3D-MID
for Automotive

Sensors – Camera Systems – Lighting – Antennas – Switches

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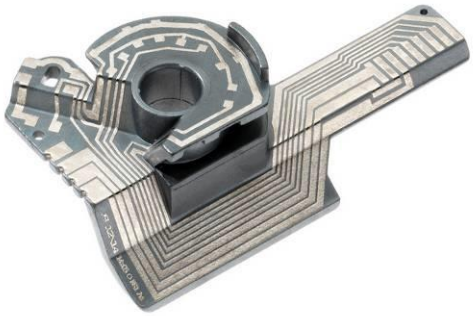
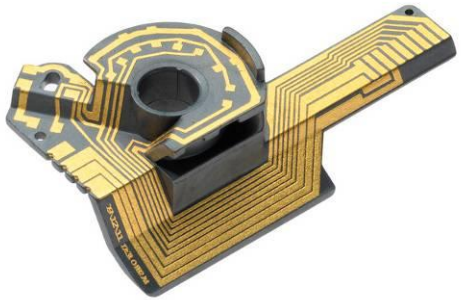
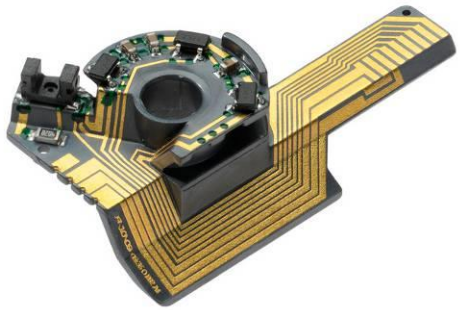
What is 3D-MID Technology ?

Pushing Performance

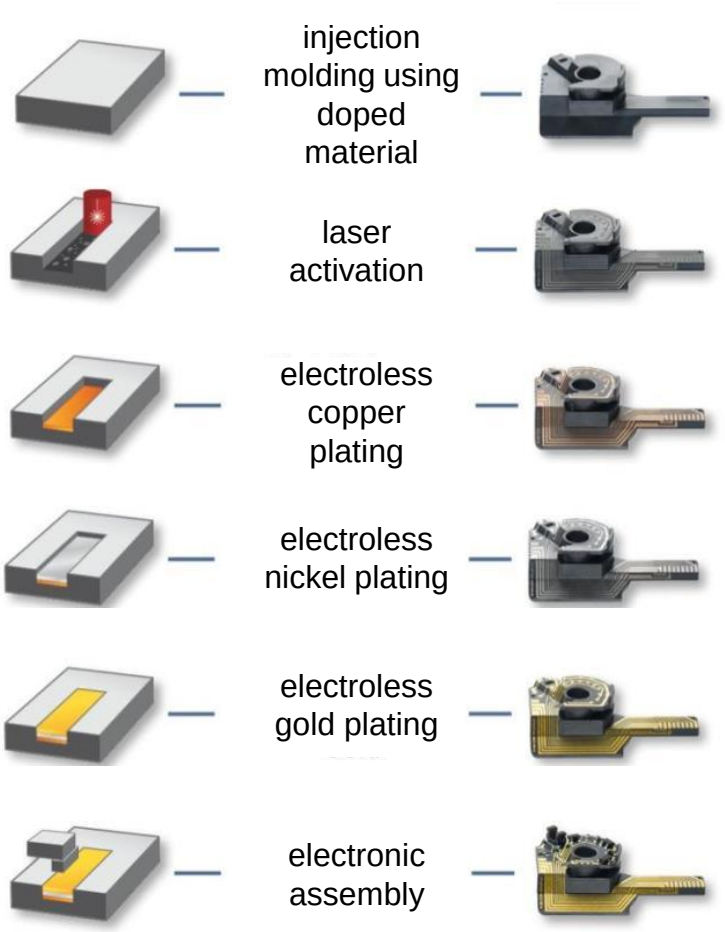
- **3D** means solutions in three dimensions are possible
- **MID** means Molded Interconnect Device or Mechatronic Integrated Device
- 3D package allows high design freedom and miniaturization
- 3D features are integrated in process
- Integration of various functions: mechanical, electrical, fluidical, optical
- Reduced number of assembly steps and interfaces

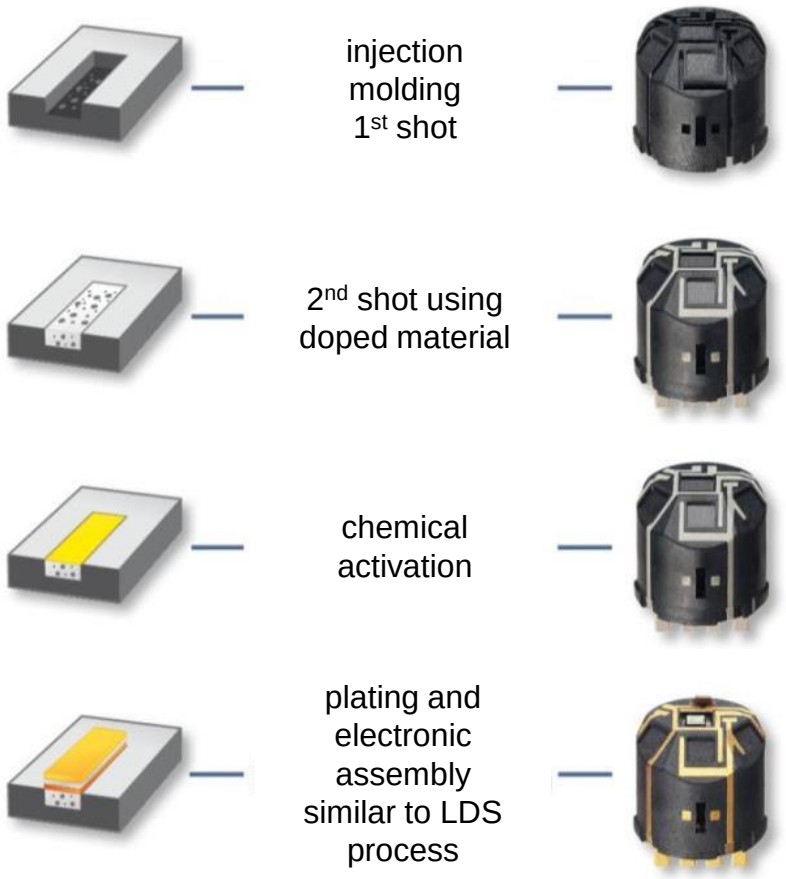






3D-MID manufacturing with laser direct structuring and 2-shot injection molding





From idea to serial production – all manufacturing steps from HARTING Biel

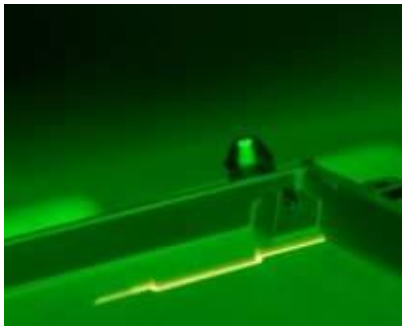
Pushing Performance

Development

Tool shop

Molding

Laser Structuring



Inspection

Assembly

Plating

Cleaning

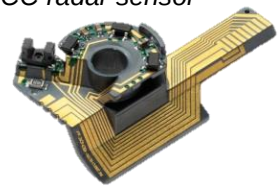
3D-MID for automotive applications

Pushing Performance

Sensors

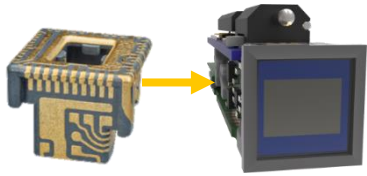
- Increasing functionality leads to increasing amount (“hundreds”) of sensors
- 3D-MID helps to realize miniaturized and weight reduced sensor systems

ACC radar sensor



Camera systems

- Today: video-based assistance driving → various camera systems
- Tomorrow: autonomic driving → more and more camera systems are required



Lighting

- New designs require high 3D design freedom
- Increasing manufacturing automation requires rigid parts and less interfaces

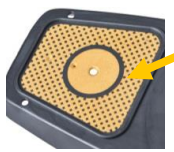
Domelight

Antennas

- comfort, infotainment and safety: not visible, function follows form

Switches

- New designs require high 3D design freedom, less space and more functions



Capacitive touch

Sensors

- 3D-MID are standard for comfort assistence, approved in serial applications for safety systems

Power train

pressure (gearbox control)
high pressure (direct fuel injection)
tank pressur
torque/position (motor control)

Comfort

humidity/temperature (climate control)
distance ultrasonic (parking)
pressur (central locking)
pressur (central locking)
rain (windshield wiper)

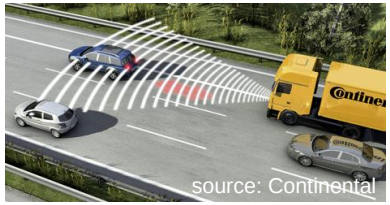
Safety

distance radar (ACC)
inclination (head lamp)
pressur (ESP)
torque (steering)
position (steering)
acceleration (airbag)
seat occupancy (airbag)
rotation speed (ESP)
acceleration (ABS)

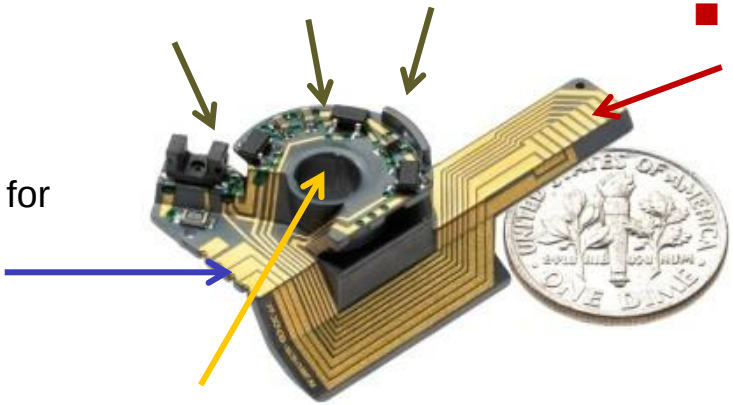
3D-MID position sensor for adaptive cruise control in cars

- **MID is part of an adaptive cruise control system**
- **MID leads to**
  - a higher precision of the SMD assembly
  - significantly reduced size of the radar sensor
  - mechanical and electrical functions integrated in one piece


source: Continental


source: Continental

- … carrier for three hall sensors, one optocoupler and SMD components.
- … integrates a connector for signal transmission.
- … integrates landing pads for power supply of motor windings.



- … ensures the precise commutation of the motor unit.

Camera Systems

- Today: video-based assistance driving → various camera systems
  - park assistent, road sign recognition, driver drowsiness detection, lane departure warning/lane keeping support, intelligent adaptive headlights, relaxed driving with radar-based functions like Adaptive Cruise Control (ACC), forward collision warning
- Tomorrow: autonomic driving → more and more camera systems are required
  - new installation locations (e.g. outside rear view mirror)
  - camera systems needs to be small and highly integrated (unvisible)

HARTING 3D-MID for camera systems

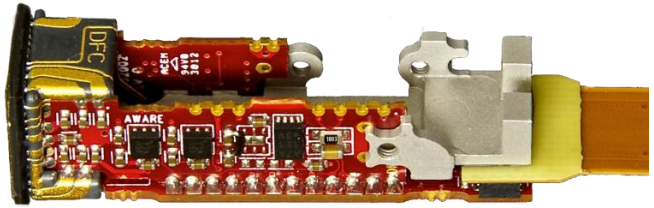
Sensor platform for a large-format camera

Pushing Performance

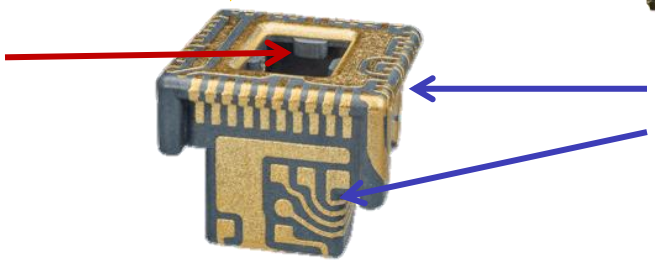
- **MID enables**
  - a miniaturized sensor platform which results in images with more pixels per constructed space
  - component reduces the weight.
  - MID integration simplifies the assembly.
  - the MID allows rectangular mounting of the CCD sensor

- **Improved solution compared to conventional PCB technology**

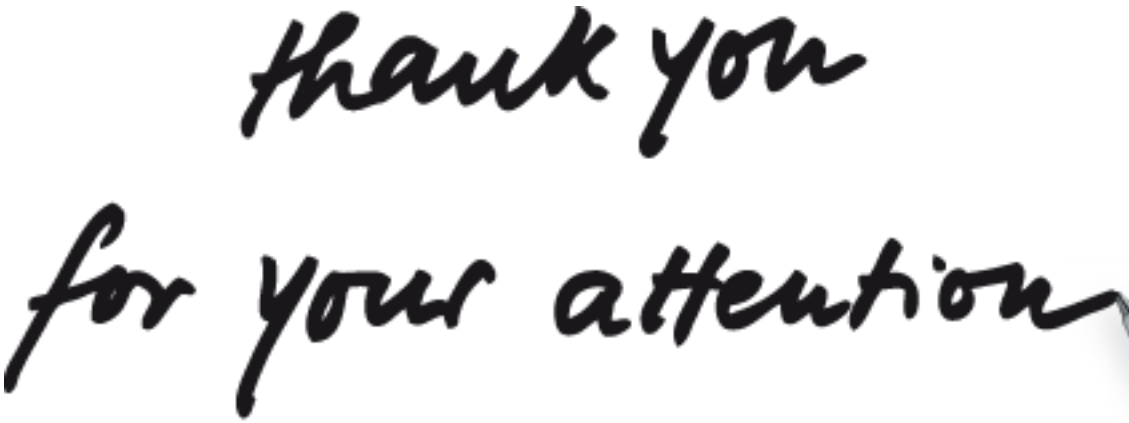
… serves as carrier of CCD (Charge-Coupled Device) sensor.



… allows interface to heat sink with directly fixing aluminum pieces to CCD sensor for heat dissipation.



… provides electrical connections to various module boards (PCB).



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