3D-MID for Automotive

Sensors – Camera Systems – Lighting – Antennas – Switches
What is 3D-MID Technology?

- 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

- Injection molding using doped material
- Laser activation
- Electroless copper plating
- Electroless nickel plating
- Electroless gold plating
- Electronic assembly

Injection molding 1st shot

2nd shot using doped material

Chemical activation

Plating and electronic assembly similar to LDS process
From idea to serial production – all manufacturing steps from HARTING Biel

Development
Tool shop
Molding
Laser Structuring

Inspection
Assembly
Plating
Cleaning
3D-MID for automotive applications

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

**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

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

**Switches**
- New designs require high 3D design freedom, less space and more functions
3D-MID are standard for comfort assistance, approved in serial applications for safety systems.
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

  - … 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

- **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).
thank you for your attention

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