2016 Integration of enmech in to the Global Mektec Group

NIPPON MEKTRON
HEADQUARTER IN JAPAN

Global reach
Local presence

25,000+
Employees worldwide

$3.2 BILLION
Global sales 2017

#1 Manufacturer
of Flexible Printed Circuits

PLANTS
Worldwide (17)

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The Global Mektec Group

$3.2 BILLION
Global Sales 2017

Million USD

0

1,000

2,000

3,000

4,000

5,000

2014

2015

2016

2017

Optical Devices
Audio & Gaming

Camera

Displays

Hard Disk Drives

Telecommunication

65%

Sales by Segments

HDD

8%

12%

Automotive

3%

4%

8%

8%
Worldwide Production Locations

Production Locations for enmech products already in Europe, China

- **EUROPE**
  - Erkelenz, Germany
  - Berlin, Germany
  - Pécel, Hungary
  - Budweis, Cechia

- **CHINA**
  - Xiamen
  - Zhuhai 1
  - Suzhou
  - Zhuhai 2

- **TAIWAN**
  - Tainan
  - Kaoshiung
  - Dafa

- **JAPAN**
  - Okuhara
  - Kashima
  - Shirasawa

- **THAILAND**
  - Ayutthaya

Sites producing according automotive standards

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Mektec Group in Europe - Locations

4 PLANTS in Europe

1200+ Employees in Europe

Certifications
- DIN EN ISO 9001 Quality Management System
- DIN EN ISO 14001 Environmental Management Systems
- BS OHSAS 18001 Occupational Health and Safety System
- DIN ISO 50001 Energy Management System
- ISO TS (IATF) 16949 Quality Management for Automotive Products
Plant Berlin

enmech – Berlin, Germany
Frontend Production and Engineering Center

Employees
~100

Space
1900m² production / 900m² prototype workshop

Capacity
800.000m²/year

Serial processes
- Roll to roll bare flex production (print, exposure, etching, laminate, contour)
- Double sided accessible copper (laser ablation and punch-technology)

Extract of prototype processes:
- Welding
- Soldering
- Coating
- Crimping
- Assembly

Extract of laboratory analysis:
- X-Ray
- EDX
- HV-Test
- Cross-Section
- Temperature / Humidity
Assembly – Hungary (Pecel)

Plant Pecel

- SMT technology (e.g. connector, fuses, NTC, LED, ASICs, welding terminals)
- Wave soldering for connector assembly
- Light beam soldering
- Crimping line for connector assembly and welding terminals
- Ultrasonic welding for bus bars
- Riveting line for bus bars
- Automated applying of adhesives

- Plastic carrier assembly incl. hot stacking processes
- Conformal coating line (e.g. fuses and welding areas)
- LASER processes for contour cut and welding
- Resistance welding
- Milling, Drilling, Stamping
- EOLT

enmech – Pecel, Hungary
Backend Production
Employees
~700
Space
4500m² production
Greenfield
New plant with 11,000m² will be ready mid of 2019
Als Bestandteil der Kabelwerke Reinshagen, mit Hauptsitz in Wuppertal, hat sich das Berliner Werk immer schon mit alternativen Verbindungstechnologien beschäftigt und hat bereits in den 80ern Applikationen mit Flachleitern, insbesondere Folien, hergestellt.

Ende der 90er wurde das Berliner Werk in Delphi umfirmiert. 2006 erfolgte dann der Verkauf an die Fa. Freudenberg NOK Mechatronic. Seit 2016 ist die enmech 100% Teil der Mektec Group. Mit dem Zugewinn des ungarischen Werkes wurde die Fertigung neu strukturiert.

Kleiner historischer Rückblick auf die Fa. enmech

Dashboard 1985

SMD 1985

SMD 2001

LASER gelötet
SnPb / 42.000 LEDs pro Tag

Multilayer 2001

Dachhimmelverkabelung 2001

Dachhimmelverkabelung 2001
enmech Applications

Produktportfolio 2017

Exterior Lighting

Ambient Lighting

Interconnection Boards for Batteries

Foil Antennas

Heating Modules

Seat and Sensors

Window Connectors

Other Electronics
Was sind die Trends im Automotive Segment?

**Trend Battery**

- New vehicle production by application [m units]
  - 2017: 93, 0% BEV, 99% PHEV, 1% ICE
  - 2020: 100, 2% BEV, 94% PHEV, 4% ICE
  - 2025: 111, 4% BEV, 87% PHEV, 9% ICE
  - 2030: 116, 4% BEV, 77% PHEV, 19% ICE

- Battery cell demand by application [GWh/a]
  - 2016: 35 GWh/a
  - 2020: 240 GWh/a
  - 2025: 780 GWh/a
  - 2030: 1,550 GWh/a

- Demand for batteries driven by increased share of xEVs
  - Battery size (avg. 55 kWh in 2020, 70 kWh in 2025)

- Commercial vehicles >3.5 to and buses add another 20% of capacity demand on top

**Trend Autonomous driving**

- Gut ein Drittel würde ein selbstfahrendes Auto kaufen

**Trend Connectivity**

- 2030 → 40% off all cars with Car to X Communication
Is enmech prepared for the future?

Needs...
• Exterieur Light
• Collision Warner
• Camera Heater
• Radom Heater
• Seat Sensors

Needs...
• Beltsensor
• Interieur Illumination
• 3D Sensor
• Seat Sensors
• Ambiete Heater
• …

“The car interior becomes the ‘next living space’.”

Needs...
• Antennas
• Antenna Moduls
• Antenna Connectors
• …

Needs...
• Battery Cell Sensoric
• Cell Connection
• Battery Heater
• Leakage Sensor
• …
Exterieur

Autonomous driving

Exterior lighting
- Less current consumption
- Clear distinctive look for each e-mobility OEM design
- Adaptive illumination
- No blind zone

Major applications
- LED Matrix headlamp (high beam, low beam)
- LED Day Time Running and Static Bending Light
- Mirror lighting indication (side marker, puddle light, side blind zone)
- LED rear lamp (tail, stop, back-up and indicator lights)
- Center high mount stop lamp (CHMSL)
**Interieur**

**Autonomous driving**

**Ambient light**
- Adjust the color and intensity before you drive and during driving autonomous “Wellness – Light”
- Automated change of light profile based on weather situation
- Search your car by using the interior lighting

**Major applications**
- LED functional lighting (reading lights, footwell illumination, dome lights)
- LSM door and headliner ambient lighting
- Interior illumination integrated into headliner
- PU based sealed Side LED stretchable
Battery Applications

- Customized battery monitoring and power distribution systems for hybrid and electric vehicles
- Including voltage and temperature sensing
- Cell connection

Major applications

- Cell connector/sensing board
- Temperature sensors
- Harness
- Heater
- Crash sensor
- Smart cell
- Solutions for pouch cells for prismatic cellscylindric cells
Connectivity

Antenna
- Antennas for mobile services of all global standards: Digital and analogue radio, data and TV services as well as remote control functions
- Send information via smartphone to your car
- Car-to-x communication

Major applications
- Antennas for use outside (e.g. roof, mirror, bumper, spoiler)
- Antennas for use inside (e.g. door, ceiling, arm rest)
- Antennas with integrated amplifier, diagnostic resistor, capacitor
Autonomous driving

Heater
- Avoid fogging and icing of sensors and cameras for autonomous driving
- Reduce system cost and weight by using heaters with constant wattage, integrated temperature control or PTC temperature control
- Safety during driving with permanent clean windshield

Major applications
- Heaters for vision systems (e.g. de-icing of camera vision area in front screen)
- Heaters for RADAR sensing
- Heaters for Wiper
- Mirror heaters with blind spot warning
- Armrest and covers heater
- Single segment heating
Autonomous driving

Glass
- Glasses are carrier for Heaters and Antenna
- Glasses are in view Smart Antenna Connector to improve Antenna performance
- Smart Interconnection Antenna to Amplifier
- Illuminated Glass as Warning Lamp, CHMSL
- Heater for thin glass and vision systems

Major applications
- Warning lamp
- 3rd-Brake Light
- Smart Interconnection Antenna to Amplifier
- Heaters for Wiper Park
Autonomous driving

**Seat occupation**
- Switch off/on function related on seat occupation
- Reduce current consumption for electrical heaters or in general for air conditioning
- Low weight, small, thin and applicable between seat cover and foam or below the foam
- Measurement of capacitance or just a switch

**Major applications**
- Front and back seat
- Removable seats
- Buckle switch
Front-End processes Berlin

Lamination photo restist

Exposure → UV light

Developping

Etching

Stripping

Chem. tin

Stamping

Laser
SMD Assembly

LASER welding

Crimping

EOL functional test