

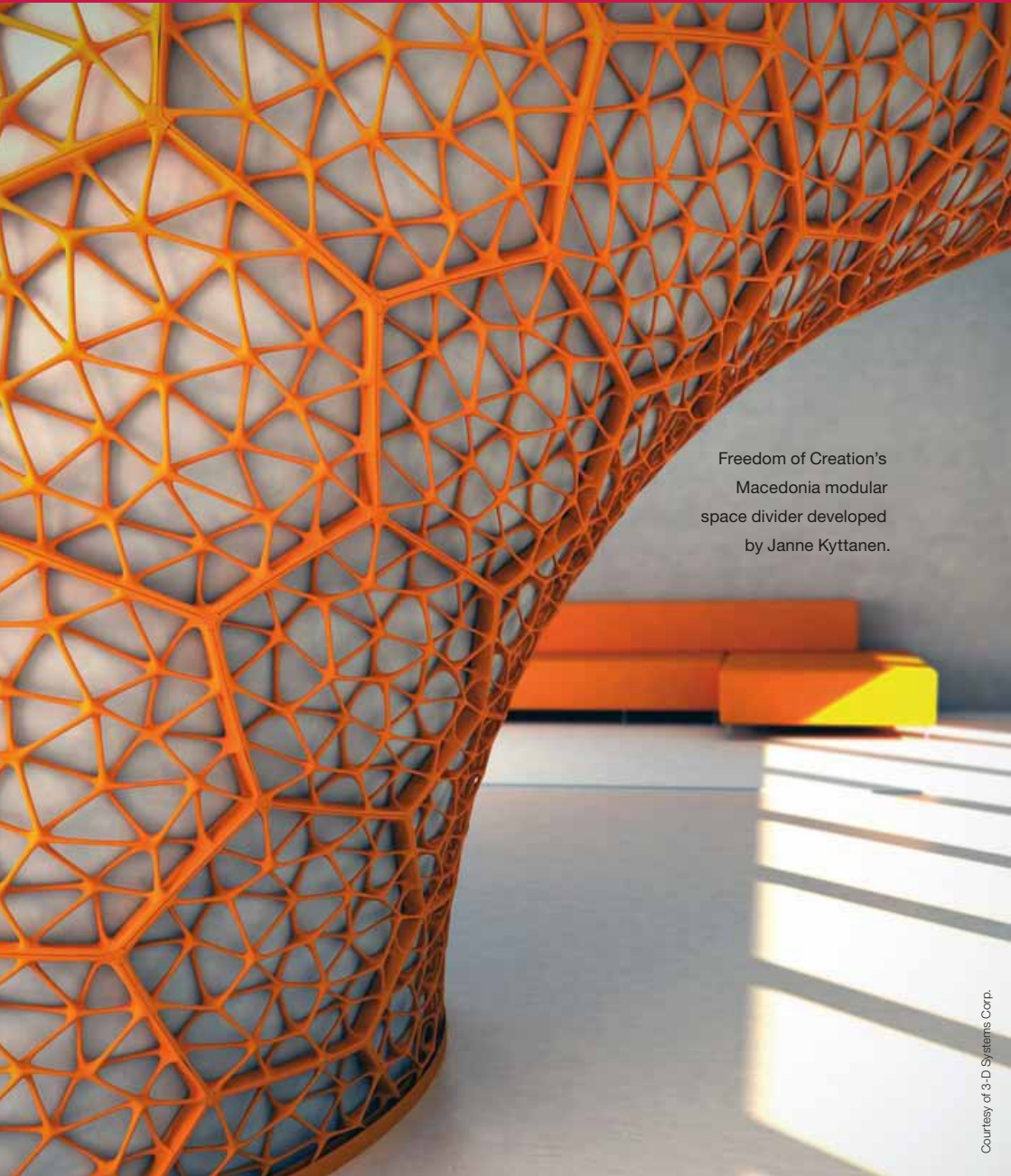
**WORLD
INTELLECTUAL
PROPERTY
DAY 2013**

**AN EXHIBITION
ON 3-D
PRINTING**

**APRIL 22 TO
MAY 3, 2013**



A GAME-CHANGING TECHNOLOGY



Freedom of Creation's
Macedonia modular
space divider developed
by Janne Kyttanen.

Courtesy of 3-D Systems Corp.

3-D printing allows us to make intricate objects previously found only in nature – or our imaginations.

With 3-D printing, we can make almost any object by “growing” it layer by layer from the bottom up (hence its other name, “additive manufacturing”).

“3-D printing allows us to take what is on the computer screen and turn it into a real life physical model in a matter of hours.” - Stratasys

The Gaudi Chair by Dutch designer Bram Geener



Courtesy of 3-D Systems Corp.

THE PROCESS

A 3-D digital design file is created using computer aided design (CAD) software or by scanning an actual object.

The 3-D design is then cut into 2-dimensional "slices" that are fed to a printer which starts building up the object layer by layer from its base.

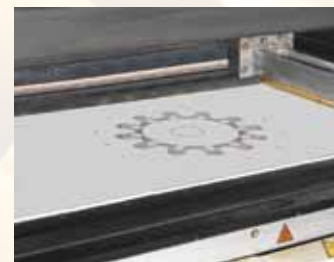
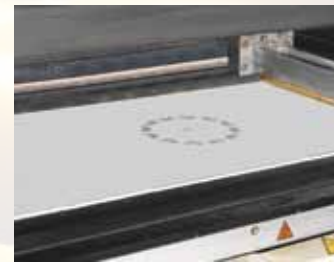
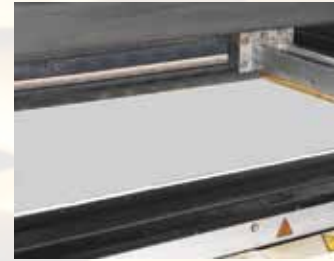
The printer deposits extremely thin layers of material (in liquid, powder or filament form) onto a "build area" and fuses them together using a range of techniques.

Some involve melting or softening layers of material, others binding powdered materials or jetting or selectively hardening liquid materials.

The first commercial 3-D print technology, known as stereolithography, was invented in 1994 by Charles Hull. Several other technologies have emerged since.



Courtesy of 3-D Systems Corp.



Design company Freedom of Creation's Palm is inspired by the fluid and sweeping foliage found in nature.

WHY ALL THE BUZZ ?

3-D printing technologies allow companies and individuals to overcome the design barriers and economic constraints associated with traditional manufacturing techniques.

All sorts of objects can be made more quickly, more cheaply and with more efficient use of resources.

SOME KEY ADVANTAGES

A single machine can create different objects in one go

Complex structures traditionally manufactured in multiple parts, can be produced in one shot

An expanding range of materials such as metals (steel, titanium, gold), high-grade plastics, and composites, can be used

3-D printed items can be lighter and stronger requiring less maintenance than traditionally crafted products

Rapid validation of new designs speeds up product development and commercialisation

Customisation is easy

On-site production simplifies the supply chain and can slash warehousing and transport costs

Lower barriers to entry for manufacturing

3-D printing uses fewer raw materials, generates less waste and is more energy efficient



Courtesy of Materialise



Courtesy of Materialise

Courtesy of 3-D Systems Corp.



Courtesy of EADS



WHAT PEOPLE ARE SAYING...



Courtesy of Materialise



Courtesy of Materialise

“When a technology becomes personal, when a technology becomes desktop, it doesn’t just get cheaper, smaller, better, more ubiquitous, what happens is it gets used in different ways. [What is] really exciting to me about the era of desktop manufacturing is not just the tools it is what people will do with them. What I can’t wait to see is when you put 3-D printers in every school, the kids are going to do things we can’t imagine.”

Chris Anderson formerly Managing Editor of Wired and author of Makers

“It really changes the way we think about production.”

Stratasys

“Eventually it will completely transform the way products are made.”

Sir James Dyson

“The “Portable Factory” concept will change the lives of many and the introduction of low-cost DIY 3-D printers will herald a new era of personal manufacturing”

RepRap Central

The technology “allows the design team to re-visit historical techniques and ideas that would have been prohibitively expensive using conventional manufacturing”.

Professor Jim Scanlan, Southampton University, co-leader of the SULSA project which designed the world’s first 3-D printed aircraft

“This is a leaner and greener technology which can be used in many sectors from aviation through to consumer goods. It has the potential to revolutionise manufacturing for the 21st century.”

Dr. Jean J. Botti, Chief Technical Officer at EADS

“I believe it is the next big thing. [It] is going to change everything - how we learn, how we create and how we manufacture.”

Abe Reichental, CEO, 3D Systems



Courtesy of 3-D Systems Corp.



Courtesy of EADS



Courtesy of Materialise

IN THE AIR AND ON THE GROUND...

Many sectors are adopting 3-D printing as part of their manufacturing strategy.

Leading aircraft manufacturers (e.g. Airbus and Boeing) are using the technology to improve the performance of their aircraft and reduce maintenance and fuel costs.

In 2011, researchers at Southampton University (UK) designed and flew the world's first "printed" aircraft. It has a 2-metre wingspan and a top speed of nearly 100 mph (161 km/h).

Aircraft designers already have in their sights the 3-D printing of a whole plane by 2050. Can you imagine?

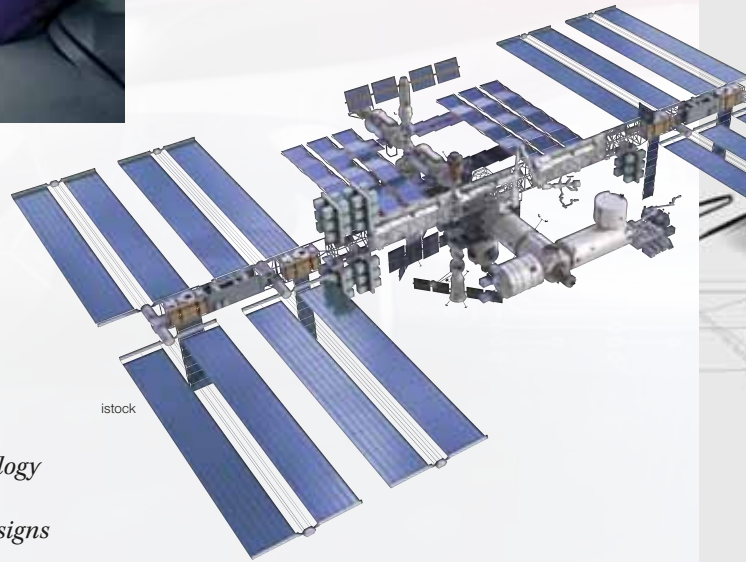
NASA scientists are exploring the use of 3-D printers at the International Space Station, to make spare parts on the spot instead of having to return to Earth.



Courtesy of Materialise



Courtesy of University of Southampton

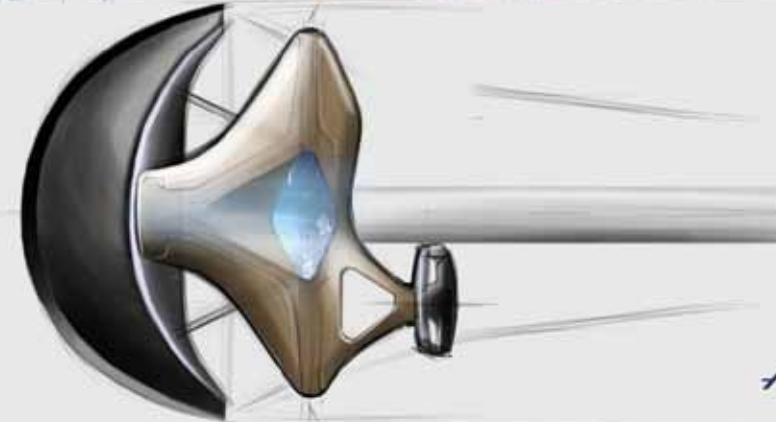
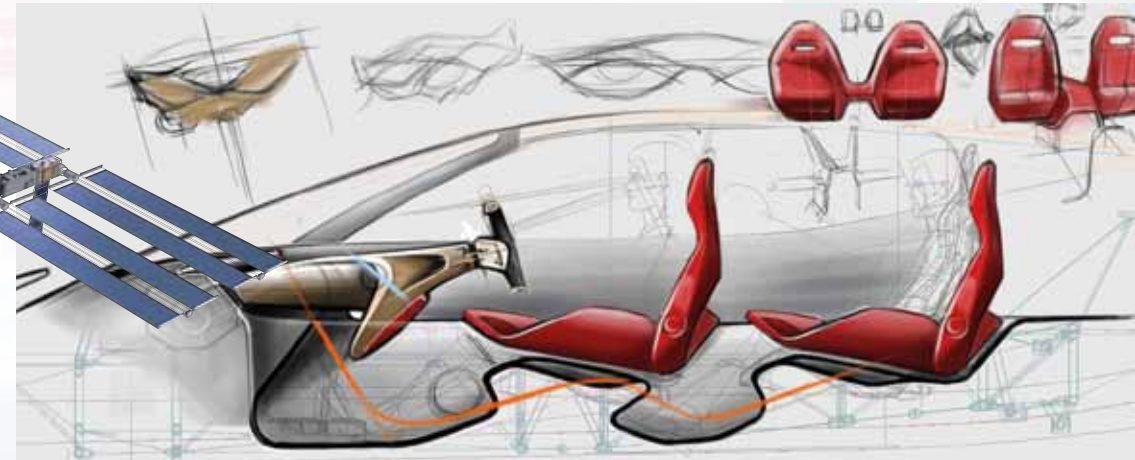


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Major car manufacturers have been using the technology for a number of years to validate and test new designs as well as to manufacture components and spare parts.



All images:
Courtesy of Materialise



REVOLUTIONIZING MEDICAL TREATMENTS

3-D printing is already widely used to produce customized prosthetics, and hearing aids perfectly fitted to each individual patient.

It is also being used to plan and perform complex surgical procedures.

In 2011, surgeons at Ghent University Hospital in Belgium performed one of the most complex facial transplants so far, with the help of digital imaging and 3-D printing.

The patient is well on the way to recovery.

Researchers in the field of regenerative medicine are also using experimental 3-D printing technologies to explore ways to regenerate human tissue and organs.



Courtesy of Materialise

Courtesy of Materialise



Courtesy of Materialise



Courtesy of Prévius+Medical



Courtesy of Prévius+Medical



Courtesy of Materialise

SEAMLESS FASHION

In the world of fashion 3-D printing is a really exciting concept and is transforming the fashion industry as we know it. Hand work has certain limitations that 3-D printing can overcome.



"I found out about 3-D printing and it opened a new world. I really hope that it develops. I can imagine people having their body scanned in future and can order a dress in their own size. That would fill the gap between haute couture and ready to wear. That would be really interesting."

Iris van Herpen, designer

"Using 3-D printing technology to redefine couture by replacing hand work with code you can now print continuous surfaces without seams or without parts. There are just gradients of material that vary in property and size and flexibility and complexity."

Neri Oxman, Architect, Professor of Media Arts and Sciences, MIT Media Lab, USA



All images:
Courtesy of Materialise



A NEW ERA OF PERSONALIZED PRODUCTION

3-D printing allows freedom to create without limitation.

Today you can design and create products using a standard home computer and a desktop 3-D printer.

You can also download, customize and print designs from the Internet

OPPORTUNITIES FOR ANYONE TO USE 3-D PRINTING TECHNOLOGIES ARE GROWING THANKS TO

More affordable, high-performance desktop printers

Increasing availability of user-friendly, on-line design tools (e.g. Autodesk 123D, Google Sketchup)

An expanding range of online 3-D printing services that can transform your ideas into reality (e.g. iMaterialise, Sculpteo, Shapeways)

Wider availability of affordable "kit" printers, such as the RepRap, that can print a large proportion of their component parts.

Courtesy of Materialise

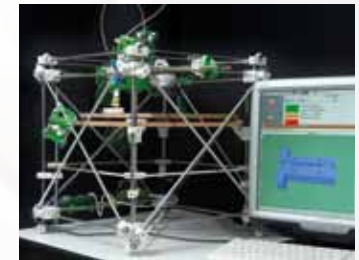


Courtesy of 3-D Systems Corp.



Courtesy of EADS

Courtesy of 3-D Systems Corp.



Courtesy of RepRap

Courtesy of Materialise



Courtesy of Materialise



FOOD FOR THOUGHT

How will 3-D printing shape our lives in the future?

Will it change the global manufacturing landscape?

How will it affect the way we do business?

Will it help us move toward a greener economy?

Will it create opportunities for greater individual and group participation in the manufacturing process?

Will it foster innovation and economic growth?

What are the challenges for policy-makers?

How do we ensure safety standards are maintained?

Who will be liable if a device fails?

How do we safeguard against unauthorized copying and transmission of digital files?

What impact will it have on the intellectual property system?



Courtesy of Materialise



Courtesy of Materialise



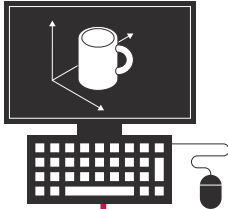
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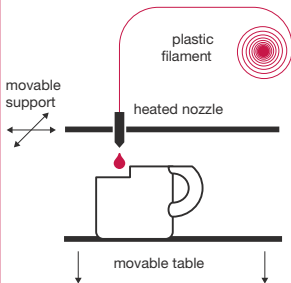
3D modeling on a computer



How a 3D printer works

3D printing consists of solidifying materials, layer upon layer, until an object has been created. There are three main techniques.

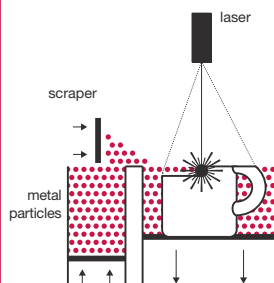
Fused Deposition Modeling Melting a plastic thread



The heated nozzle deposits the melted plastic in layers.

Applications:
do-it-yourself, spare parts, etc.

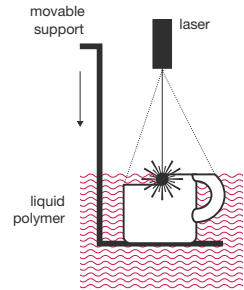
Selective Laser Sintering Fusing particles into a mass



The laser's heat fuses particles of powder into a mass, layer by layer. The scraper delivers the particles for each layer.

Applications:
large parts (up to 1 m diameter) made of titanium, gold, stainless steel or aluminum, such as automobile fuel tanks.

Stereolithography Solidifying a liquid



The liquid polymer's surface hardens when exposed to the laser, which traces the layers one at a time. The object is slowly immersed into the liquid.

Applications:
transparent parts, thin parts for prototypes.