

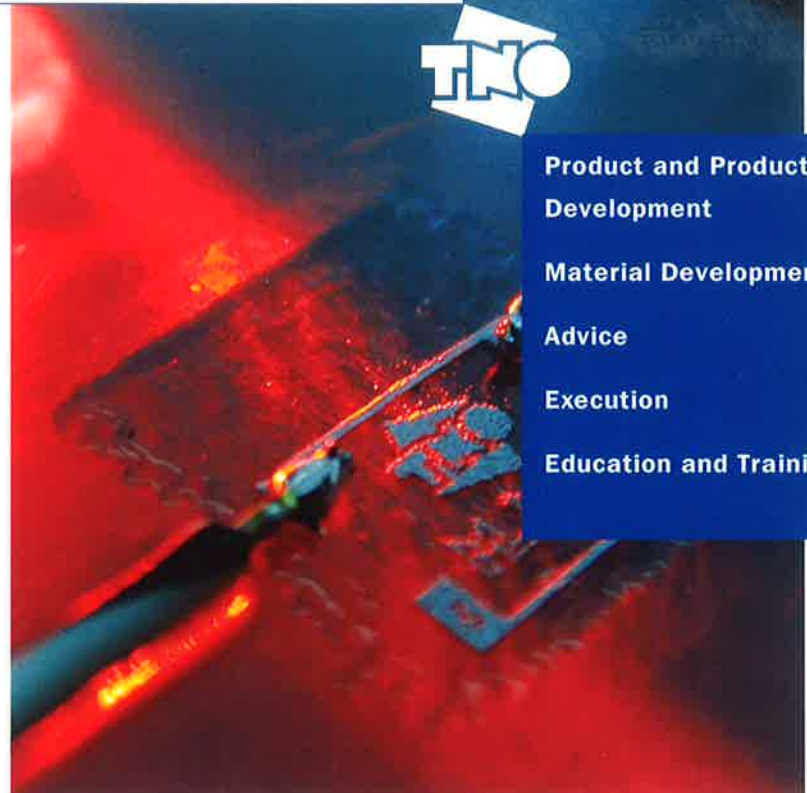
# Take advantage of our unique knowledge of materials

*In the field of Rapid Manufacturing (RM), TNO Industrial Technology focuses on a combination of manufacturing technology and materials. It has accumulated a huge wealth of knowledge on applications for the various RM materials. With this knowledge at your disposal you are perfectly placed to respond rapidly and flexibly to market demand.*

The key to Rapid Manufacturing lies in the materials. But naturally you also need to know exactly what the materials can and cannot do. TNO Industrial Technology can help you in your assessment, thanks to the broad and deep knowledge it has built up over the years. Groundbreaking research still continues today.

### Exploiting the properties of materials

TNO Industrial Technology deploys Layer Manufacturing Technologies (LMT), which enable various materials to be applied in pre-determined positions in a single step: Multi Material Manufacturing (MMM). Thanks to the detailed knowledge of the properties materials acquire during LMT production, products can be designed that take this into account.



Product and Production Development

Material Development

Advice

Execution

Education and Training

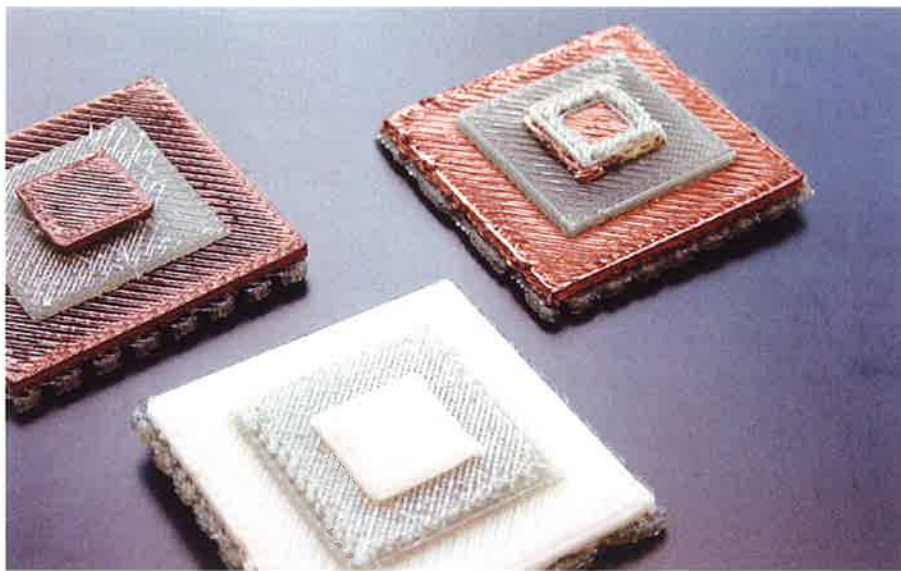
### Rapid manufacturing

In its use of LMT technologies TNO Industrial Technology focuses primarily on laser sintering and 3D printing because of the flexibility offered. But innovative subtractive technologies (including high speed milling, EDM, CNC) also have their place as they too can offer major speed benefits. To support its Time Compression Technologies TNO Industrial Technology also develops digitalisation and knowledge systems.

### Putting products into practice

If you provide detailed requirements for your product, TNO Industrial Technology can translate these needs into practice across the entire chain (or a part of it).

Please turn over for some case studies.



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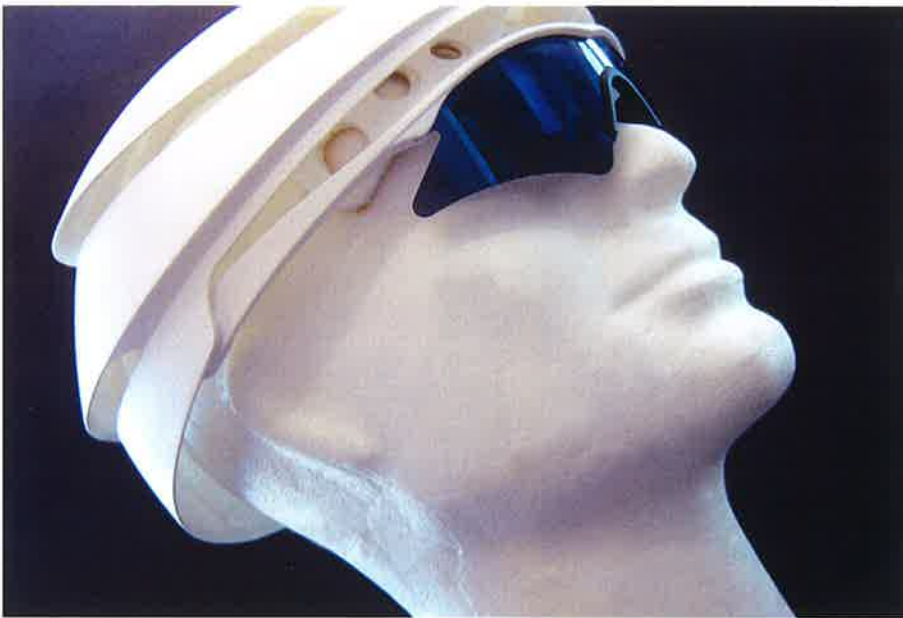
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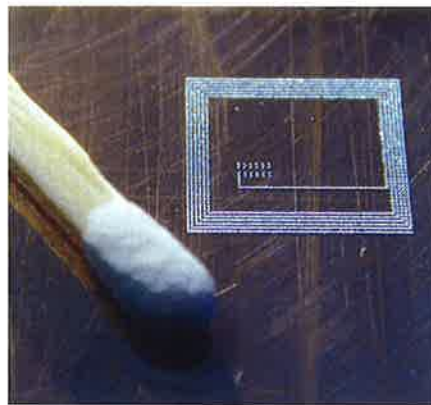
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▲ NOC\*NSF, DSM, rower Dirk Lippits and TNO Industrial Technology collaborated on the development of this helmet. By scanning Lippit's head and collating this data with the helmet design, the nylon helmet could be custom made with the SLS machine.



▲ Microjetting can be used to build conductive metal tracks with dimensions  $10^{-6}$  m into any 2D or 3D shape. This is impossible using other technologies.

Rapid Manufacturing is also used in the medical sector. This scaffold for tissue formation is printed from body-friendly hydroxyapatite and is just a fraction of a millimetre in size. ▼



▲ To solve the problem of dust contamination during grinding, TNO Industrial Technology developed this direct vacuum system fitted to the equipment. Injection-moulding was prohibitive because only 10 were needed. Instead the SLS machine was used for their manufacture.

