

# SMD on Molded Interconnect Devices

## Soldering and Adhesive Technology

In the growing field of products with increasing levels of integration and functionality, for different kinds of requirements and needs various MID technologies are provided. Based on hot embossing, two shot molding or laser patterning technologies various devices can be designed not only with a high 3D capability and finest metal line pitches down to 200 µm, but also with a large potential for cost reduction. Furthermore, MID are compatible to well known technologies like SMD assembly by means of soldering and bonding by adhesives.

Compared to standard substrates for SMD assembly, e.g. epoxy resin PCBs, thermoplastic substrates for MID usually have a higher coefficient of thermal expansion (CTE) and lower thermal stability. Furthermore, in order to get good adhesion of the metal layer the surface roughness of electroless plated metal lines is comparatively high. Thus, SMD assembly on MID is investigated carefully at the HSG-IMAT with special attention to reliability.

The most common way of SMD assembly is soldering, but not all thermoplastic offer sufficient thermal stability for a lead free process. High performance materials like e.g. PBT/PET, PA6/6T and LCP are well suited for lead free soldering which is shown in various cases. If other thermoplastic are required or the thermal stress should be minimized, adhesive technology using isotropic conductive adhesives (ICA) is a very interesting alternative.

Both assembly technologies show high reliability. After thermal shock testing and cyclical humidity storage testing almost no decrease of shear strength could be observed.

A new challenge for SMD assembly are 3 dimensional substrate geometries with varying assembly levels, small cavities and different orientations.

### Molded Interconnect Devices (MID)

- Higher functionality
- Higher level of integration
- Reduction of cost
- Reduction of weight
- Smaller package size

### SMD on MID

- Lead free soldering
- Assembly with isotropic conductive adhesive (ICA)
- Assembly on 3 dimensional substrate geometries



Source: Festo AG & Co. KG, HSG-IMAT

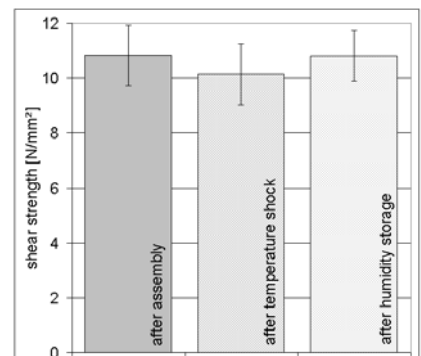
#### Example of environmental testing

Substrate material: PBT / PET

Soldering: Vapour phase  
( $T_{max} = 235^{\circ}C$ ; SnAgCu solder)

Temperature shock testing:  
100 cycles @  $-40 / 85^{\circ}C$

Cyclical humidity storage testing:  
6 cycles @  $25 - 55^{\circ}C / 93\% \text{ r.h.}$



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