

Laser direct structuring¹ of three-dimensional Pocan[®] interconnect devices



A significant current trend in industrial production of electric and electronic devices involves the miniaturization of the individual components, whilst simultaneously equipping them with greater functionality. A successful solution lies in using three-dimensional injection molded plastic interconnect devices (3D-Molded Interconnect Devices or 3D-MID in short). Not only do they offer a high level of design freedom, but they can even be used to create sophisticated mechatronic systems that combine electric and mechanical functions.

The LPKF Laser & Electronics AG's laser direct structuring process² is an innovative technology used to manufacture 3D-MIDs. It allows conductive tracks and electronic components to be attached directly to the plastic interconnect device in a simple, environmentally friendly process (without the use of etching or caustic chemicals). The process offers an extremely high level of layout flexibility. Moreover, it was recently shown that the miniaturization potential of the process has still not even come close to being exhausted. In contrast, conventional processes are already reaching their limits in this respect with many electronic components.

The LDS process is based on thermoplastics containing a certain complex organometallic compound as the active additive. Three-dimensional molded parts are made from these thermoplastics, and a laser then 'writes' a high-definition circuit diagram on their surface. In this process the laser beam vaporizes the topmost layer of polymer and activates the underlying metallization nuclei of the active additive. The activated areas are then plated with a layer of copper in an electroless metallizing bath, and electro-reinforced if necessary.

Customized polyesters

LANXESS has developed various grades of its Pocan[®] polyester for laser direct structuring. They are adapted so that all the process steps can be easily managed, from the preparation of materials to the finished component (injection molding, lasering, metallizing, and soldering if necessary).

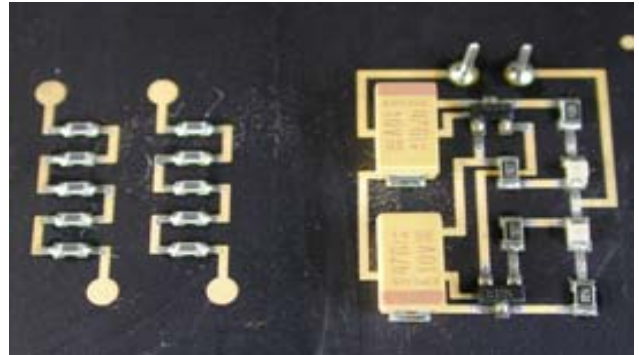
Pocan[®] DP 7102

is a PBT designed for injection molding, with a 25 % mineral content. It allows the production of warpage-free molded parts with excellent surface quality. We also offer Pocan[®] TP 710-003, which can be used to extrude profiles that can then be further developed into interconnect devices using the LDS process.



Pocan® DP T 7140 LDS for lead-free soldering

Pocan® DP T 7140 LDS has a glass fiber / mineral content of 40 % and is heat resistant at very high temperatures. It is suited to lead-based and particularly to lead-free soldering processes using SnAg(Cu) alloys. It can stand up to the temperatures of both vapor phase soldering (approx. 230 °C) and reflow soldering (furnace temperatures up to 275 °C). Both these processes are very widely used in the manufacture of 3D-MIDs.



¹ Utilization of the Laser Direct Structuring (LDS) process may be dependent on patents of third parties, e.g. EP 1191127 B1, EP 1274288 und EP 0 917597 B1.

² LPKF-LDS® is a registered trademark of LPKF Laser & Electronics AG

Durethan® and Pocan® are registered trademarks of LANXESS Deutschland GmbH

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Developmental Product

Any product designated as a developmental product is not considered part of the LANXESS Corporation line of standard commercial products. Complete commercialization and continued supply are not assured. The purchaser/user agrees that LANXESS Corporation reserves the right to discontinue this product without prior notice.

Typical Properties

Property data is provided as general information only. Property values are approximate and are not part of the product specifications.

Health and Safety

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling LANXESS products mentioned in this publication. Before working with these products, you must read and become familiar with the available information on their hazards, proper use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets (MSDS) and product labels. Consult your LANXESS Corporation representative or contact the Product Safety and Regulatory Affairs Department at LANXESS. For materials that are not LANXESS products, appropriate industrial hygiene and other safety precautions recommended by their manufacturer(s) must be followed.

Regulatory Compliance

Some of the end uses of the products described in this brochure must comply with applicable regulations, such as the FDA, NSF, USDA and CPSC. If you have any questions on the regulatory status of any LANXESS engineering thermoplastic, consult your LANXESS Corporation representative or contact the LANXESS Regulatory Affairs Manager.

Regrind

Where end-use requirements permit, regrind may be used with virgin material in quantities specified in individual product information bulletins, provided that the material is kept free of contamination and is properly dried (see maximum permissible quantities and drying conditions in product information bulletins). Any regrind used must be generated from properly molded/extruded parts, sprues, runners, trimmings and/or film. All regrind used must be clean, uncontaminated, and thoroughly blended with virgin resin prior to drying and processing. Under no circumstances should degraded, discolored, or contaminated material be used for regrind. Materials of this type should be discarded. Improperly mixed and/or dried regrind may diminish the desired properties of a particular LANXESS product. It is critical that you test finished parts produced with any amount of regrind to ensure that your end-use performance requirements are fully met. Regulatory or testing organizations (e.g., UL) may have specific requirements limiting the allowable amount of regrind. Because third party regrind generally does not have a traceable heat history or offer any assurance that proper temperatures, conditions, and/or materials were used in processing, extreme caution must be exercised in buying and using regrind from third parties. The use of regrind material should be avoided entirely in those applications where resin properties equivalent to virgin material are required, including but not limited to color quality, impact strength, resin purity, and/or load-bearing performance.

Note:

The information contained in this publication is current as of June, 2009. Please contact LANXESS Corporation to determine if this publication has been revised.

