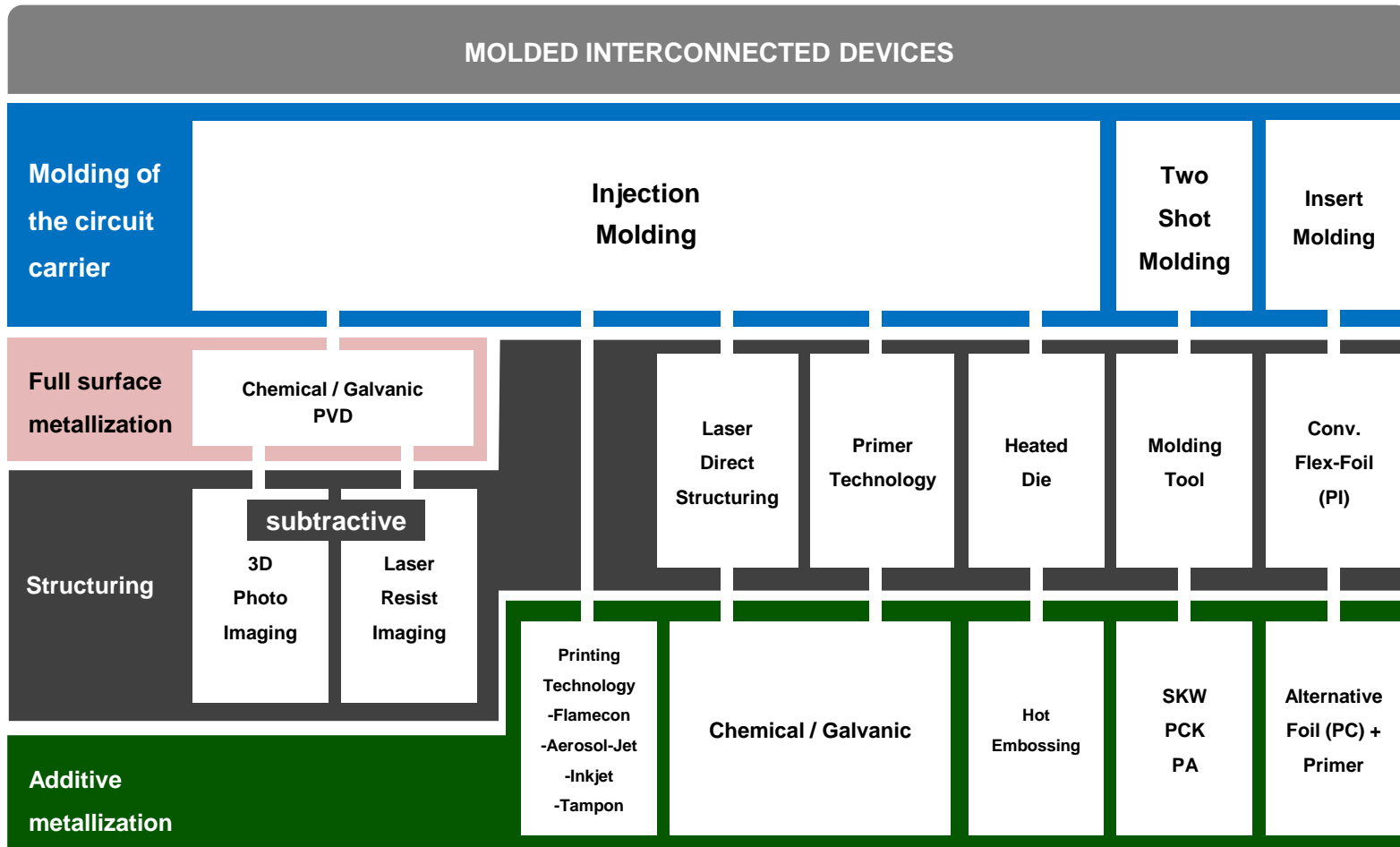
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Up to 40% cost saving potential depending on the specific product, piece numbers and other boundary conditions.

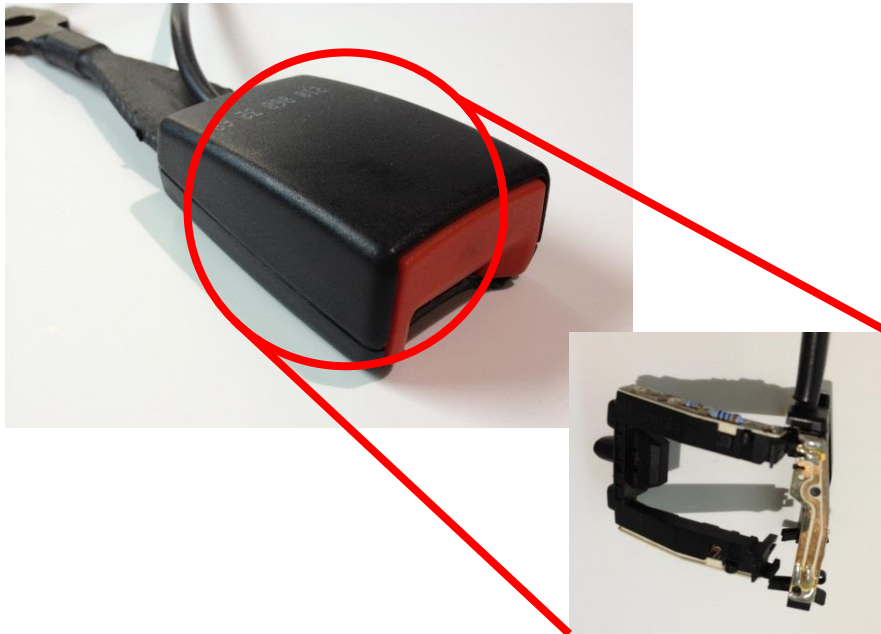
Source: www.3d-mid.de

Manufacturing Processes

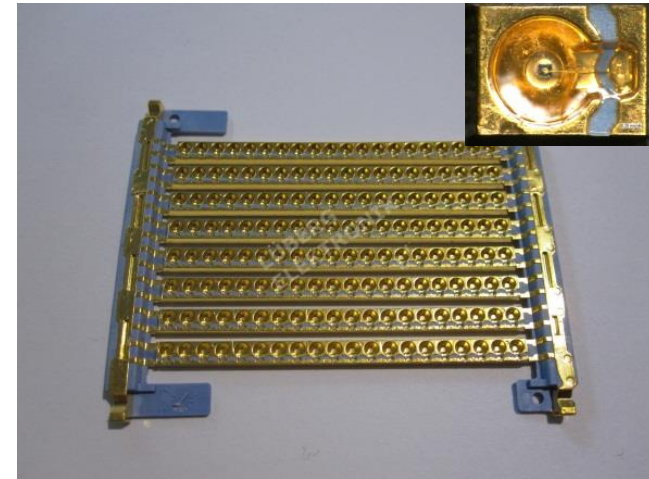


Source: www.3d-mid.de

Examples of Lüberg MIDs



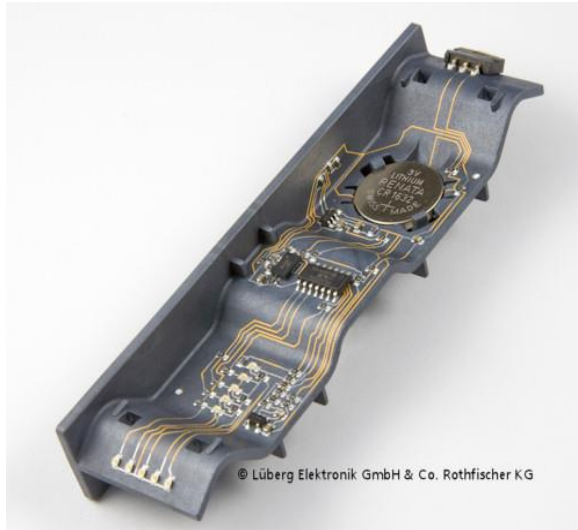
Seatbelt safety component
- First MID in series
production @ Lüberg



MID IR-LED housing
- 2-shot technology

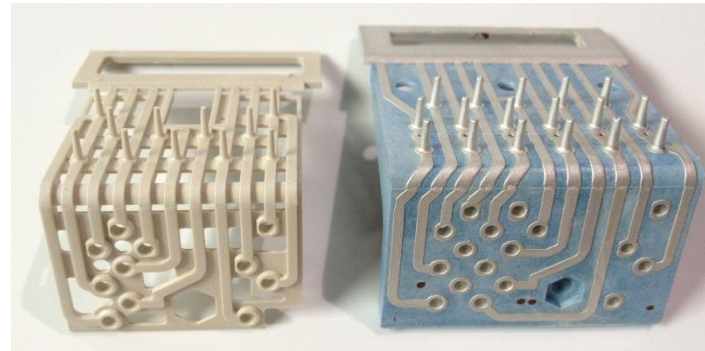
Selective metallization of 3-D structures

Examples of Lüberg MIDs



Spirit level (Wasserwaage)

- Demonstrator (MID-Tronic)
- LDS technology



Angled circuit relay

- 2-shot technology



Shielding application

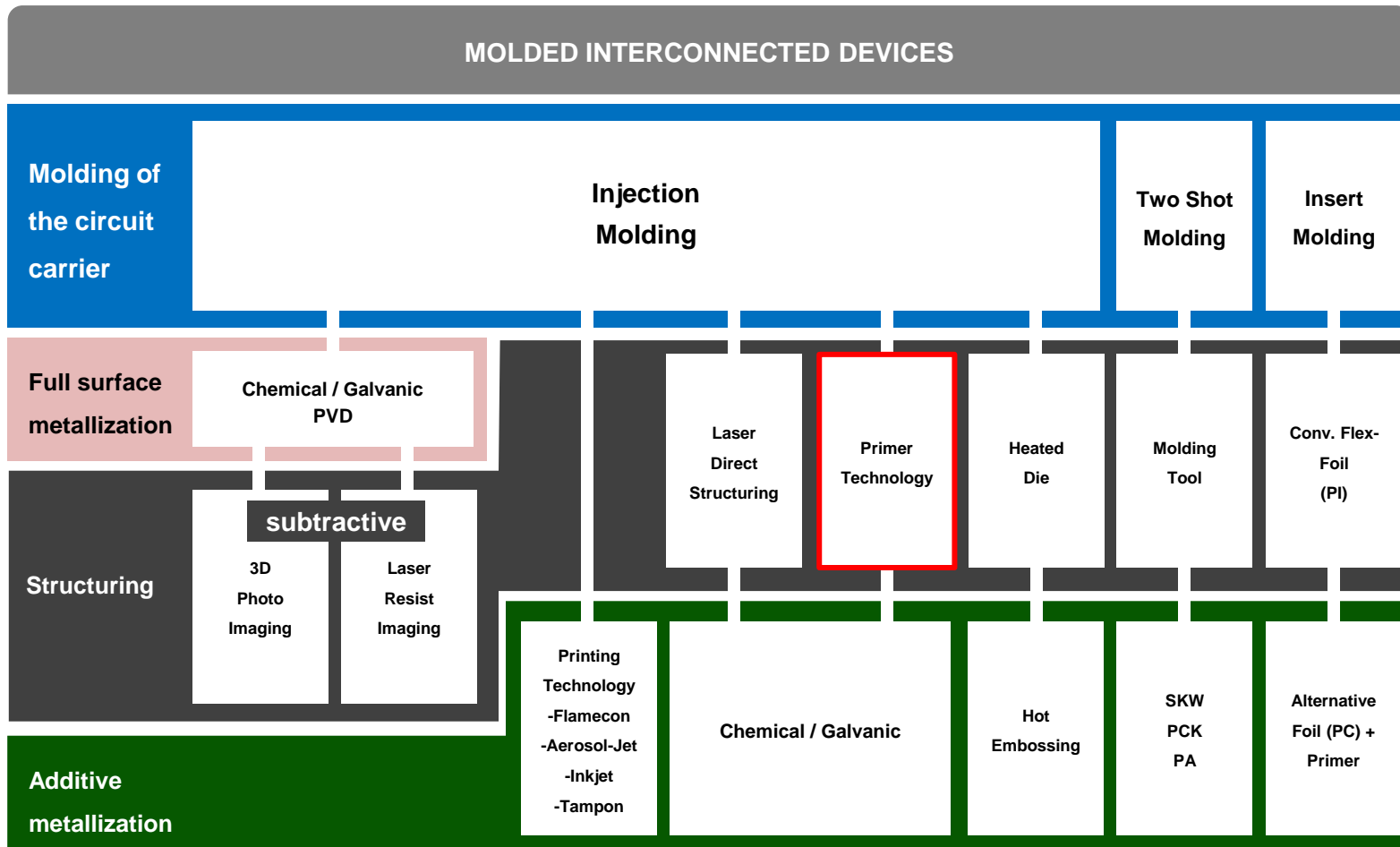
- for healthcare sector
- primer technology

Selective metallization of 3-D structures

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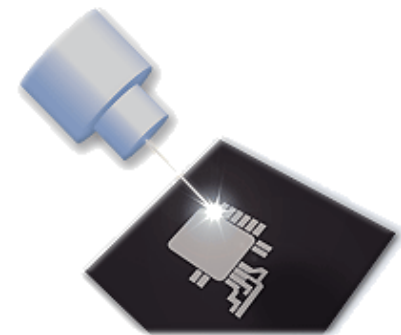
Manufacturing Processes



Source: www.3d-mid.de

Technology limitations

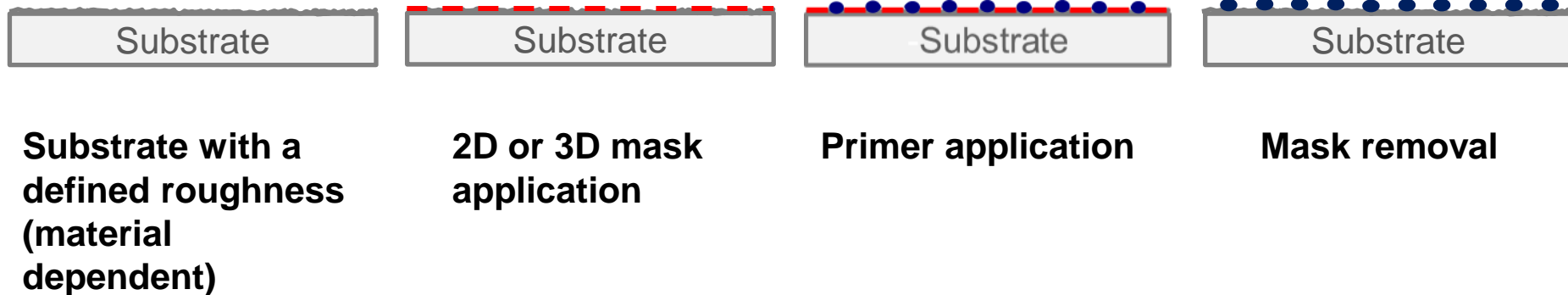
- All standard thermoplastic materials, as well as most of the high-performance thermoplastic materials are suitable for metallization using this method.
- Possible adaptability of technology to different materials through mechanical/chemical pre-treatment methods.
- Material specific primer formulation.
- Different functional components available, such as: Pd, Cu, etc.
- Cu layer adhesion ranging from 0.5 up to 1.5 N/mm (depending on plastic substrate).
- Metallization layout detail level depending on plastic substrate.
- No quantity limitations – already possible from 1 piece.



Primer application methods

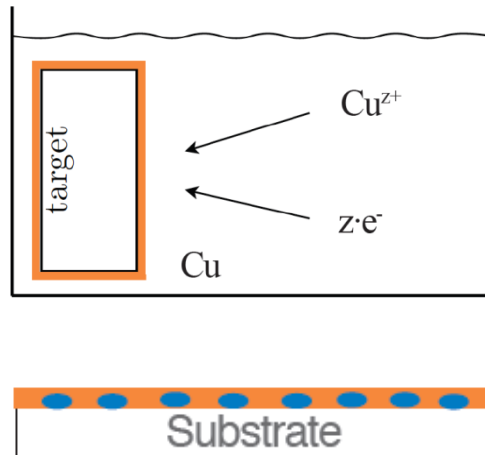
- Spraying
- Dipping
- Painting
- Screen printing – in development
- Inkjet printing – in development

Primer application example based on spraying, dipping and painting techniques



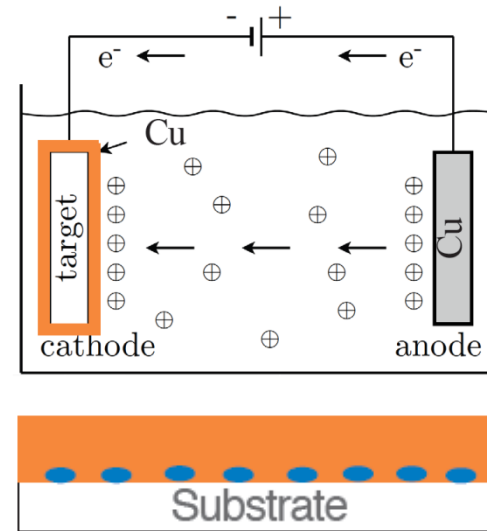
Metal plating with primer technology

Active bath 1



Electroless plating of copper (1-2 μm) on primer germs

Active bath 2 (optional)



Electroplating of copper up to it's final thickness

Simplified scheme of primer based metallization process

Examples of primer technology applications



**Selective Plating-on-Plastic of security elements for medical industry
produced with primer technology**

Examples of primer technology applications



**Capacitive joystick
for medical imaging devices
manipulation**



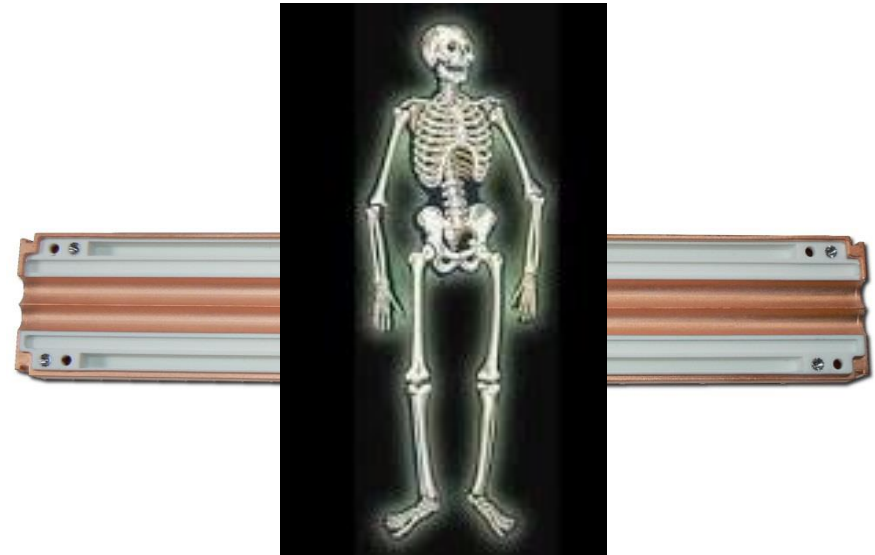
Healthcare security component

**Selective Plating-on-Plastic of security elements for medical industry
produced with primer technology**

Examples of primer technology applications



**Capacitive joystick
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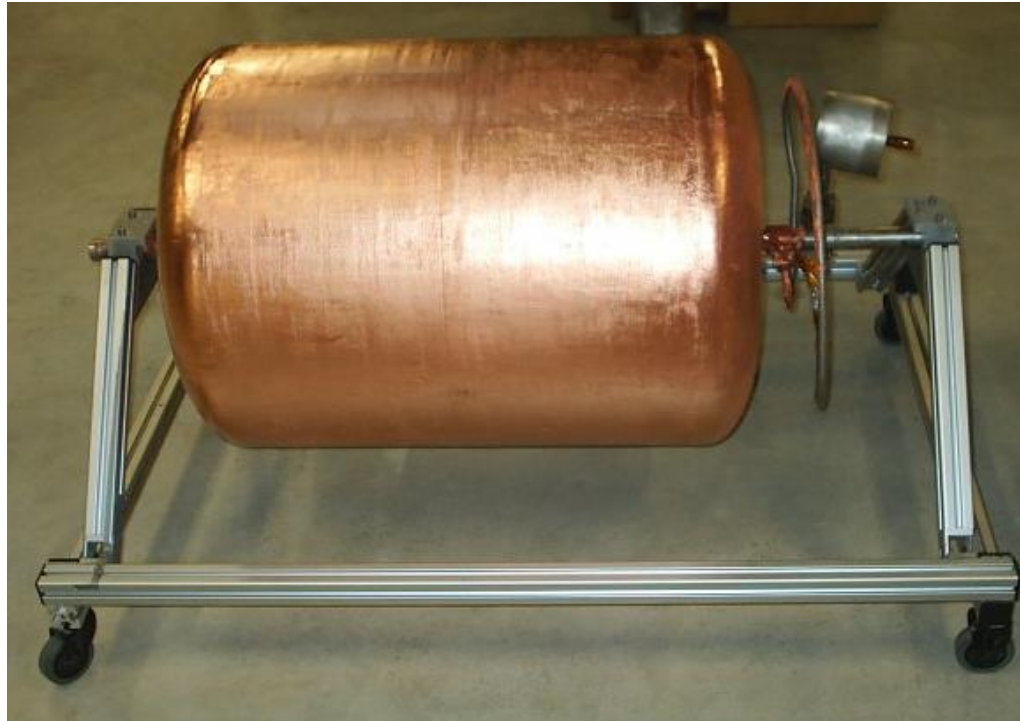
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**Selective Plating-on-Plastic of security elements for medical industry
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Cryogenic storage systems



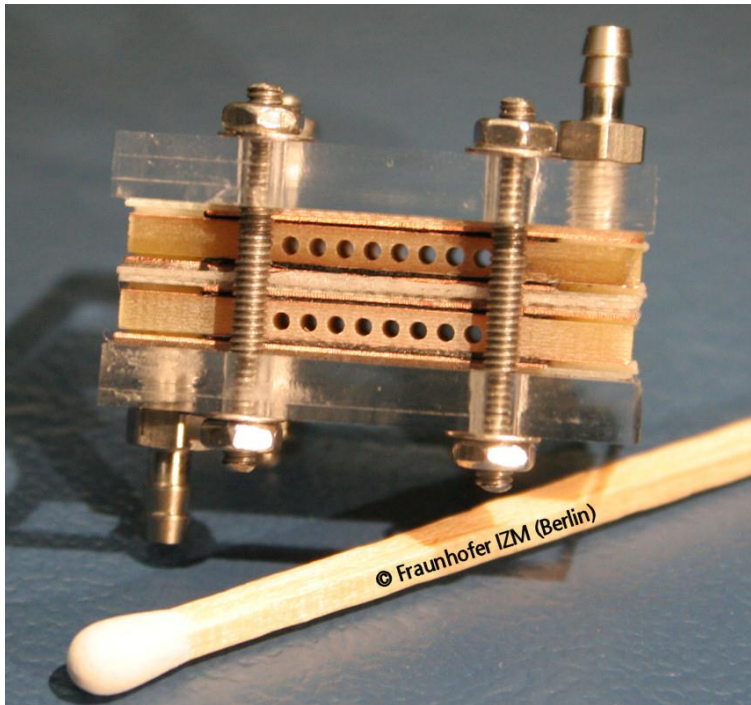
Metallization of high-performance GF/CFR composite tanks for cryogenic fuel storage systems for automotive, aerospace and space industry.

Cryogenic storage systems

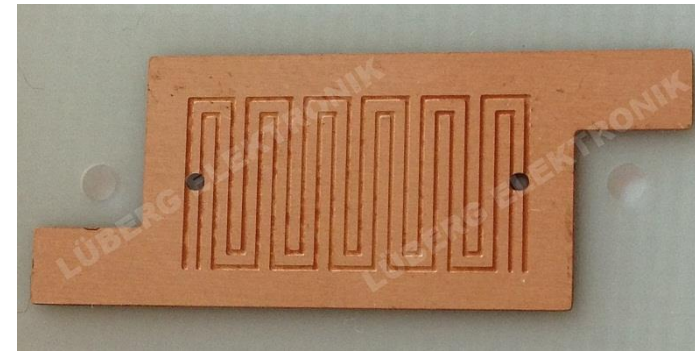


Metallization of high-performance GF/CFR composite tanks for cryogenic fuel storage systems for aircraft and aerospace industries using primer technology.

Micro fuel cells



FUEL CELL STACK
(Fraunhofer IZM, Berlin)



Anode (LÜBERG Elektronik)



Katode (LÜBERG Elektronik)

**THANK YOU FOR
YOUR ATTENTION!**