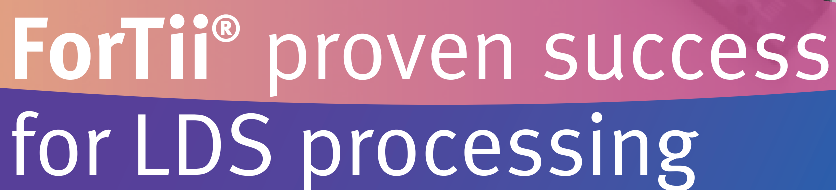

ForTii® proven success for LDS processing

Two major trends continue to drive the electronics industry, and determine the technologies used. In the consumer market, there is a focus on producing smaller and lighter products with more functionality. The miniaturization of electromechanical components like connectors and sensors requires reflow soldering technologies since the contact pitch is so small.

This causes a need for materials that can resist high temperatures up to 280°C. Another path to miniaturization is through the integration of functionalities into the components or (sub)systems by conversion or disruptive technologies.

The second force driving the industry is the focus on creating greener technology with a lower ecological impact. A few pioneering companies set their green targets independently. As trendsetters in the industry, they influence the content of future standards. The majority of companies follow the regulations set by governments or international associations.

LDS techonolgy

The use of MIDs allows for smaller components with less weight. They require a mix of materials in lower volumes. The LDS process is environmentally friendly since it omits the use of aggressive chemicals or etching.

In the manufacture of Molded Interconnection Devices (MIDs), a thermoplastic part serves as the 3D substrate for conductive tracks. Several processes are used to manufacture this type of device. Some of these are based on fully metallizing plastic parts, and then removing the plating in a secondary step by etching or photoresist processes. Others rely on creating conductive circuits on the parts directly, either by using advanced printing processes or high temperature dispensing. A secondary curing operation is often required.

A third group of MID requires a structuring step, where the differentiation between conductive and insulating areas is determined. One common method used to achieve this is a two-component molding technology using two distinct types of thermoplastics, one of which can be plated. An emerging technology in this sector is Laser Direct Structuring (LDS). Molded compounds are exposed to a laser beam in all three dimensions.
This direct laser writing causes chemical activation through ablation of the exposed polymer surface, preparing the surface for the proper adhesion of copper in a standard electroless plating process through ablation.

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This method requires only a few straightforward process steps: molding, lasering and plating. This makes LDS a highly flexible design solution – using only adjustments in the software, various electronic circuits can be created on very short time cycles without any additional investment.

ForTii: Providing hassle-free LDS development

Whether electronic systems are destined for consumer electronics, appliances or automotive applications, functional integration and miniaturization continue to be the main market trends. The use of MIDs plays an important role in the development of electronic systems, and LDS technology is proving itself one of the most effective methods to cope with all the demands. ForTii is DSM's best-in-class material suitable for LDS and the complex and diversified demands of the industry. Our LDS portfolio in ForTii is approved by LPKF Laser & Electronics AG.

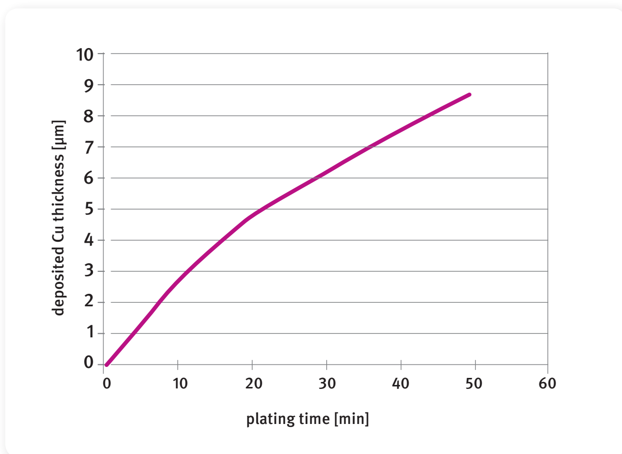
Trouble-free processing

Compared with traditional molded plastic components, LDS components require more processing steps, which could lead to a longer and more complicated supply chain. In addition to molding and assembly, LDS component also require laser processing and plating. LDS grades of ForTii provide robust performance in all steps of the LDS process, ensuring the quality of the product and greatly reduced development times.

Best-in-class platability

ForTii LDS has proven itself one of the easiest materials to work with in the plating process. Plating on the lasered tracks is quick and easy.

Fig.1 Copper plating speed



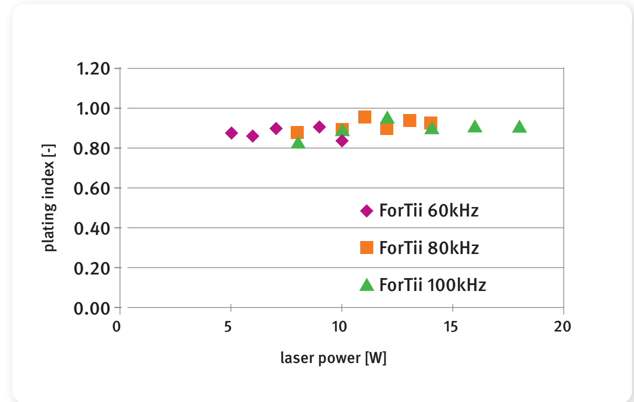
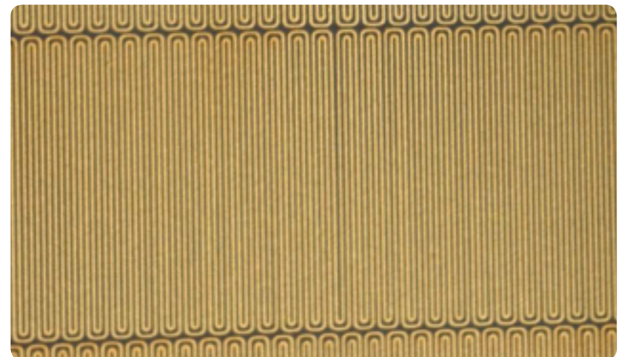


Fig.2 Plating Index

This improves productivity since shorter time is required compared with the same thickness of metal, for example, only 20 minutes of processing is necessary for a 5 micron copper layer.
ForTii LDS has proven its versatility with different plating bath conditions, which means slight changes in the conditions will not impact the quality of the plating. Moreover, ForTii achieves resolutions as high as 100 microns in the serial production environment. This provides the opportunity for designers to create smaller components and more compact constructions.



Good flow

ForTii's LDS grades have the flow in line with competitive grades. Our LDS grades have been proven in a wide variety of applications from less than a gram to tens of grams, and from wall thicknesses below 0.5mm to a few millimeters.

As a result of functional integration and miniaturization, features not best developed using plastic molding are often designed for LDS processing. The good flow characteristics of ForTii LDS ensures the successful molding of many challenging designs.

One size fits all assembly

More often than not, LDS components require a soldering process, in which the plastic is exposed to very high temperatures. Due to its extremely good mechanical performance at high temperatures, ForTii LDS provides the capability of working with all available soldering processes, including manual soldering, vapor phase soldering, reflow soldering, and others. ForTii's heat deflection temperature is way above the temperature needed for reflow soldering (260°C). This also prevents any warping or deformation during the soldering process.

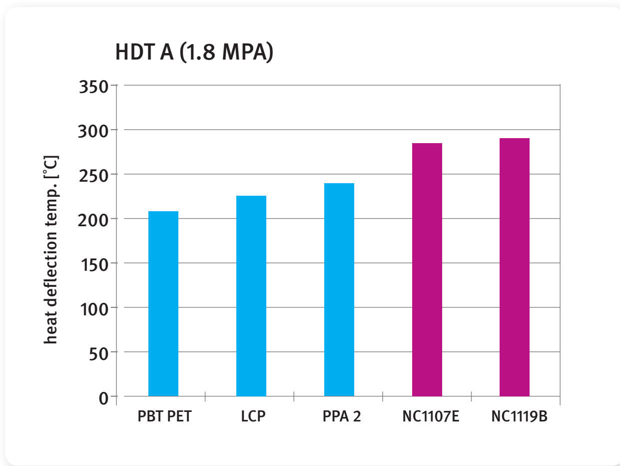


Fig.3 Heat deflection temperature of several polyamides

Balanced mechanical performance

ForTii's LDS grades provide an ideal balance in mechanical performance. It has high stiffness and strength, while also offering high ductility. ForTii can be used in housing designs that require either descent impact resistance or a snap fit without much concern about the material performance. This presents more possibilities for the designer, enabling the incorporation of various mechanical functionalities into the LDS component.

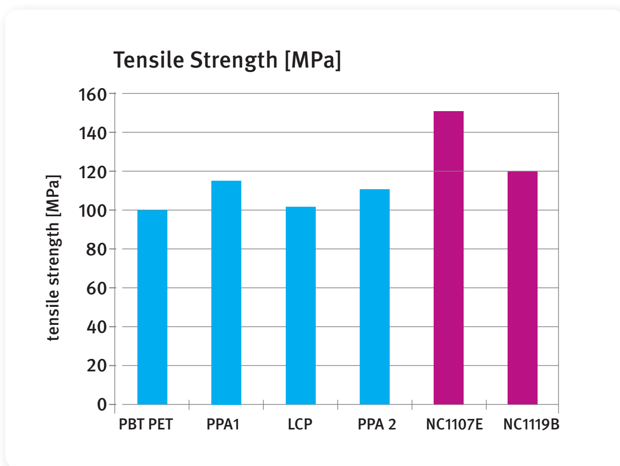


Fig.4 Tensile strength of several polyamides

Trade name	ForTii	ForTii	ForTii
Color	Nat Blk	Nat Blk	Nat Blk
TM (GPa)	12	10.5	11.2
TS (MPa)	130	150	120
EaB (%)	1.2	2	1.6
Notched charpy (kJ/m2)	2	4.2	
UL94 performance bar 0.8 mm	HB	HB	V0
HDT A (1.8MPa) (°C)	300	285	290

Support

DSM has a long and successful track record with LDS components, and all sales of our ForTii LDS grades are supported by a highly dynamic team. We combine best-in-class competence in materials knowledge, application knowledge, design capability and CAE capabilities, with access to the entire LDS value chain, including end customers. We believe that strong development partnerships will continue to drive this market, and we are ready to work together with our customers to bring LDS technology to the next level.

DSM Engineering Plastics

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