Mektec Group

Solutions from Flexible Printed Circuits to Mechatronic Modules

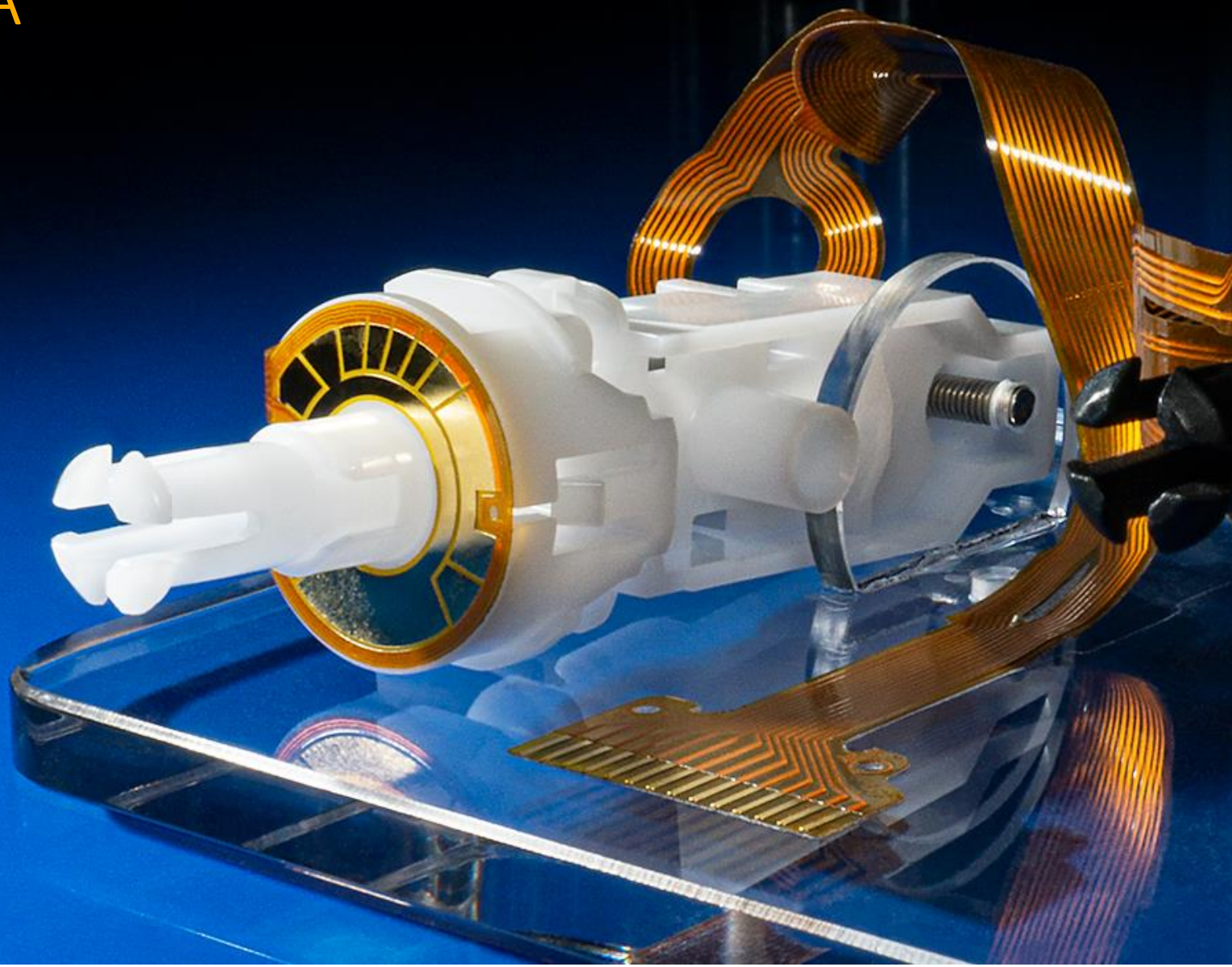
# Sales Presentation

## Mektec Group in Europe

# FPCs are Mektec's DNA

Starting as Japan's first manufacturer of **Flexible Printed Circuits** Mektec is the original source for FPC boards. Over the last 50 years, we set the gold standard for many game-changing applications – in our target markets all over the world.

Along with our in-house material production, design expertise and pioneering spirit ***Mektec*** advances **FPC technology**: our broad portfolio of interconnection and assembly technologies shapes the core of our innovative **Mechatronic Modules *enmech***.



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# Our Product Family

Original Excellence in

## Flexible Printed Circuits

Defining FPC technology for decades:
Global service, outstanding quality, and unique features


Enabling

## Mechatronic Modules

Pioneer in enabling mechatronic assemblies based on FPC technology:
Enthusiastic and passionate

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# Product Milestones

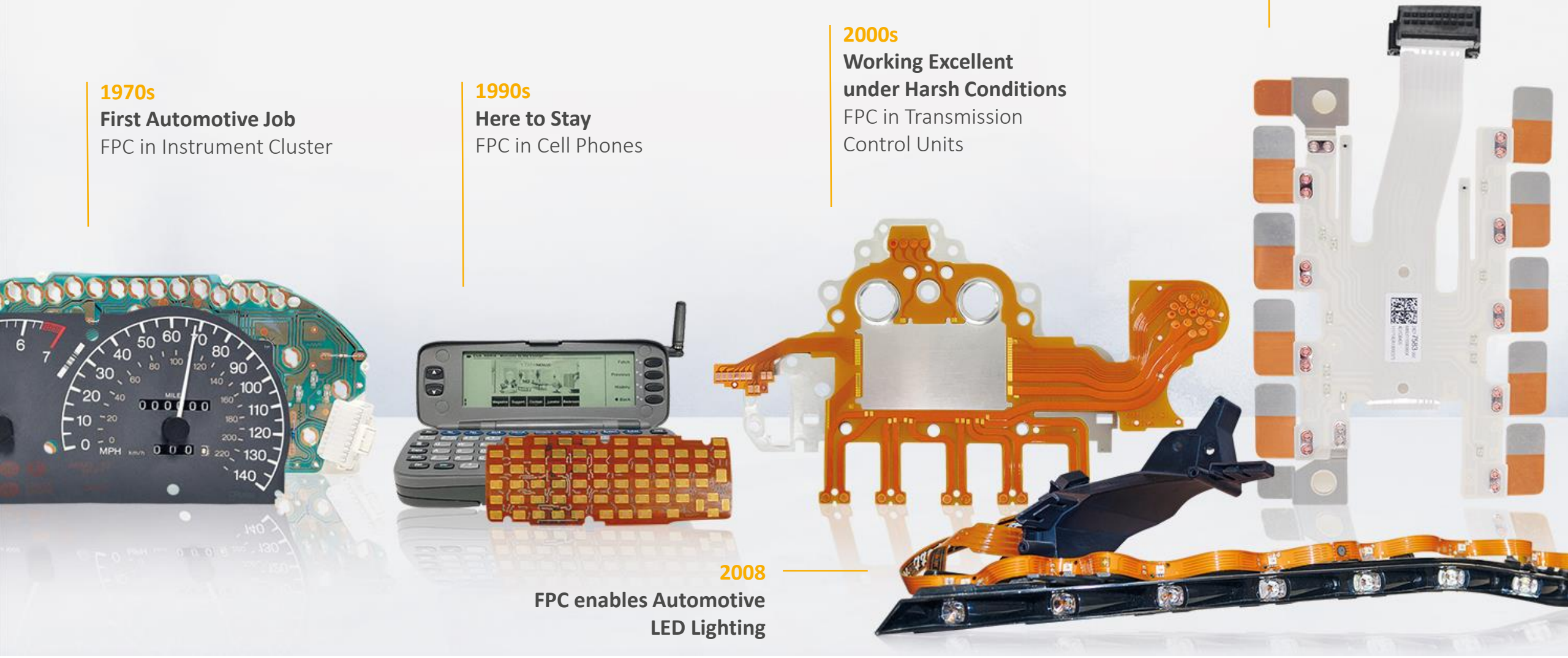
real pioneer work: establishing the standard for decades

**1970s**
**First Automotive Job**
FPC in Instrument Cluster

**1990s**
**Here to Stay**
FPC in Cell Phones

**2000s**
**Working Excellent under Harsh Conditions**
FPC in Transmission Control Units

**2010s**
**First FPC Battery Interconnection Devices**



**2008**
**FPC enables Automotive LED Lighting**

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# Technology Portfolio

MARKET and CUSTOMER

Installation Space Analysis | Design | Industrialization

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## FPC

- Subtractive and additive technology
- Surface finishing
  (galvanic and/or immersion gold, silver, and tin)
- Cover foil and cover coat
- Laser and punching processes
- Cold and warm forming
- End-Of-Line

enmech
enabling flex mechatronics

## FPC plus mechatronics

- SMD & TH technology
- RoHS soldering
  (reflow, laser, inductive, and wave)
- Monitored crimping and connector assembly
- Joining technologies
  (ultrasonic and laser welding, riveting)
- Encapsulation technologies
- Carrier assembly
  (adhesive technology, hot staking, welding)
- Automated optical inspection,
  In-Circuit test & End-of-Line test

Outstanding Quality

# Our Global Network

20,000+ employees | 2.3 billion € global sales* | 64% telecommunications, 16% automotive

## America

**USA**
3x Sales

## Europe

**Hungary**
1x Plant

**Czech Republic**
1x Plant

**Germany**
1x Sales
2x Plants

## Asia

**China**
4x Plants, 4x Sales

**Taiwan & Korea**
2x Plants, 2x Sales

**Vietnam & Thailand**
3x Plants, 1x Sales

**Japan**
Global HQ
3x Plants, 3x Sales

**Singapore & Indonesia**
2x Plants, 2x Sales

*FY2019

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# MEKTEC IN EUROPE

1,200+ employees | 160 M € sales in 2019

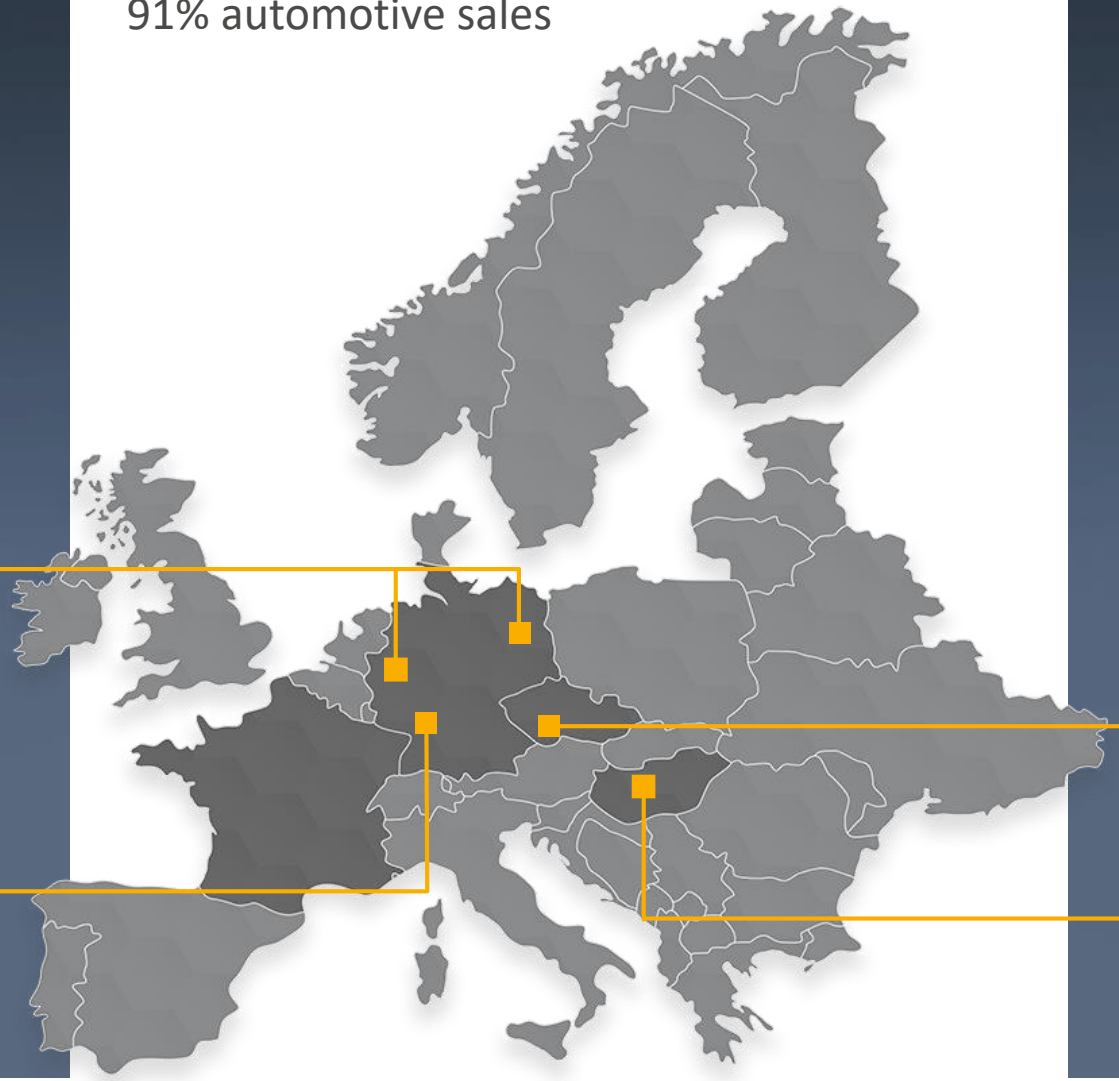
91% automotive sales

European sales

2017: 128 M €
2018: 145 M €
2019: 160 M €

Production sites certificates

| | |
|---|---|
| IATF 16949 | ISO 9001 |
| ISO 45001 | ISO 14001 |
| | ISO 50001 |



## GERMANY

Berlin
Erkelenz
*FPC Plants*

## WEINHEIM, GERMANY

European Sales &
Administration

## CZECH REPUBLIC

Budweis
*Back-End Plant*

## HUNGARY

Pécel
*Back-End Plant*

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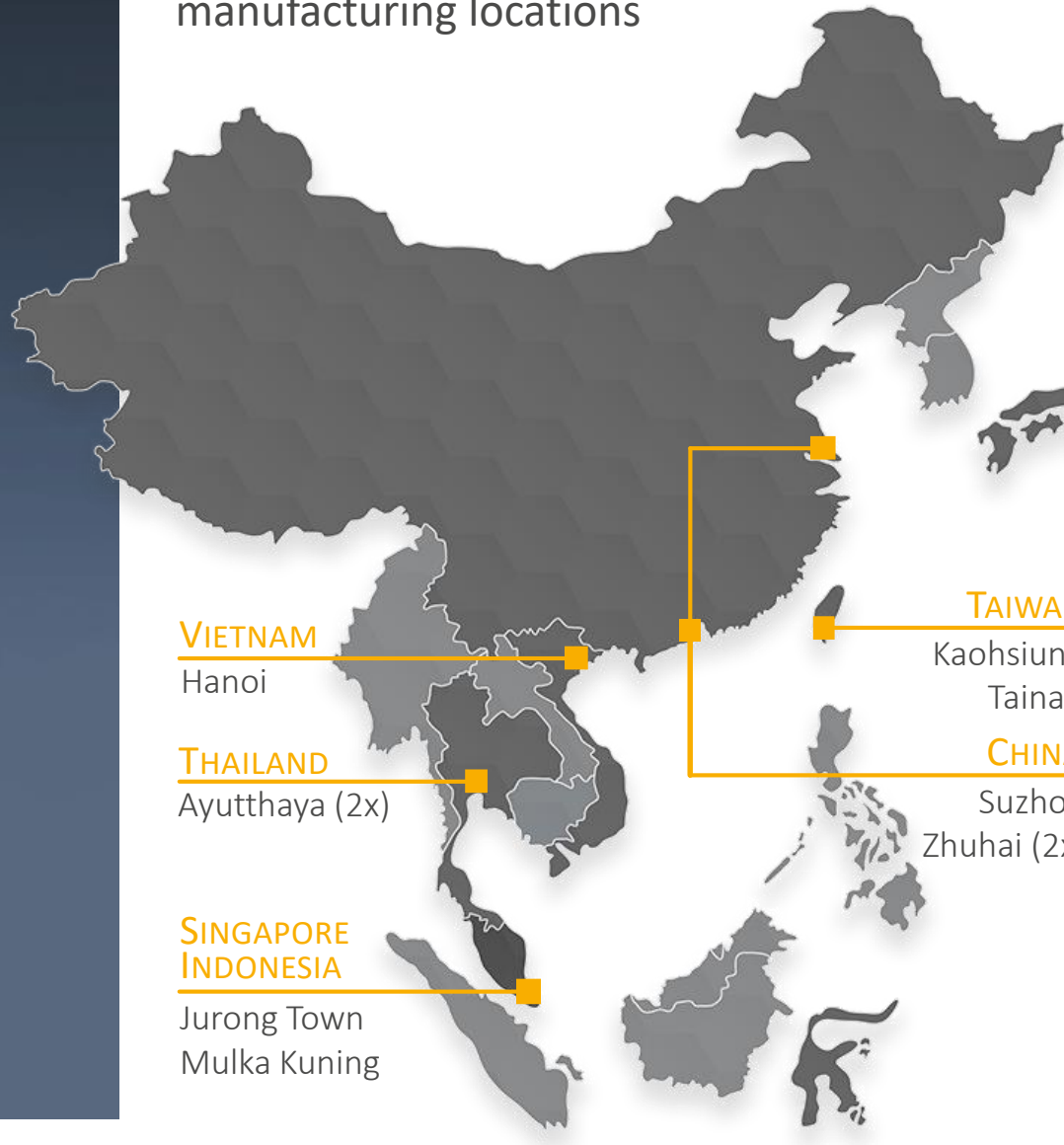
# MEKTEC IN ASIA

manufacturing locations



**JAPAN**

Tokyo, Global HQ

Ibaraki Plant
Kashima Plant
Ushiku Plant

**TAIWAN**

Kaohsiung
Tainan

**CHINA**

Suzhou
Zhuhai (2x)

**VIETNAM**

Hanoi

**THAILAND**

Ayutthaya (2x)

**SINGAPORE**
**INDONESIA**

Jurong Town
Mulka Kuning

Major production sites certificates

- ISO 9001
- ISO 14001
- IATF 16949
- ISO 45001

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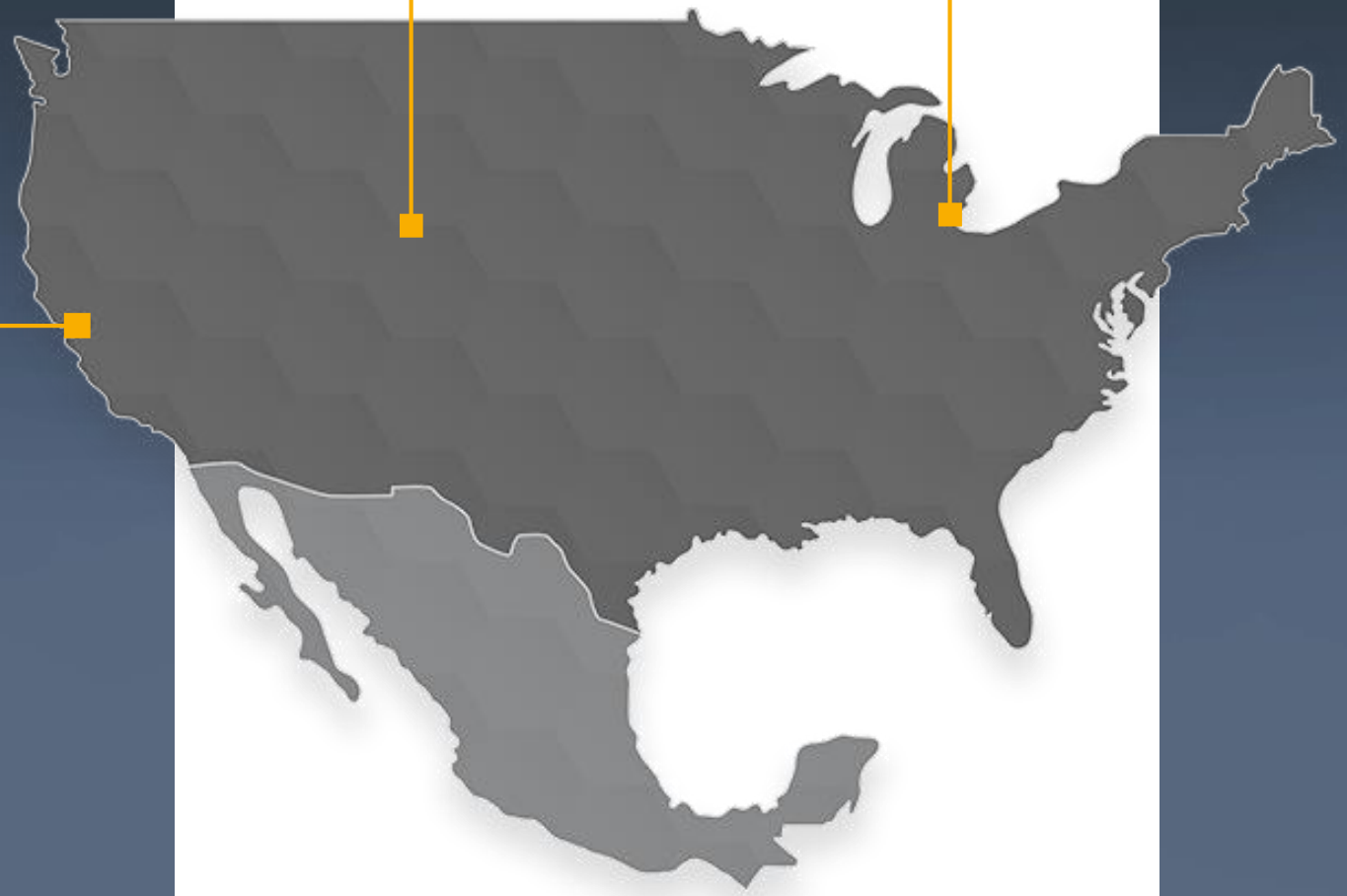
# Mektec in America

**Thornton, CO**
Sales Office

**Wixom, MI**
Sales Office



**San Jose, USA**
American Sales & Administration

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# MEKTEC FPC TECHNOLOGY

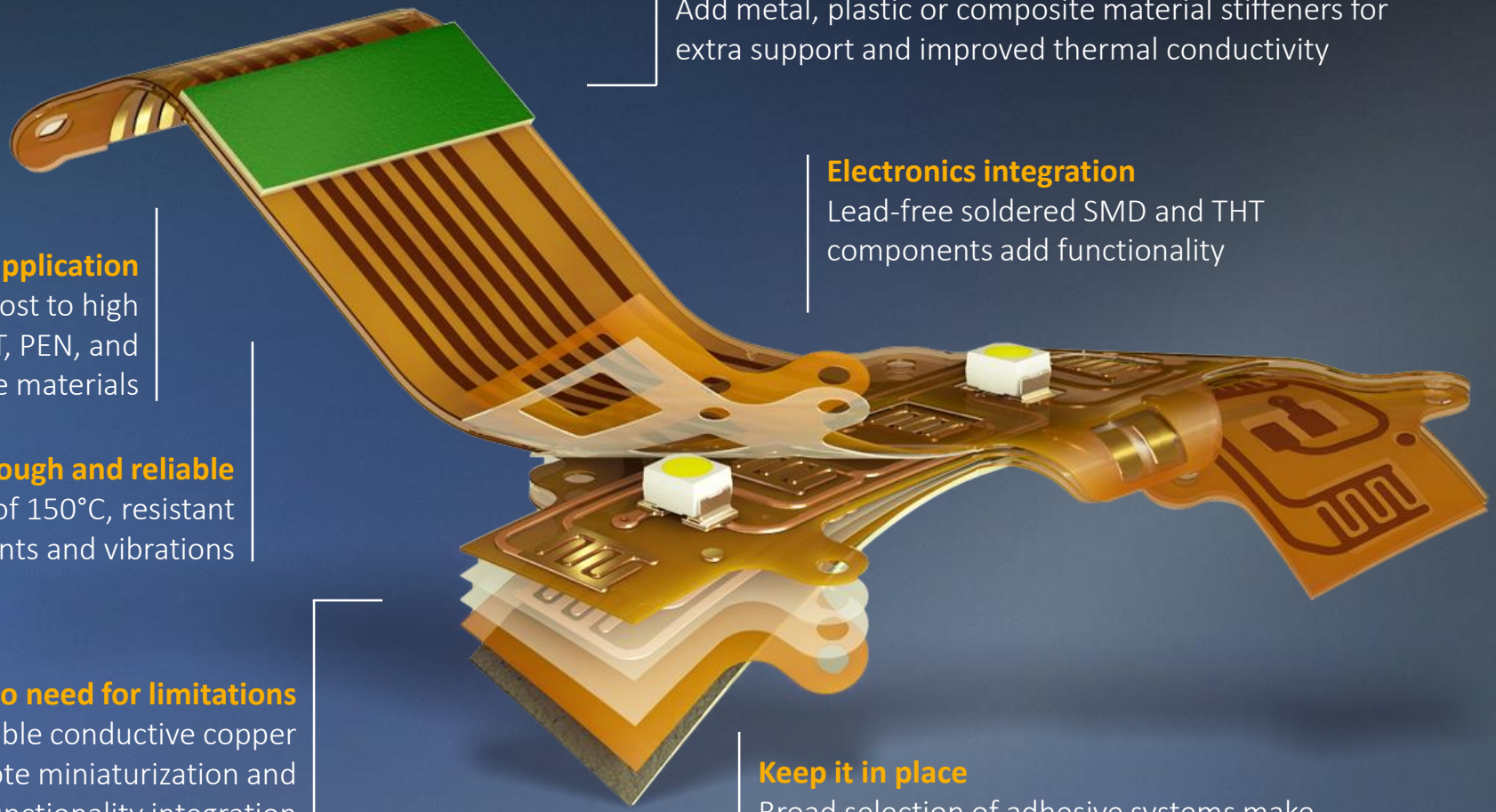
lightweight and fits everywhere

**Rigidity where needed**
Add metal, plastic or composite material stiffeners for extra support and improved thermal conductivity

**Electronics integration**
Lead-free soldered SMD and THT components add functionality

**Tailored to your application**
From low-cost to high performance: PET, PEN, and PI base materials

**Tough and reliable**
Max. operation temp. of 150°C, resistant to chemical agents and vibrations



**No need for limitations**
Up to 8x flexible conductive copper layers promote miniaturization and functionality integration

**Keep it in place**
Broad selection of adhesive systems make installation fast and safe – for a whole lifetime

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# Surface Finishing

protect copper from strain and oxidation | ensure soldering, bonding, and welding

**ENIG**

*Electroless Nickel Immersion Gold* offers absolute flat pads for SMD soldering and aluminum wire bonding

**Galvanic Nickel Gold**

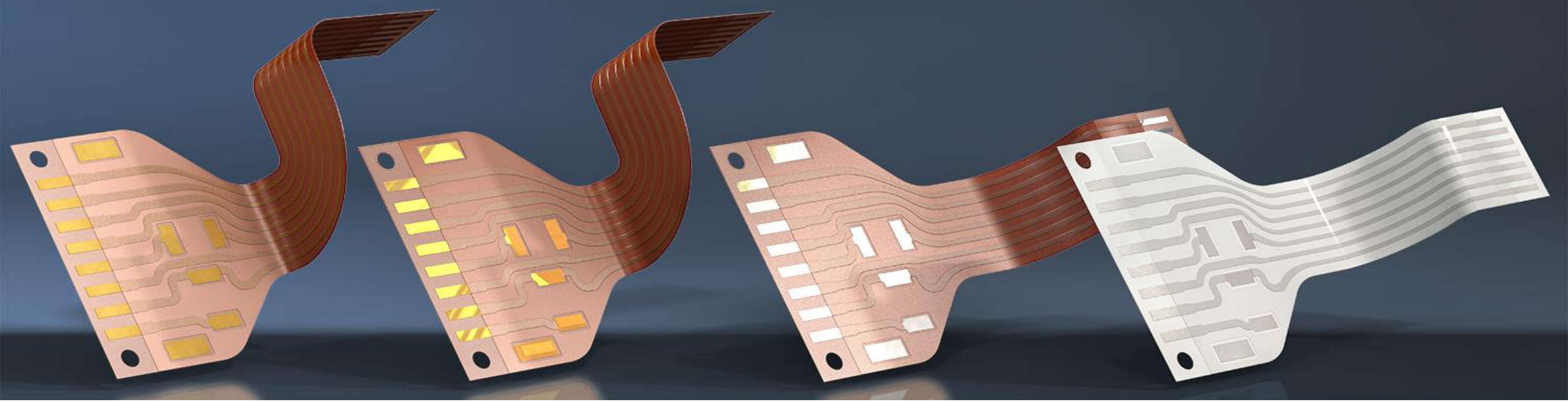
Our most refined surface finish. Resistant against mechanical strain. Great for bonding and soldering

**Immersion Silver**

Long shelf life up to 12 months and bondable with aluminum wires. This finish offers absolute flat pads for SMD

**Immersion Tin**

The 1.2 µm thin layer is a cost efficient and mostly sufficient way to ensure SMD solderability and prolonged shelf life



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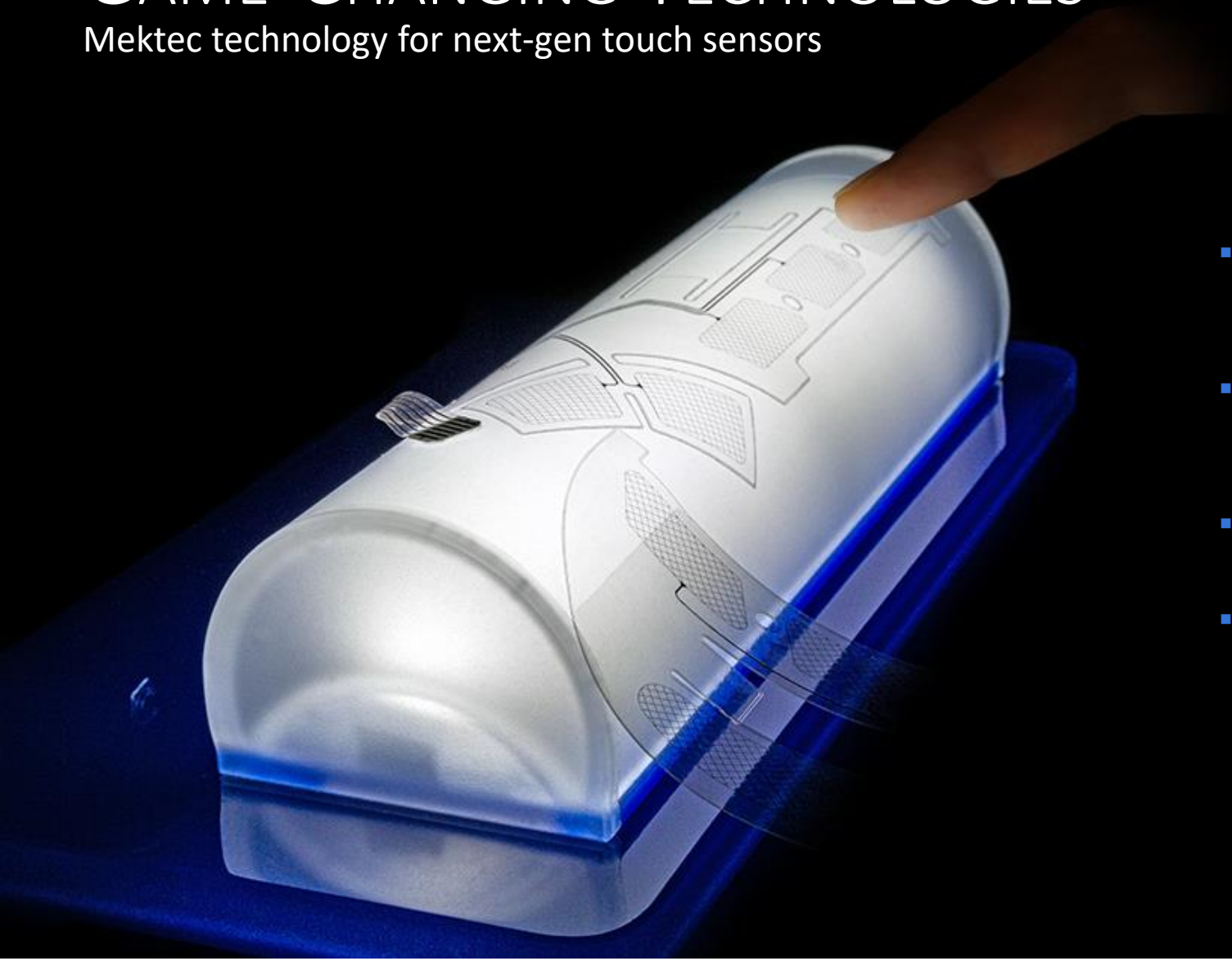
# Game-Changing Technologies

Mektec technology for next-gen touch sensors

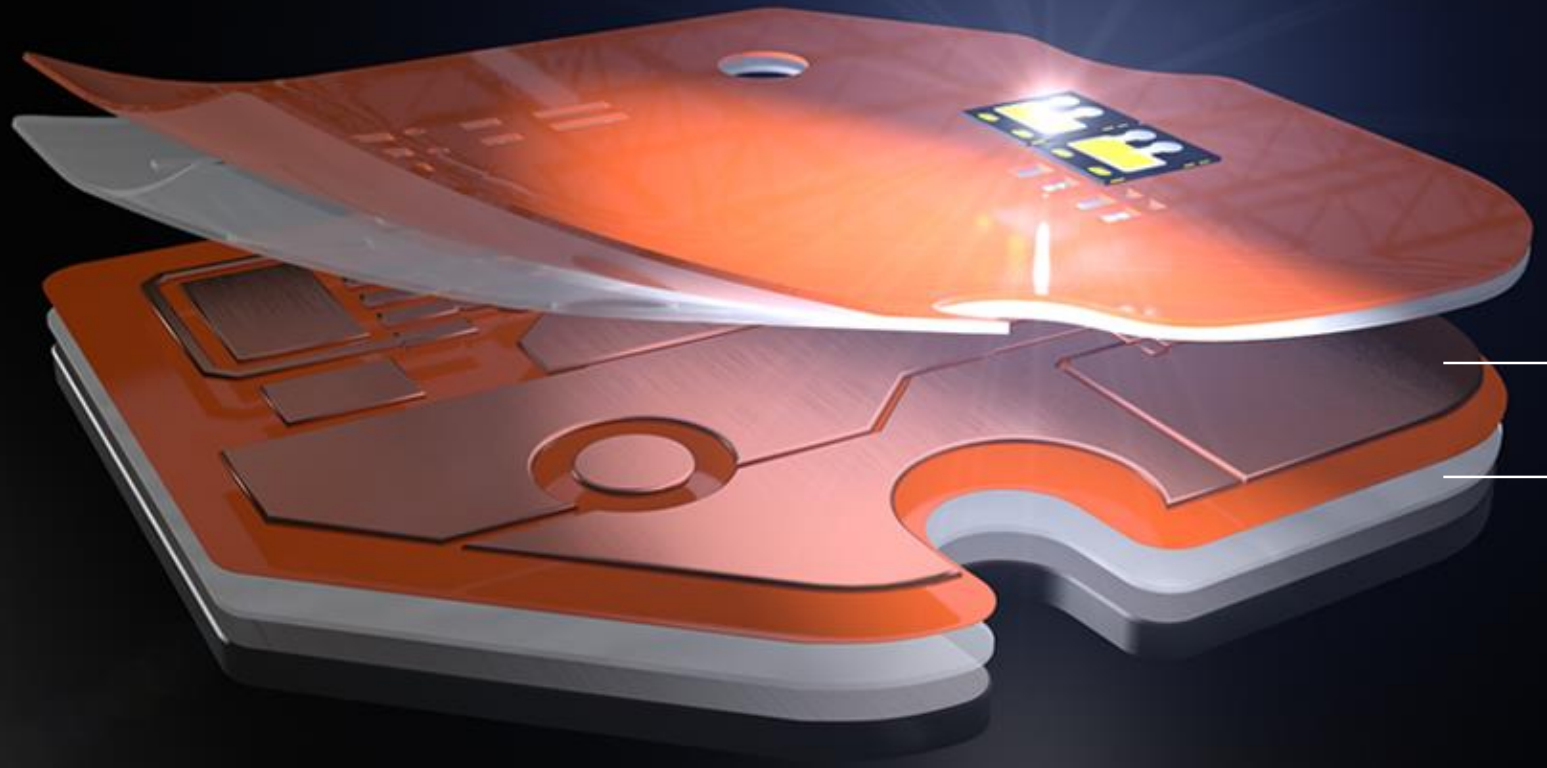


- Mektec’s translucent FPC builds are the smartest way to enable back-illuminated capacitive touch sensors
- Finest copper structures of 40 µm width guarantee maximum light transparency and design freedom
- The special copper treatment prevents color shift of light caused by refractions
- Compared to additive technologies you benefit from our reliable and cost-efficient subtractive mass production processes

# The Heat is Off I

## Mektec technology for next-gen LED and pixel lights

- Mektec's all-new special FPC design stops heat accumulation around LEDs and laser diodes
- Pack even more high power LEDs and extensive LED arrays on a smaller area
- Combine with all the FPC features: 3D integration, less interfaces, easy and safe assembly



**Less and thinner layers**
No adhesive between copper and ultra-thin base material reduces thermal resistance

**Improved adhesive**
400%+ thermal conductivity between aluminum and base film

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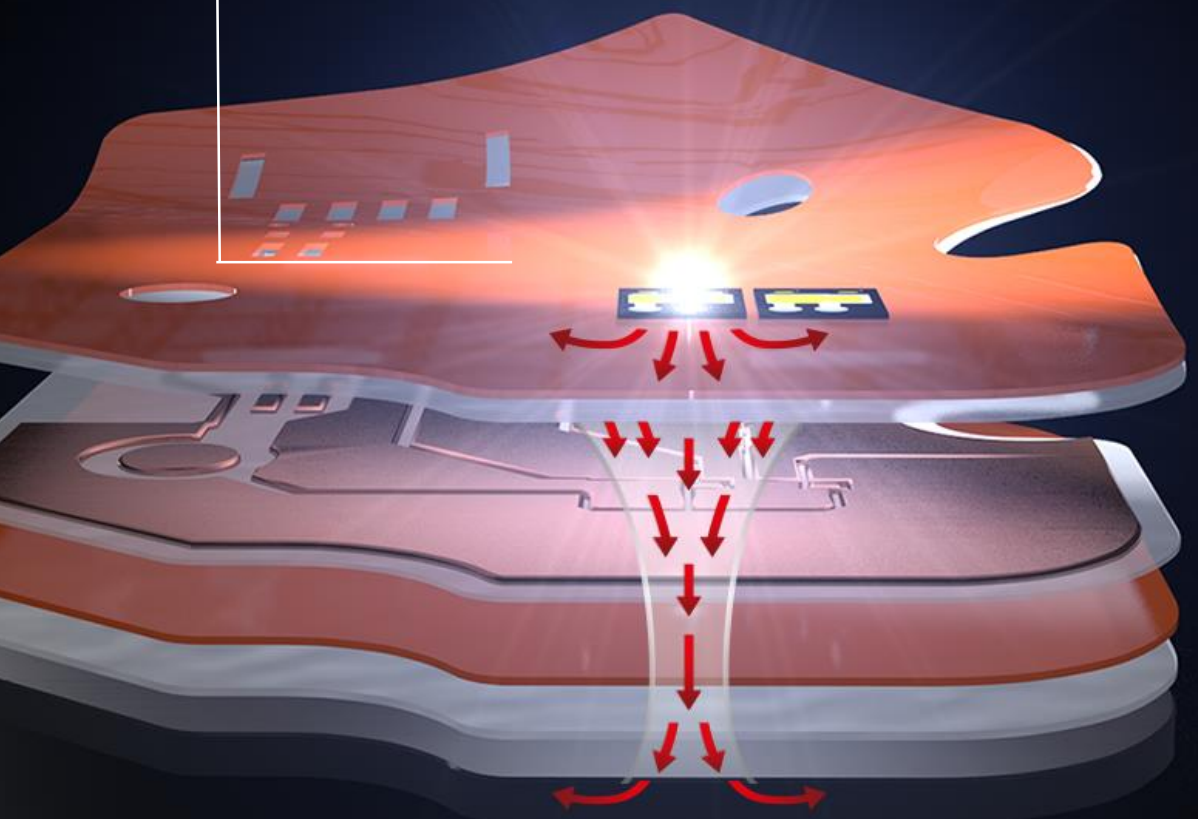
# The Heat is Off II

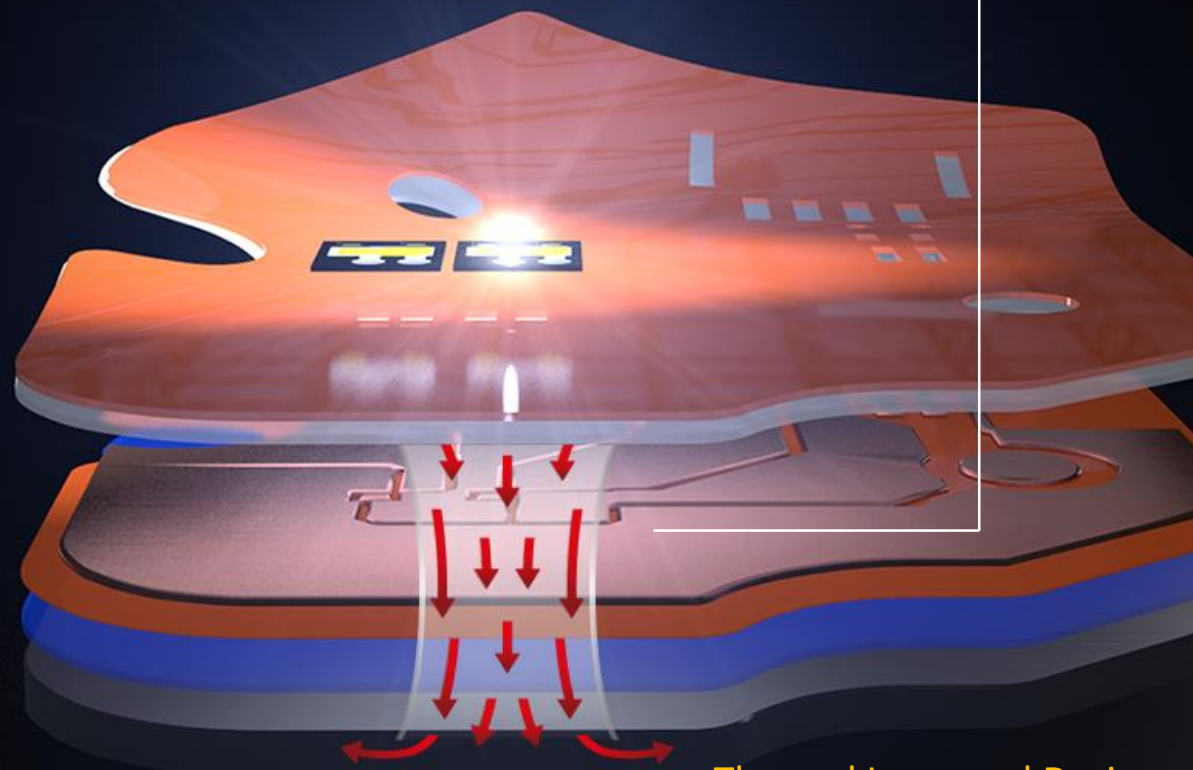
Mektec technology for next-gen LED and pixel lights

Huge thermal resistance of conventional FPC design may cause heat accumulation around LED



Conventional FPC Design

Thermal resistance reduced by **85%** improves heat dissipation to aluminum backplate



Thermal Improved Design

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# Interconnection Technologies I

enabling mechatronics: the technologies behind

**Assembly**
Heat stacking, ultrasonic welding of plastic, adhesive assembly or screwing for a customized mechanical fit

**Soldering**
Full integration of electrical components: automatic soldering, AOI, and conformal coating

**Sealing**
Perfect in harsh environments: Sealing / molding of connectors, electronics and grommets

**Easy to connect**
Monitored crimping of automotive and industry connectors fulfill strict automotive quality standards

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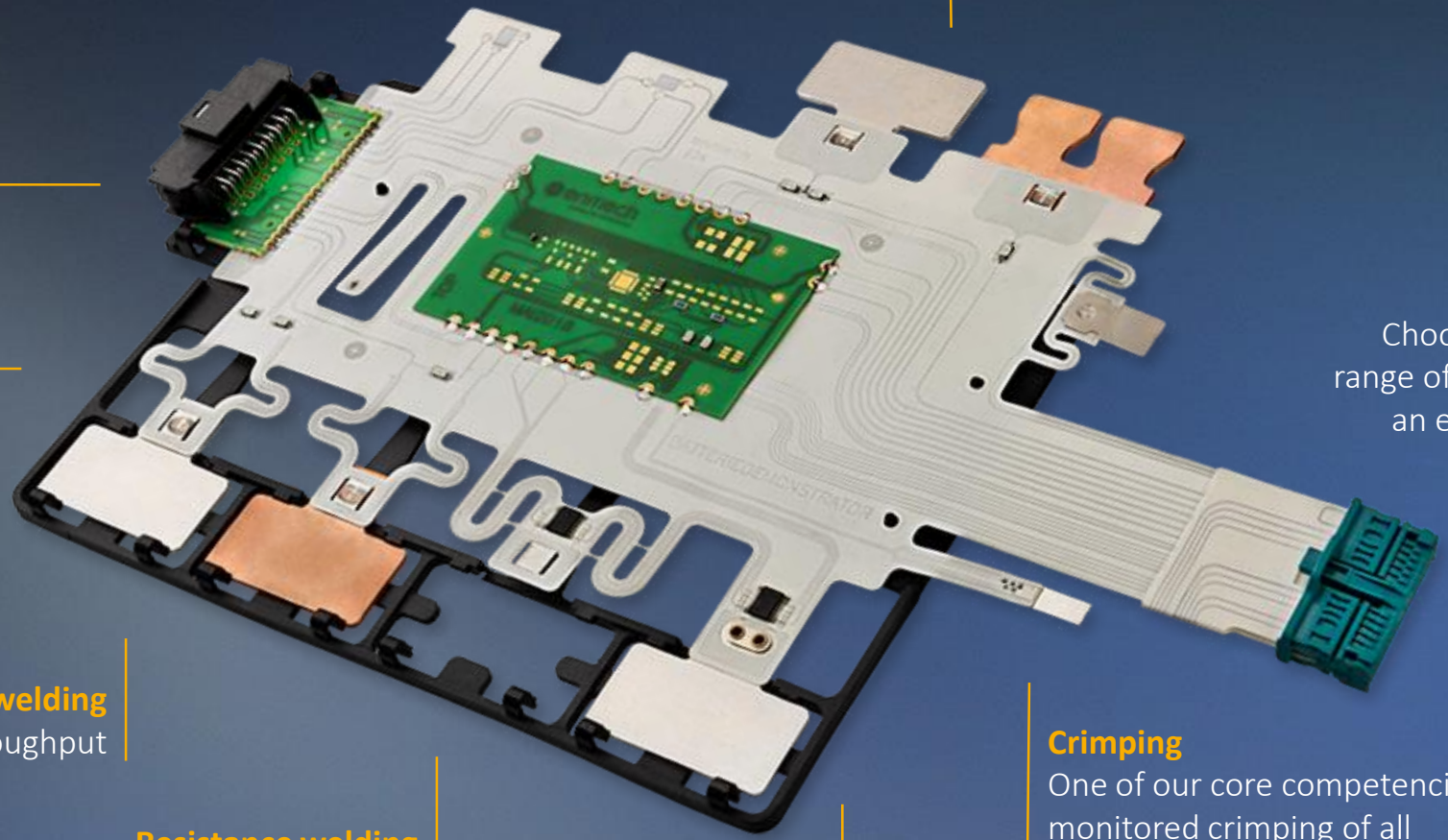
# Interconnection Technologies II

enabling mechatronics: the technologies behind

**Ultrasonic welding**
For mixed materials and alloys

**PCB soldering**
Combine cost efficient single layer FPC with multilayer PCBs



**Connectors**
Choose from a wide range of connectors for an easy link to your system

**SMD / THT soldering**
Directly integrated: electrical components, (coaxial) cables and connectors

**Laser welding**
High throughput

**Resistance welding**
Efficient and cost effective

**Riveting**
Proven for decades

**Crimping**
One of our core competencies: monitored crimping of all common crimp systems

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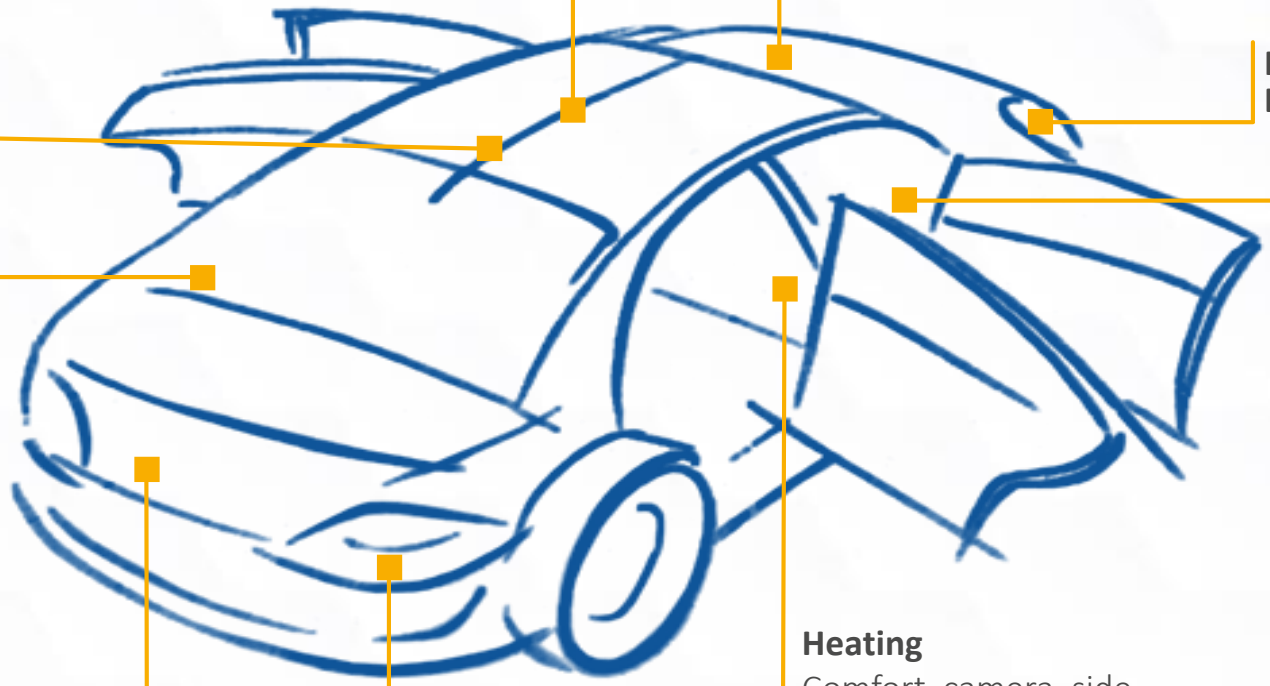
# Our Automotive Applications



**Sensor Electronics**
Pressure, temperature, flow, and humidity sensors

**Switch Electronics (HMI) Display Interconnection**

**Antennas**
High and low frequencies

**Front Lighting Electronics**

**Transmission Control Electronics**

**Window Connectors**
Antenna and heating

**Heating**
Comfort, camera, side mirror and wiper heaters

**Battery Electronics**
Interconnection and temperature sensing

**Tail-light Electronics**

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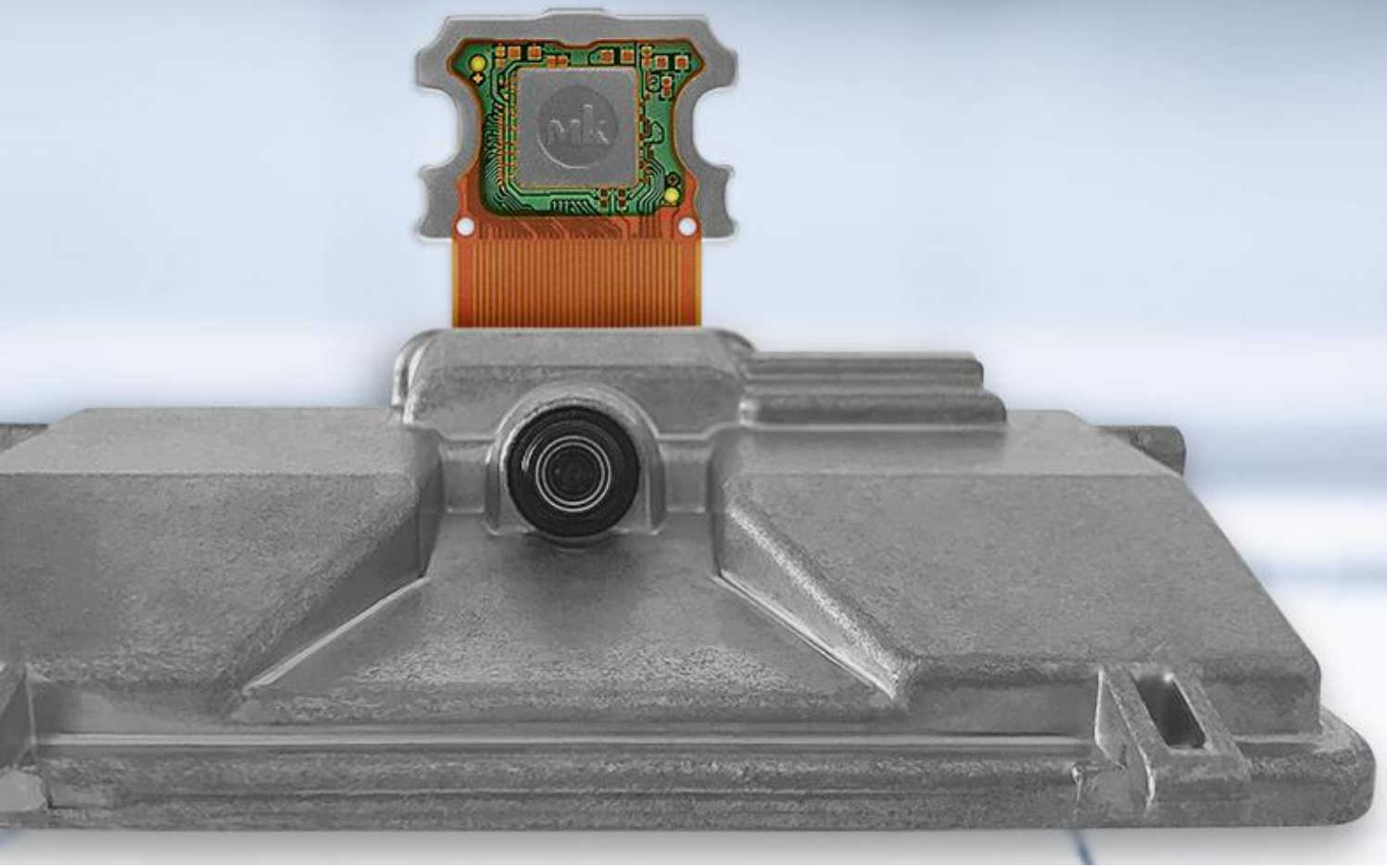
# Advanced Driver Assistance Systems

camera interconnection | radome and camera heaters



- You benefit from our decades of expertise in products for mobile telecommunication
- All of our products fulfill global automotive requirements for electronic and mechanical assemblies
- FPC technology is a smart way to enable many driver assistance applications: radome and camera heaters, electronic interconnections, antennas, etc.

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# Sense & Control

## sensor interconnection

- Resistance against vibrations, chemicals, and thermal stress
- Flexible 3D design brings sensor components close to the point
- Integration of electronic components
- Integration of FPC and plastic / metal components
- Encapsulation technologies

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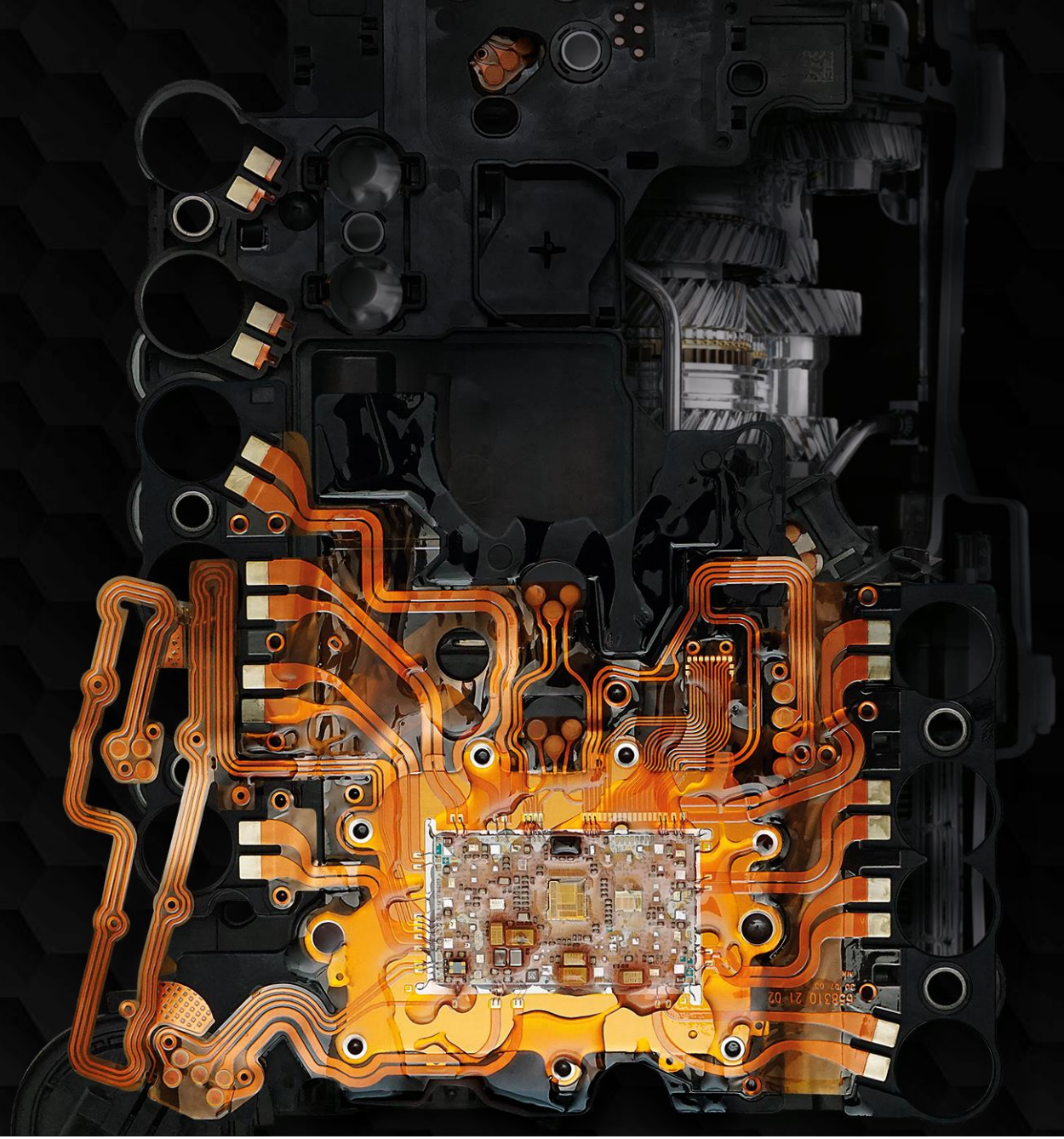


# POWERTRAIN

## transmission control interconnection

- Working just perfect in harsh environments: our FPC technology easily manages constant temperatures of 150°C
- Mektec materials withstand rough fluids such as motor and gear oil, battery acid, coolant, etc.
- The integrated design reduces electrical interconnections and adds maximum reliability to your product
- Due to the thin, light and flexible design our FPC products are safe against vibration stress

# LIGHTING

## front and rear automotive lighting

- FPC offers 3D design characteristics while reducing electrical interfaces
- Drilling of optically referenced holes and advanced pick-and-place technologies contribute to highest position accuracy
- Combine the advantages of FPC technology with the thermal characteristics of IMS
- Special FPC material setups minimize thermal resistance
- Colored finishes for distinctive designs

# INTERFACES

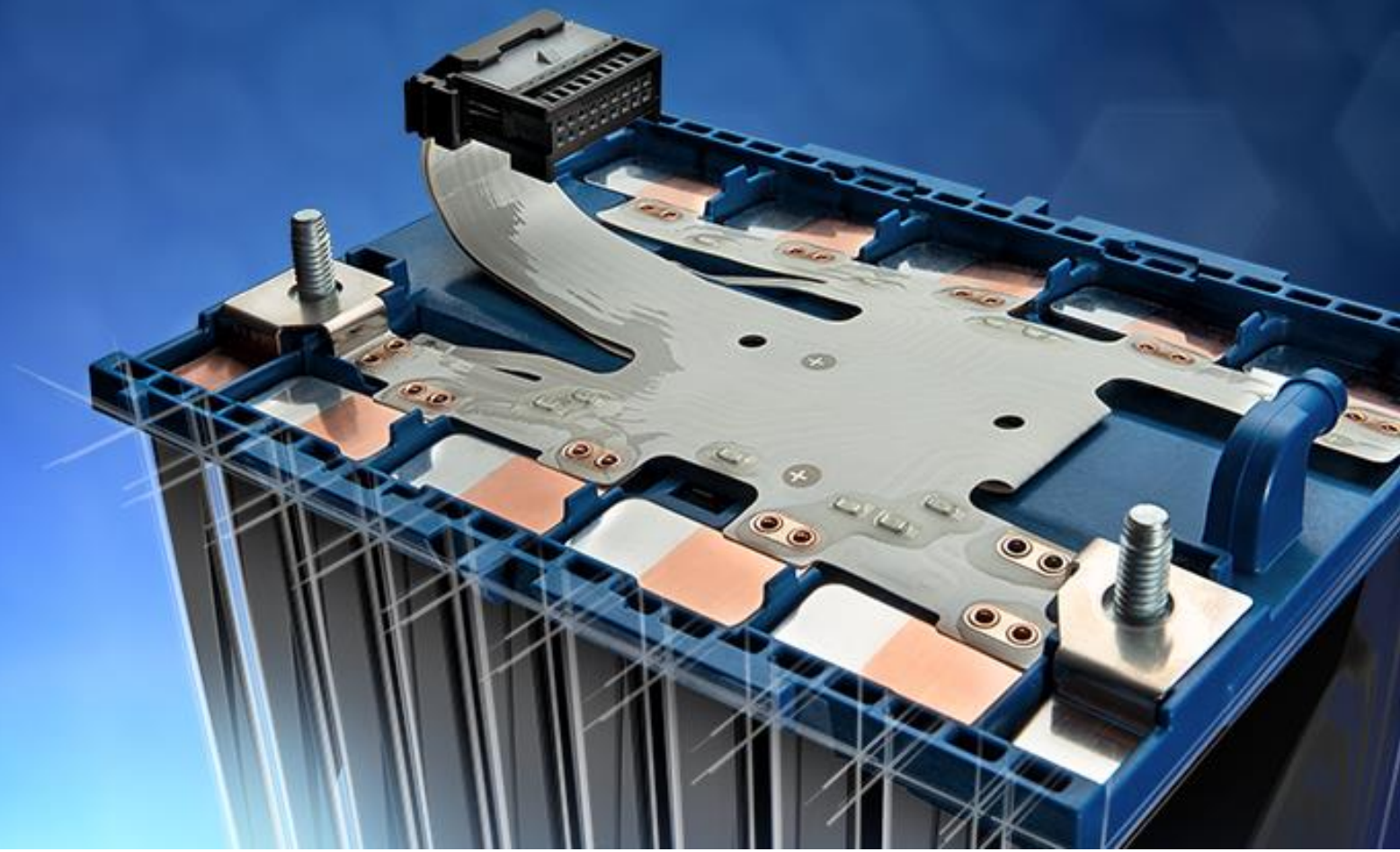
## switches | touchpads

- Thin, flexible, and space saving 3D design follows nearly every mechanical contour
- Gold surface finishes protect copper against mechanical strain
- Integrated electrical components
- Preassembled modules simplify your assembly processes
- Double-layer FPC design for touch sensitive applications
- Highly transparent films and smallest electrical traces enable illuminated touch sensitive applications

# ELECTROMOBILITY

## voltage, temperature monitoring | balancing device for batteries

- FPC design maximizes available space for battery cells and compensates tolerances
- Close-to-the-point temperature monitoring
- Integrated fuses protect the system from shorts
- The FPC design minimizes the number of electrical interfaces
- Ultrasonic, resistance, or laser welding to connect FPC to bus bars
- Encapsulation technologies enable functionality under hazardous conditions



# VISIBILITY

## heaters for wipers, cameras, and side mirrors

- Constant wattage and long-term stable PTC technology for self-regulating smart systems
- Adhesive systems and mechanical fixations for a fast and reliable installation
- The thin 3D design emerges heat where needed
- Large selection of technologies to connect FPC to round cables
- Various sealing technologies make our heaters resistant against harsh environmental conditions
- Technical support and decades of expertise in designing customized heating applications

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# CONNECTIVITY

## antennas | antenna connectors

- Flexible 3D structure guarantees perfect fit into smallest spaces and superior performance
- Adhesive systems and mechanical fixations enable fast and reliable installation
- FPC based design keeps antenna structures in place - no shifting anytime
- Large selection of interconnection technologies (crimped connectors, soldered coaxial cables)
- Integrated electronics
- Encapsulation technologies (molding, conformal coating)

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## Your contact:

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