

Hot Embossing

Technology for MID Manufacturing

Hot embossing is a fast and economic process for production of Molded Interconnect Devices (MID), which doesn't need wet processing steps. The layout of an electronic circuit is milled into a steel stamp by high speed cutting (HSC). A special copper foil is placed on the MID. With a suitable press equipment the foil is pressed on the MID at an increased stamp temperature. The conductor lines are punched out and connected with the thermoplastic substrate. The remaining foil is removed and the MID is ready.

Hot embossing can be applied on a variety of thermoplastic materials like polyamides (PA), polybutylenterephthalates (PBT), polyphenylensulfides (PPS) etc. Manufacturing of through holes is also possible by embossing the foil into the holes of a substrate and subsequently filling the vias with conducting adhesive. Alternatively pins can be pressed in and soldered. Hot embossing is not limited to rigid substrates, also special plastic foils or flat flexible cables (FFC) can be structured too.

Hot embossing foils normally are based on copper with functional surface layers on bottom and top. As a top layer metals like Sn or Ni/Au are used depending on further processing of the MID substrate. The bottom layer usually has a treatment with a rough surface which enables a good adhesion to the thermoplastic substrate. Copper foils for hot embossing are commercially available in different thicknesses from 12 – 100 µm. Minimum line width and space depends on the copper foil thickness and is approximately 400 µm / 400 µm for a 25 µm foil.

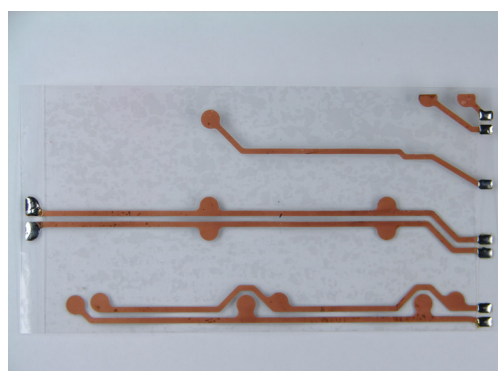
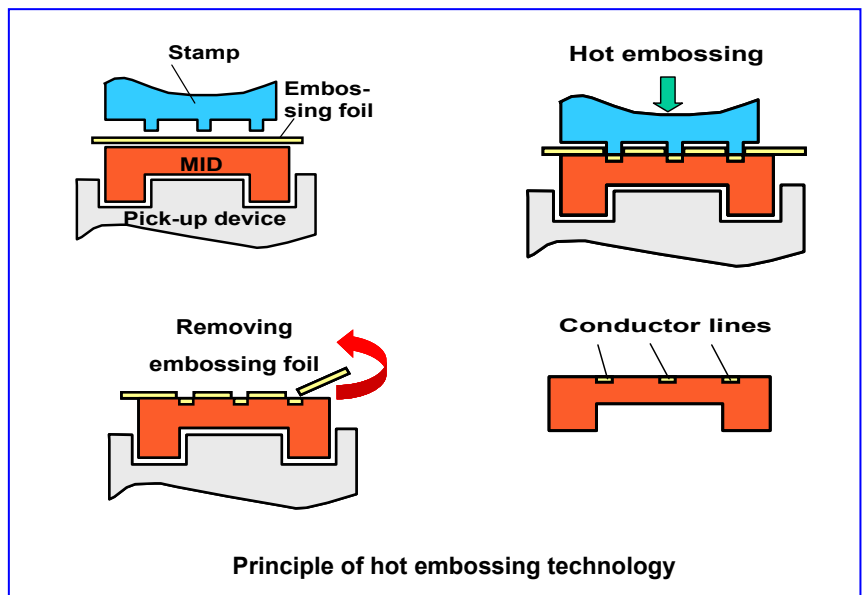
HSG-IMAT has experience in hot embossing technology for many years, was involved in build-up of an automatic MID production line and has accompanied many applications from development to production. Actual R&D works deal with thermoplastic substrates (rigid and flex) for high temperature applications as well as with increasing the life time cycle of stamps by depositing hard materials like DLC.

Characteristics

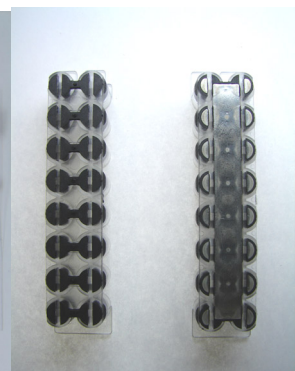
- Cost economic process for MID manufacturing
- Technology available for a lot of thermoplastics
- No wet processing steps required
- Process applicable also for flexible circuits

Applications

- Control and automation
- Automotive
- Life sciences
- Medical devices
- Information and communication



Flexible circuit in hot embossing technology



MID for biotechnological applications before/after hot embossing (Ref.: Amaxa, Balda)