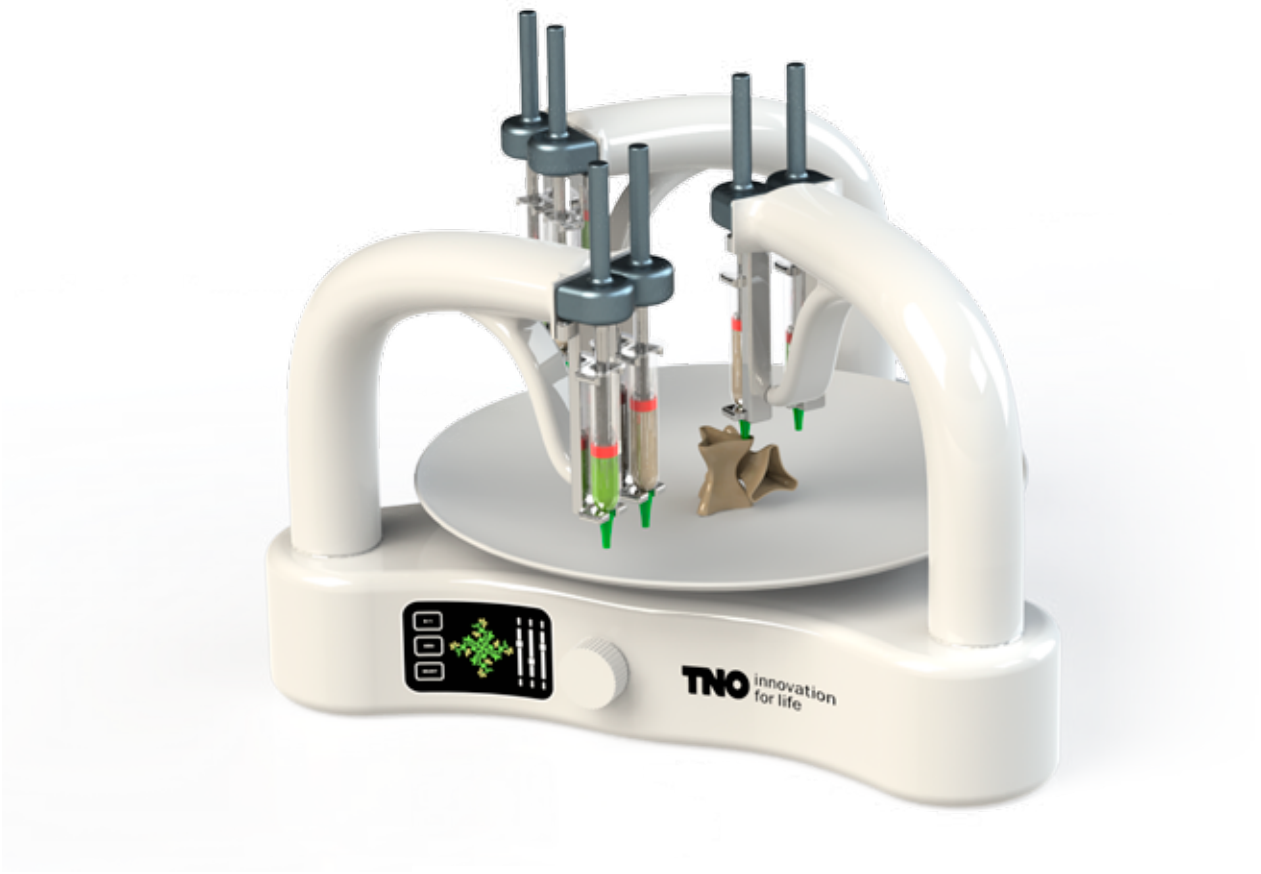
3D FOOD PRINTING



TNO innovation for life

Imagine eating your favorite food, imagine its shape, taste, texture and nutrtional are all exactly matched to your individual needs and preferences and freshly 3D printed.

3D PRINTING

3D printing is an innovative manufacturing process whereby an object is built up layer by layer, from a 3D computer design using a variety of printing technologies. These technologies were developed for the manufacturing industry and hence typically process plastics, ceramics and metals. 3D printing is used for the production of objects made from both a single type of material as well as combinations of materials in which each material is deposited, for instance, by a separate print head. Over the last couple of years TNO investigated printing technologies for their applicability to food product production and has recently shown great potential for the layerwise building of complete, 3D, well-structured, multi-material food products produced from a series of base ingredients.

Much of the current research in food processing is aimed at (incremental) improvements of existing technologies or at replacement of individual steps in the food production chain in order to increase efficiency. On a much more ambitious level some research is being carried out on the development of technology that might replace much larger parts (i.e. multiple steps) or even the complete food production process. 3D food printing is one such technology!

NOVEL FOOD STRUCTURING METHODS

3D Printing of food allows enormous freedom of design not only in terms of 3D shape but also the composition (the ingredients and their ratios), structure, texture and, perhaps most importantly, taste. 3D printing technology can create unique new products and structures, that other methods simply cannot emulate.

TNO started researching the shaping of food with 3D printing technologies, resulting in successful collaborations with food designers and manufacturers. Now we are looking more and more into using 3D printing technology for the creation of novel food structures.
For these new structuring methods traditional ingredients are generally used. However, we are also looking into the usage of alternative base materials like algae or insects and this is becoming an increasingly important focal point for TNO.

Differences in taste or dietary patterns of people of different ages, sex, occupation, health or lifestyle, can be used as input for personalization of food by adjusting the composition, density or structure to the preference and needs of the user. Mass-customization can applied to produce food products for personalized nutrition. By using flexible computer aided manufacturing systems to produce a custom output, products can be mass produced with low cost whilst allowing the flexibility of individual customization. Presently TNO is working on a food printing project called “PERFORMANCE”, an overall concept that allows the automated manufacture and supply of personalized, specially textured food for frail and elderly people with mastication and swallowing problems.

MULTIDISCIPLINARY APPROACH

Aside from the knowledge on 3D printing technologies other knowledge is also essential to move this technology forward. Mechatronics and ICT, specific food knowledge in the areas of ingredients, formulations and their behavior under various process conditions are just a few examples. By combining and merging these different disciplines TNO is able to offer unique, innovative and sustainable solutions in this field.

THE FUTURE

At this point in time the possibilities of this emerging technology are being explored with respect to the type of products that can be made from a materials and technology point of view. However, the potential is clear. To realize the prospects offered by 3D food printing, research has to be continued. We are looking for business partners in several industries including food manufacturers, the food (service) industry and developers of 3D food printing equipment for industrial or domestic use. Join us now to explore the possibilities.

BENEFITS

- Ability to make free form food products
- Design and produce novel food textures
- Make truly personalized food products for a wide variety of consumers
- Combine food ingredients and flavours in a completely new way
- Novel food structuring using a broad range of (alternative) food ingredients

www.tno.nl/3dfood

3D printed carrots manufactured by Fused Deposition Modeling for the PERFORMANCE project

First complex 3D printed chocolate globes for gastronomy

3D printed free-form pasta product

Savory snacks produced by Selective Laser Sintering

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TNO HEALTHY LIVING

TNO is an independent research organization with a broad knowledge of several fields. TNO initiates technological and societal innovation for healthy living and a dynamic society.

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