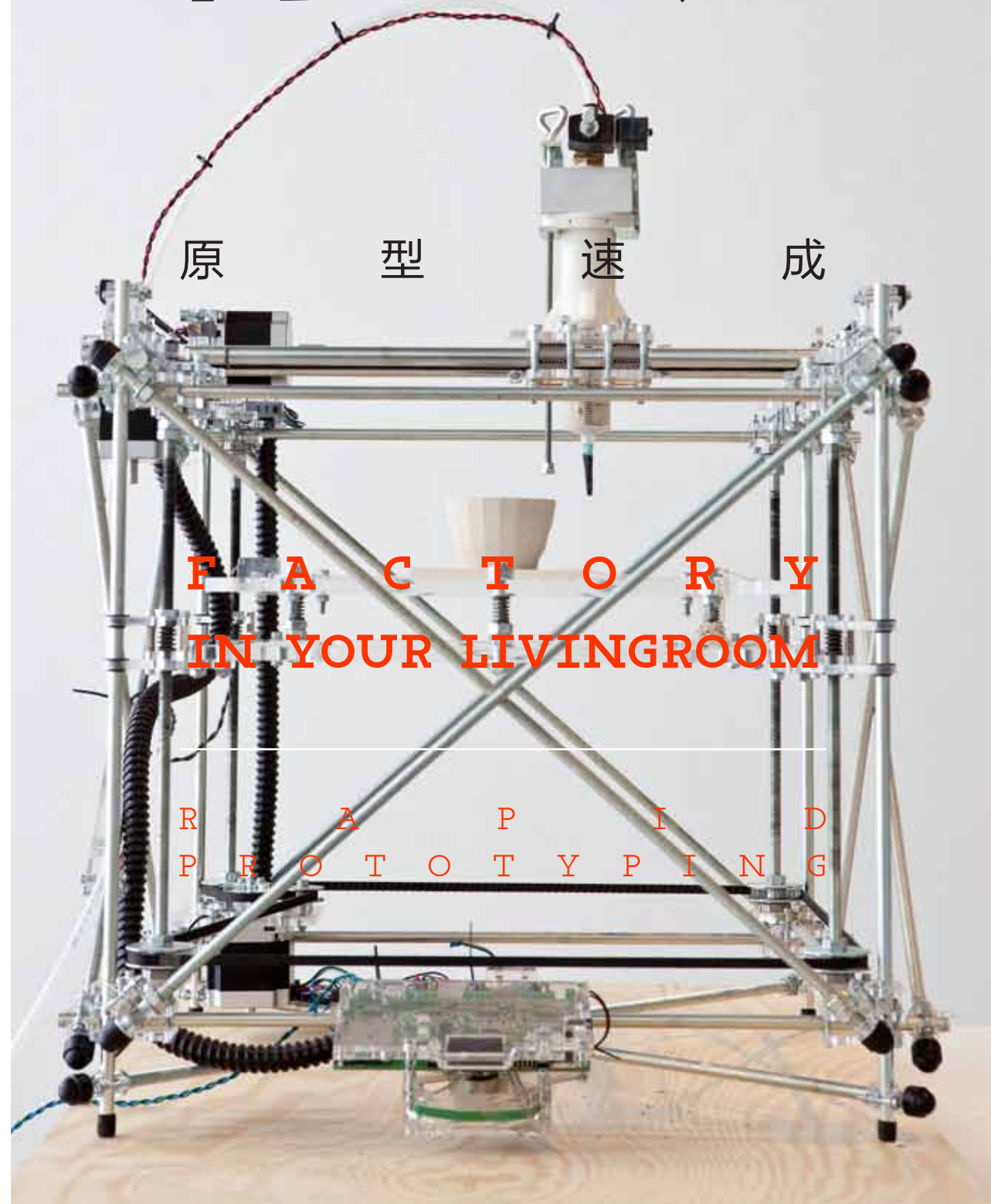


# 客厅里的工厂



原型速成

FACTORY  
IN YOUR LIVINGROOM

RAPID  
PROTOTYPING

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L'Artisan Électronique \_Unfold, photos by Kristof Vrancken

STRATIGRAPHIC MANUFACTURY \_Unfold, photos by Kristof Vrancken

如果每个人都能够制作家具，会发生些什么？有没有可能在世界上的任何地方都可以开发和生产家具呢？设计师是否可以在构思产品时不去定义它的终版，而只去规划一个开放式的设计过程，从而产生一组多变的虚拟集合呢？这听起来像是天上的馅饼，但却有可能在不远的未来成为现实，越来越多的设计师正在研究当前的工业生产体系，重新定义设计范围，并试图向消费者开放。他们在设计项目中提出可替代的解决方案，方案中采用诸如3D印刷这样的数字化制造方法，从而可以使购买者参与部分的设计决策。

“工艺”这个词往往会让人联想到一些景象：你可能会想到一个在做木工活的木匠正在一块大木头上钻眼儿。或者是一个做陶艺的人正伏在陶轮上用双手捏塑一只粘土容器。但是，在不久的将来，你可能会看到一个人在作坊里做着和陶匠同样的事情，不同的是，前者使用的则是完全不同的工具。与传统的雕刻和制陶工具不同，人们可以在一个屏幕前用手在空中拟制一只容器——这有点儿像任天堂Wii的游戏情节。在他的后面有一个小型机器，准确地说是一台开源3D打印机，此时它正在等待打印的最终结果——一个用手塑型的陶瓷容器。

3D打印，也叫做快速成型或添加制造技术，即在电脑成像的基础上，通过采用一种特殊设计的打印机器将添加的材料层层累积来制造三维物体。近30年来，这种技术主要用于汽车制造和航空航天业，制造商用它替代聚酰胺或尼龙来制作汽车原型零件，如今，3D打印机能够利用粘土、金属或玻璃等材料让设计者尽情创造具有无限可能性的产品，同时它也开辟了新的市场来吸引消费者和品牌进行互动，为他们将要购买的产品增加个人特色。

What would happen if furniture was available to everyone? If it could be developed and produced in any location in the world? What would happen if designers didn't conceive final end products but a new genre of open-ended design processes, originating in a virtual, ever-changing collective? What still sounds like a pie in the sky, could become a reality in the not too far future as more and more designers are examining the established industrial production system, redefining the design field and opening it up to the consumer. Their projects propose alternative solutions, which deploy digital manufacturing methods like 3D printing, to enable the purchaser to be part of the design decisions.

The term 'craftsmanship' evokes certain images in us: you may think of a carpenter in his joinery, drilling a hole into a big wooden staff. Or of a potter bending over a wheel, forming a clay vessel with his hands. But in the near future you might think of a person in a workshop, pursuing the same procedure as the potter, but with completely different instruments. Instead of traditional sculpting and pottery tools, he uses his hands to form a vessel in the air in front of a screen – a movement that reminds of a Nintendo Wii game. At his back is a small machine, or precisely an open source 3D printer, waiting to print the final result, a hand-shaped ceramic vessel.



Unfold set up a manufacturing site in one of the main venues, Adhocracy, of the first Istanbul Design Biennial, where it is collaborating with local craftsmen, designing, producing and selling 3D-printed ceramics.



迄今为止，这种技术已经在小范围内实现了。3D打印技术已经进入医疗领域，用来制作隐形支架和助听器，电子公司使用这种设备制作器械原型，而建筑师们则用它来建立模型。此外，像Mykita这样的时尚饰品公司也引进了这种先进的技术。2011年，这家总部位于柏林的眼镜制造商推出了Mylon系列眼镜。该系列眼镜采用聚酰胺3D打印而成，结实轻便，并且可以通过加热进行调整以适用于不同的佩戴者。相比之下，耐克的设计师和工程师吕克·富萨罗（Luc Fusaro）也正在研究采用3D打印机制造一双运动鞋，为了让打印出来的鞋子全面贴合购买者的脚形及尺寸，首先要对顾客的脚步进行扫描。从长远来看，这种技术的进步很可能带来一个可下载产品数据的特殊软件的诞生，人们可以通过这个软件参与产品的制作并自定义产品的操作。然而，这种可能性也是有限的，毕竟我们知道不是每个人都可以成为产品设计师。即使已经有小批量的家用桌面3D打印机面世，更多的产品数据还是会被发送到本地的制造业中心。在全球意义上说，这一技术意味着较低的碳足迹：与其全世界各地运送产品，不如仅在互联网上传送数据。

随着这一新生事物的演进，它已经成为了一个孕育设计师的肥沃土壤。2010年，由Claire Warier和Dries Verbruggen在比利时联合创立的工作室Unfold创建了一个L'Artisan Electronique（电子工匠），先用一个虚拟的陶轮扫描一个旋转的容器。然后通过管道向开源3D打印机中注入粘土，之后便可打印出一个陶器。“该技术的灵感来自最古老的制陶工艺，在旋转的陶轮上放置一卷一卷的陶土，然后慢慢堆叠起来，做出陶器的造型。”Dries Verbruggen说：“当我们看到第一代开源3D打印机用塑料以类似的方式工作时，我们就联想到了古老的制陶工艺。”这种精湛手艺和电脑精确计算组合而成的工作模式帮助Unfold工作室创造出了一件最新的作品，Stratigraphic Manufacturing，这是一个分布在全球各地的网络，小规模地联系着生产者、程序员和3D建模师。他们通过这个网络和工匠合作，分享他们的技术创新，Unfold工作室设立了一些临时场所，在这里进行陶瓷的设计、3D打印、生产和销售。

3D printing, the summary term for Rapid Prototyping or Additive Manufacturing, is a digital method of creating three-dimensional objects based on a computer drawn image with material being added layer-by-layer using a specifically designed printer. For almost 30 years predominantly used by carmakers and aerospace companies to build prototype parts for their vehicles out of polyamide or nylon, 3D printers today are capable to make use of materials such as clay, metal or glass. It provides designers with far broader possibilities, creating new markets for consumers to engage and interact with a brand, in adding their personal attributes to the product they are going to buy.

On the long run this progress includes the possibility to download product data with a special software, to engage and to shape the manipulation of a product. However this may happen within boundaries that are save, as obviously not everybody is a product designer. Even there is already a small range of desktop 3D printers developed for home use, more likely the data will be send to local manufacturing centres. In a global sense this means lower carbon footprint: instead of sending a product across the world, only the data will be sent across the Internet.

As this new reality evolves, it is already a fertile playground for designers. In 2010, the Belgian collective Unfold, founded by Claire Warier and Dries Verbruggen, created L'Artisan Electronique, a virtual pottery wheel that scans the manipulations of a rotating vessel, with the results later on being printed using an open source 3D printer modified with a tube to deposit clay. "The inspiration for the technique came from one of the oldest techniques in pottery, coiling, where you make rolls of clay and stack them up to create a form," says Dries Verbruggen. "When we saw one of the first open source 3D printers working in a similar fashion with plastic we made the link with the very old technique of ceramic coiling." The further stage of this combination of skilled handcraft and computerized precision resulted in Unfold's most recent work, Stratigraphic Manufacturing, a distributed global network connecting small-scale producers with programmers and 3D modellers. Collaborating with craftsmen to share their technical innovation, Unfold sets up temporary manufacturing sites, where 3D printed ceramics are designed, produced and sold.

A similar approach can be found with Dutch design studio Minale-Maeda, founded by Mario Minale and Kuniko Maeda in 2006. The components of their Inside Out Furniture, a collection, which consists of chairs, tables, sofas and sideboards, were specifically designed to be downloaded and are kept together with 3D printed plastic connections, which suit various sizes of wood. Building on this project, Minale-Maeda has developed Keystone, a set of 3D printed plastic connectors that combine standard wooden parts so that anyone can fabricate their proposed items of furniture. The compact connectors can be printed at a local manufacturing centre and assembled by the user with no need for joinery skills or instruction booklets.



Keystones \_ project by \_ Studio Minale-Maeda, images by \_ Studio Minale-Maeda



Minale-Maeda是一所由Mario Minale和Kuniko Maeda于2006年在荷兰创立的设计工作室，它也采用了类似的技术和方法。在他们的Inside Out Furniture系列作品中，包括椅子、桌子、沙发和餐柜等室内家具组件都是为了便于下载而特别设计的，同时都是采用3D打印的塑料接头组装起来的，这些接头可适用于不同尺寸的木质家具。在这个项目的基础上，Minale-Maeda工作室还开发出了Keystone接头，这是一组3D打印而成的系列塑料接头，可连接各种标准尺寸的木质组件，这样一来，任何人都可以制作自己想要的家具。这些连接件非常紧凑，可以在当地的制造中心打印制作，即使是没有木工技能的人，也可以在没有说明书的情况下把它们组装起来。

设计师Dirk van der Kooij只是单纯痴迷于3D打印机的快速建型。他最出名的作品是Endless Series，这是由3D打印机打印而成的一系列再生塑料产品，他的打印方法随着设计的演变而变化，并通过不断改造自己的“机器人”来推进他的工作。“在设计Endless Series的过程中，我受到了旧式3D打印机打印形状的启发，”这位荷兰设计师解释说。“制作方法是沿用了30年的老规矩，但是老机器却不是很准确。通过仔细检查打印过程，人们可以看到这些形状是如何形成的：一根极细的线前后有序地移动，高效地建立形状。于是我突然产生了一个想法：‘我要创造一个专门制作家具的机器。’通过清晰地展示椅子的制作过程，我用粗厚的塑料线制作了一个实实在在的塑料装饰品...这就是Endless的意义。”

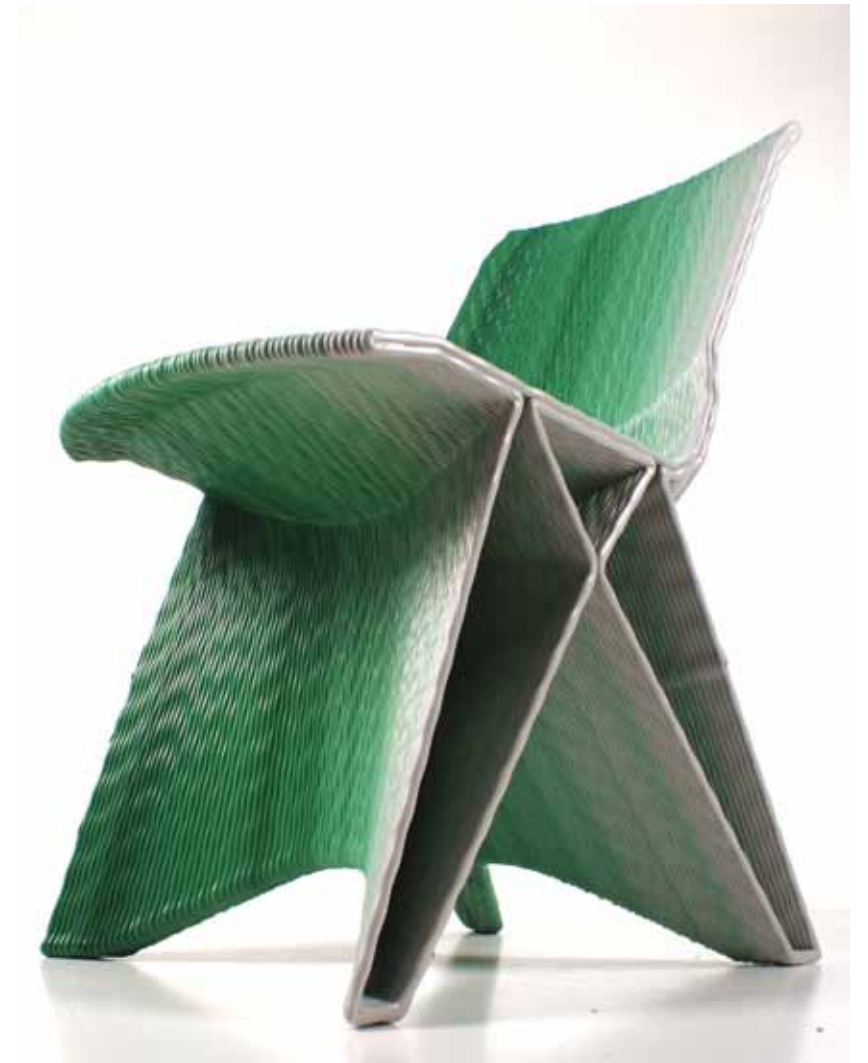


Inside-out furniture \_ project by \_ Studio Minale-Maeda, images by \_ Studio Minale-Maeda



Another designer simply obsessed with rapid prototyping is Dirk van der Kooij. Best known for his Endless Series shaped from a continuous string of recycled plastic by a 3D printer, his method builds up on the evolution of his designs, continuously rebuilding his 'robot' as a way of advancing his work. "Designing the Endless Series, I was inspired by a shape that was made using an old 3D printer," explains the Dutch designer. "This principle is 30 years old, but the older machines were not very accurate. By carefully examining that process, one could identify how the shape was being formed: a very thin thread was meticulously moved to and from, building up the shape very efficiently and without waste. The idea occurred instantly: 'I'm going to build a machine specialized in making furniture'. Thick threads of plastic that create an honest ornament by clearly showing how the chair is fabricated... Endless."

German designer Markus Kayser went even one step further, building the 3D printer Solar Sinter that uses sunlight and sand to craft glass objects in the desert. Using a large Fresnel lens, the machine focuses a beam of sunlight and creates temperatures between 1400 and 1600 degrees Celsius. Being hot enough to melt silica, it builds up glass shapes inside a box of sand mounted underneath the lens. This experiment aims to raise questions about the future of manufacturing and spark off our imagination of making use of the production potential of the world's most efficient energy resource: the Sun. By way of contrast, Dutch office DUS architects are doing a research on construction, role of ornament, and the possibly of personalized designs. They created the world's first movable pavilion, KamerMaker, that can 3D print entire rooms in plastics, both demonstrating 3D printing to the general public and pushing the limits of the technology.



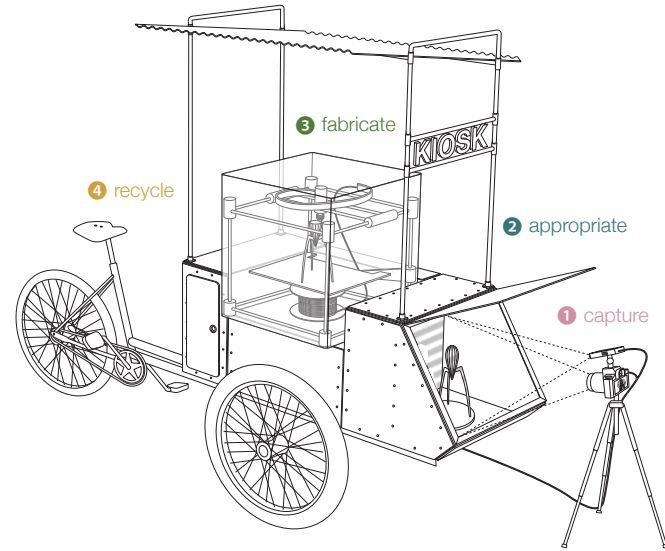
Dirk van der Kooij \_ Endless Plus Low Chair Gradient Green & Endless Process

德国设计师Markus Kayser的方法则更进一步，他制造了名为Solar Sinter的3D打印机，这台机器可以在沙漠中利用阳光和沙土制作玻璃工艺品，它可以通过一个大型菲涅尔透镜聚焦阳光，产生1400度到1600度之间的高温。这样的高温足以熔化二氧化硅，于是，镜头下面的一盒沙子就可以被融化成玻璃。这个实验针对未来的制造业提出若干问题，引发人们思考如何去有效利用太阳能这一世界上最高效的资源。相反的，DUS建筑事务所的荷兰办公室正在进行一项有关建筑、装饰物角色和个性化设计可能性的研究。他们创造了世界上第一个用3D打印机整体打印的可移动塑料亭子KamerMaker，这个作品既向公众展示了三维打印，也突破了该技术的限制。

Unfold工作室的作品Kiosk进一步揭示了3D打印技术的未来，通过街边的便携式3D打印店，数字制造技术将慢慢进入我们的生活。有了它，用户可以调整、打样、删除，增加、减少或是复制新的对象并当场用3D打印机打印出来，例如修复破的鞋子，甚至是生日礼物。这种技术已经描绘出未来将要发生的最显著的变化。我们很可能会更愿意看到生产各式限量定制产品的小公司进入市场，而不是人们自己在家打印物品。这也可能意味着一种新式的手工艺风潮将卷土重来，到时候，各地的人们都能制作出符合个人属性的产品，而不是被国外的厂家统一注塑生产。

“我们真的不相信最近被主流媒体大肆宣传的家庭式3D打印竟被很多人追捧。不是每个人都愿意自己制作东西。我们更期待看到的是由消费者输入数据后的分流式生产，而不是从消费者自己制造的产品，”Dries Verbruggen说。“3D打印永远无法替代传统的技能，但它是一个我们可以建造事物的额外工具。每个人都可以用这个工具制作装饰品、工艺品和个性化的建筑元素，”DUS建筑事务所合伙人Martine de Wit总结道。

Kiosk by Unfold \_ infographic & logo



A further project that gradually reveals a near future scenario is Kiosk by Unfold. It demonstrates how digital manufacturing methods might be entering our lives by operating as a portable 3D copy shop that appears on our streets. With it the user can adapt, sample, remove, up- and downscale or copy new objects and 3D-print them on the spot, producing for example custom made fix for broken shoes or even birthday presents. The project already lays out where the most remarkable shift will take place. Most likely we will rather see small companies enter the market with limited specialized assortments than people printing their items at home. And this could also mean a comeback of a new craftsmanship, where things are produced locally with individual attributes, rather than being injection moulded abroad.

“We do not really believe that at home manufacturing, which is being hyped in the mainstream media these days, will be as big as many people want us to believe. Not everybody wants to make things. We are more looking at distributed manufacturing of goods with input from consumers instead of consumer manufactured goods,” remarks Dries Verbruggen. “3D printing will never take over more traditional skills, but it’s an extra tool we can use to build. This fabrication tool allows ornament, craftwork, and the personalization of building elements to become affordable again,” concludes Martine de Wit, partner at DUS architects.

Kiosk by Unfold \_ photos by Kristof Vrancken



# 07

## C H A P T E R



## J A S O N \_ A T H E R T O N

To garnish

- Compressed apple strips,
- Picked dill,
- Sea pursulane
- Stone crop
- Samphire
- Grated frozen lime zest