

# Tatiana Reinhard

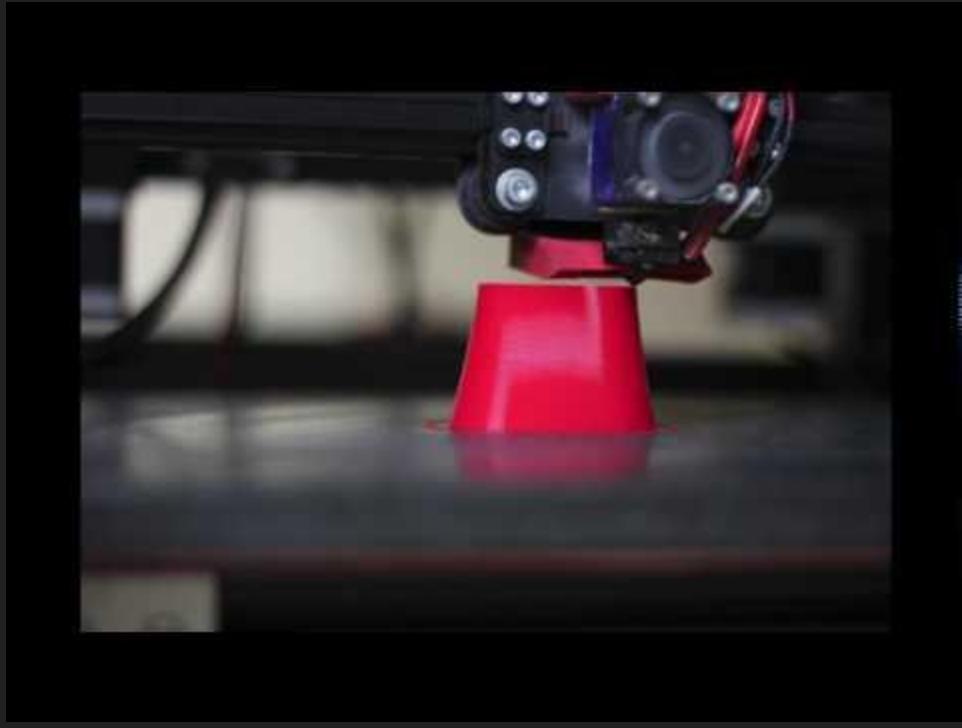
@iarn



## L'impression 3D, une révolution ?

L'impression 3D c'est quoi ?

# Fabrication Additive



Et d'après vous, quel âge à l'impression 3D ?



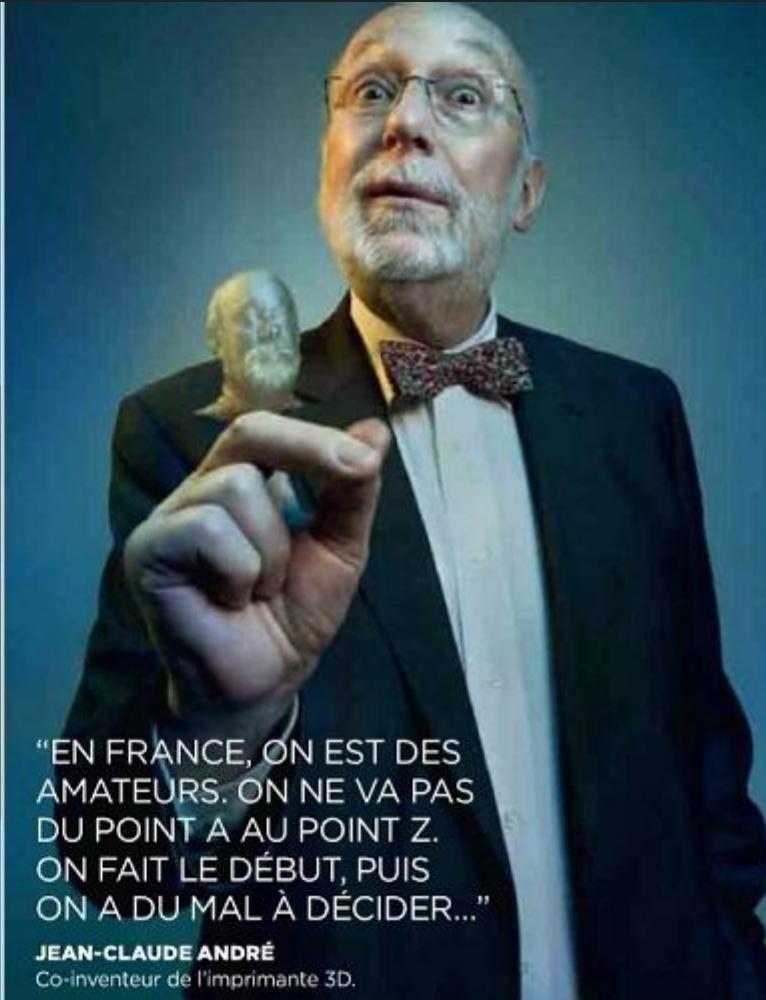
Tintin et le lac au requin ( 1972 ) 0:52



"SI NOUS AVIONS GARDÉ  
LES BREVETS EN EXIGEANT  
DES PARTS DE PROPRIÉTÉ,  
C'ÉTAIENT DES MILLIARDS  
POUR LA FRANCE."

**ALAIN LE MÉHAUTÉ**

Co-inventeur de l'imprimante 3D.



"EN FRANCE, ON EST DES  
AMATEURS. ON NE VA PAS  
DU POINT A AU POINT Z.  
ON FAIT LE DÉBUT, PUIS  
ON A DU MAL À DÉCIDER..."

**JEAN-CLAUDE ANDRÉ**

Co-inventeur de l'imprimante 3D.



# 3D SYSTEMS®

600 millions d'euros de bénéfice chaque année.

# 3D SYSTEMS

<b>Création</b>	1986
<b>Action</b>	New York Stock Exchange (DDD)
<b>Siège social</b>	Rock Hill
<b>Direction</b>	Vyomesh I. Joshi (depuis 2016)
<b>Activité</b>	Impression 3D et conception assistée par ordinateur
<b>Filiales</b>	Z Corporation
<b>Effectif</b>	2 620 fin 2018
<b>Site web</b>	<a href="http://3dsystems.com">3dsystems.com</a> [archive]
<b>Capitalisation</b>	1 136 millions USD en octobre 2019
<b>Chiffre d'affaires</b>	688 millions USD en 2018

Alors pourquoi on en parle  
que maintenant ?

Mais que se passe-t-il ?

Et du coup on fait quoi  
avec l'impression 3D ?

Et vous, de quoi avez-vous entendu parlé ?

Impression 3D = 1 nom

...

mais des dizaines de technologies  
différentes

# un gadget ?





une menace ?

A photograph showing a man in a green t-shirt and jeans working on several 3D printers. He is leaning over a row of printers, which are all active with glowing green build plates. The printers are black with transparent side panels. The background shows a workshop environment with shelves and tools.

run business ?

A futuristic scene on the moon's surface. In the foreground, a small, white, dome-shaped habitat or laboratory is partially buried in the grey lunar soil. A robotic arm of a rover is visible on the right side. An astronaut in a full spacesuit stands further back, looking towards the horizon. The background shows the vast, dark void of space with a large, partially illuminated Earth visible in the upper right corner.

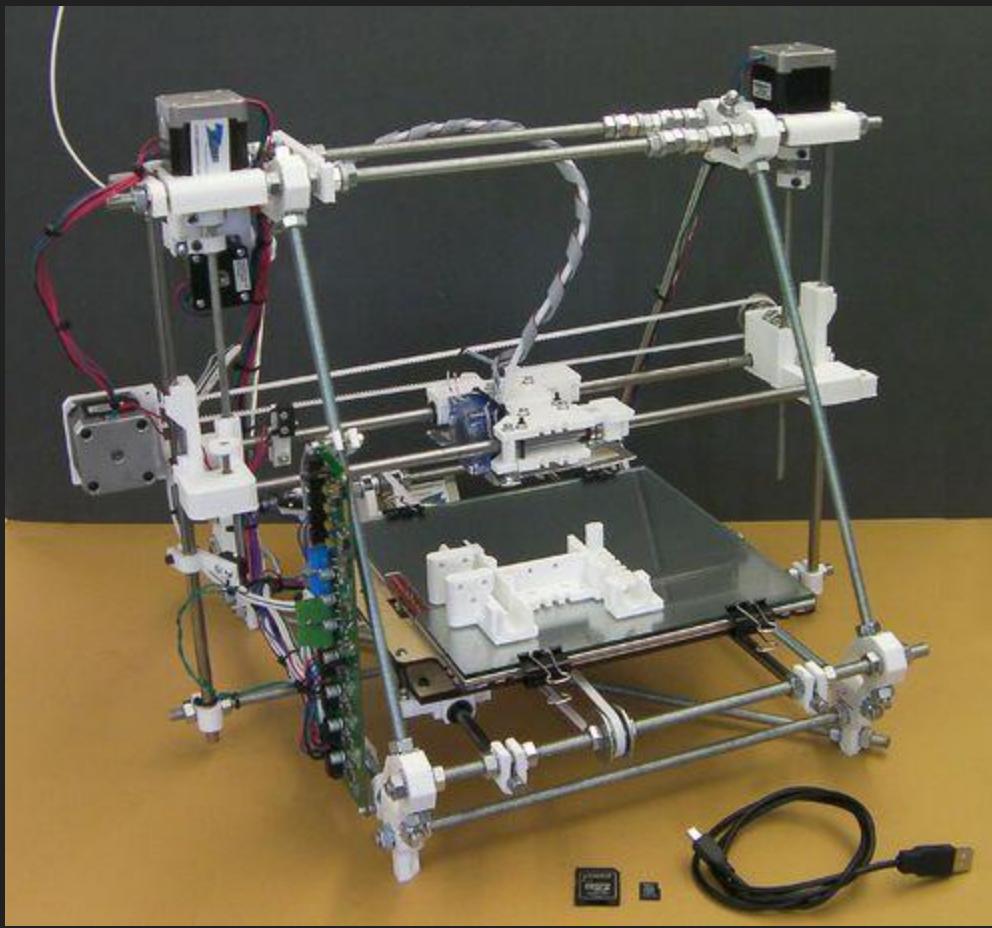
Un délire ?



une bulle ?

# Répliquer

C'est en effet un usage très commun.  
Et d'ailleurs parlons de la RepRap



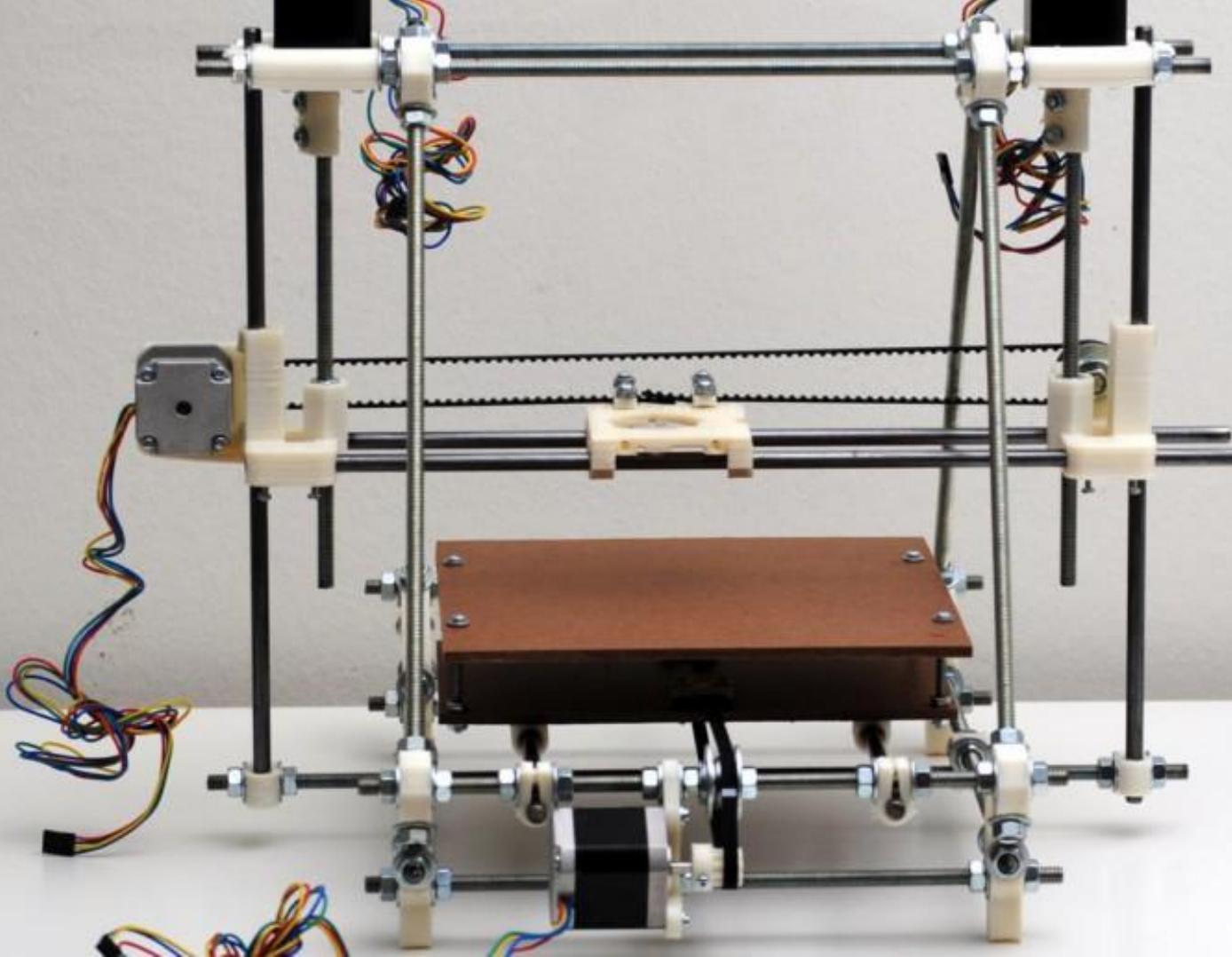
# conséquences



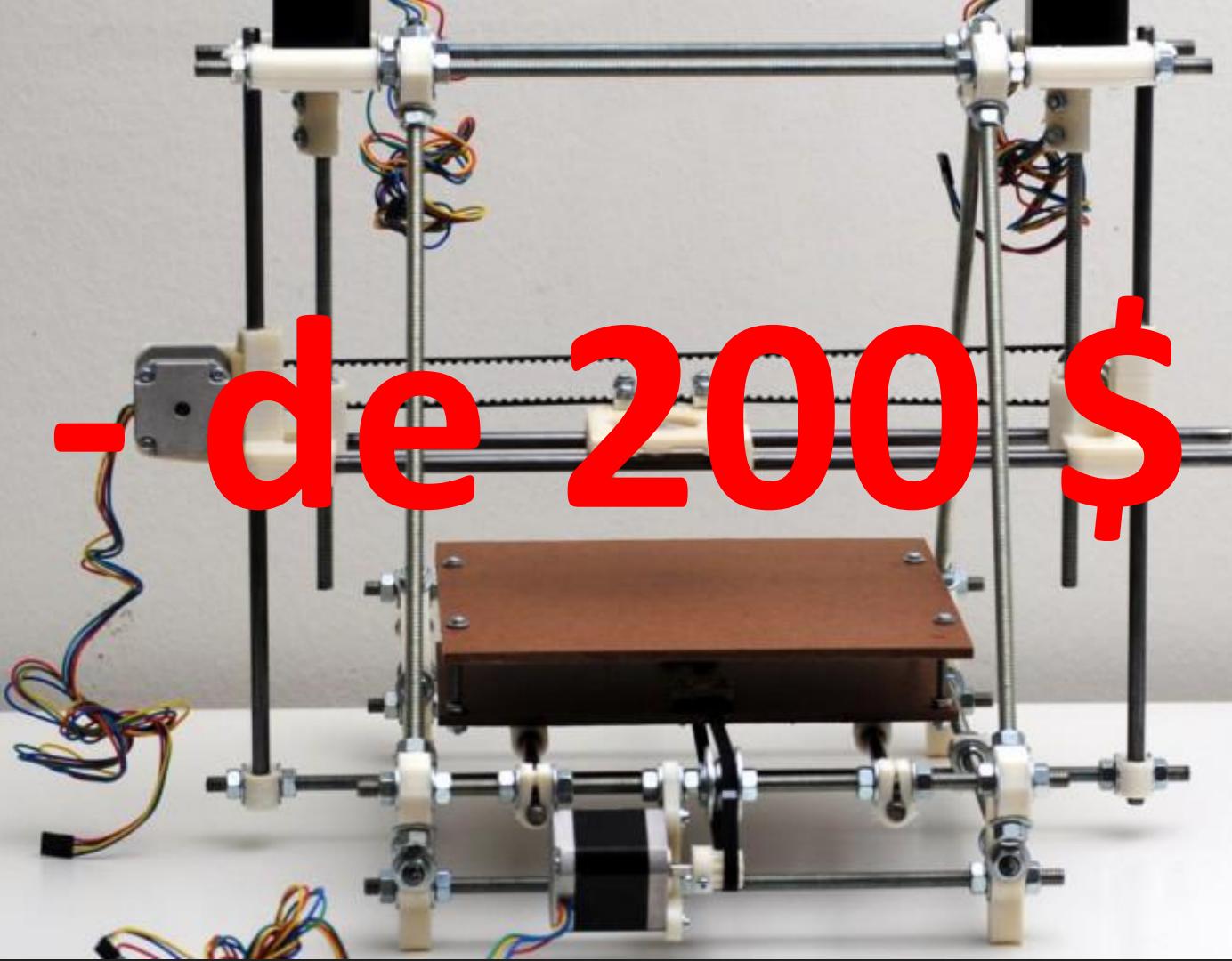


10.000 \$





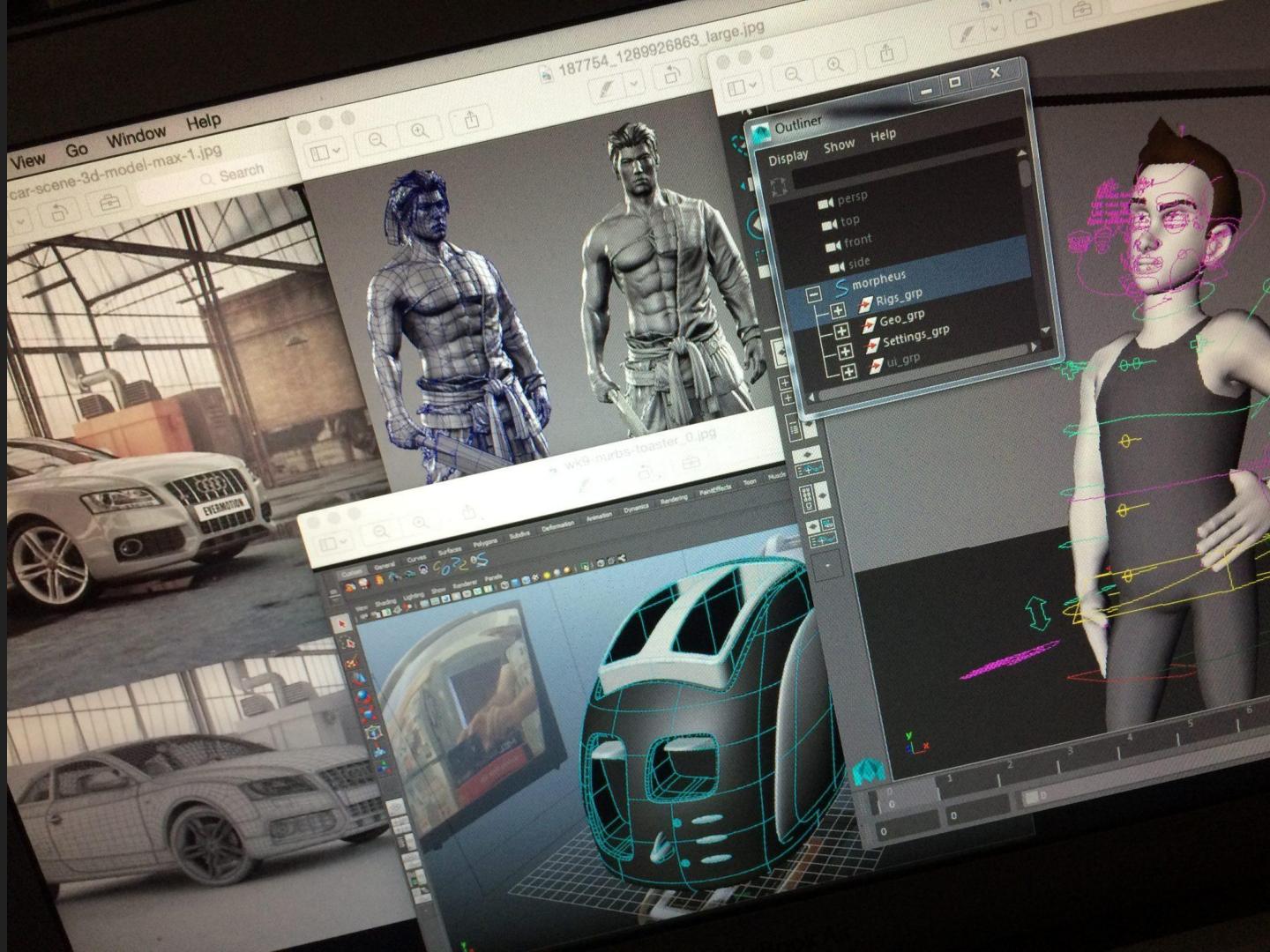
- de 200 \$



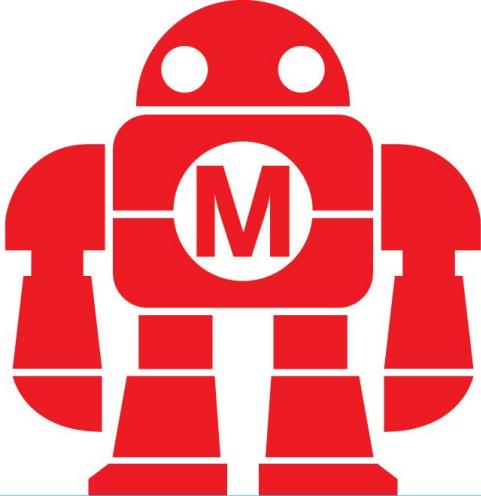
Et du coup on fait quoi  
avec l'impression 3D ?

Moi ce que j'en fais...

# Mon parcours







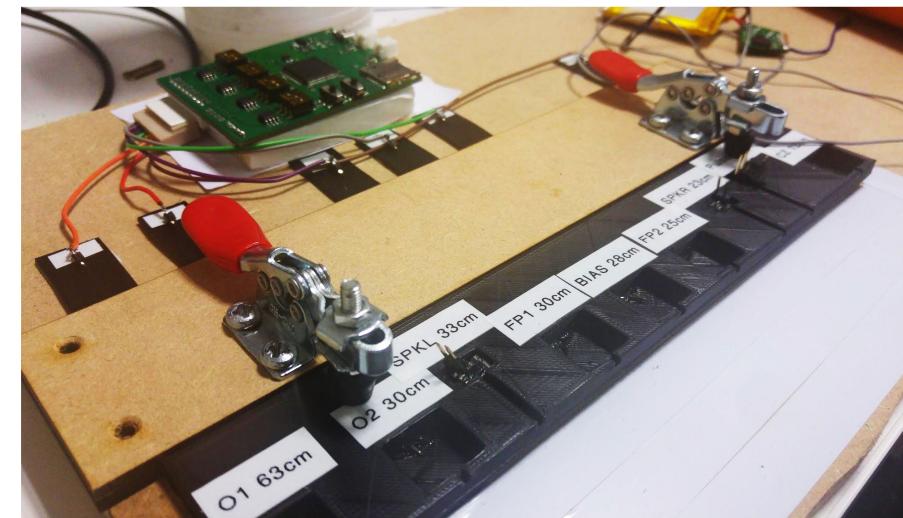
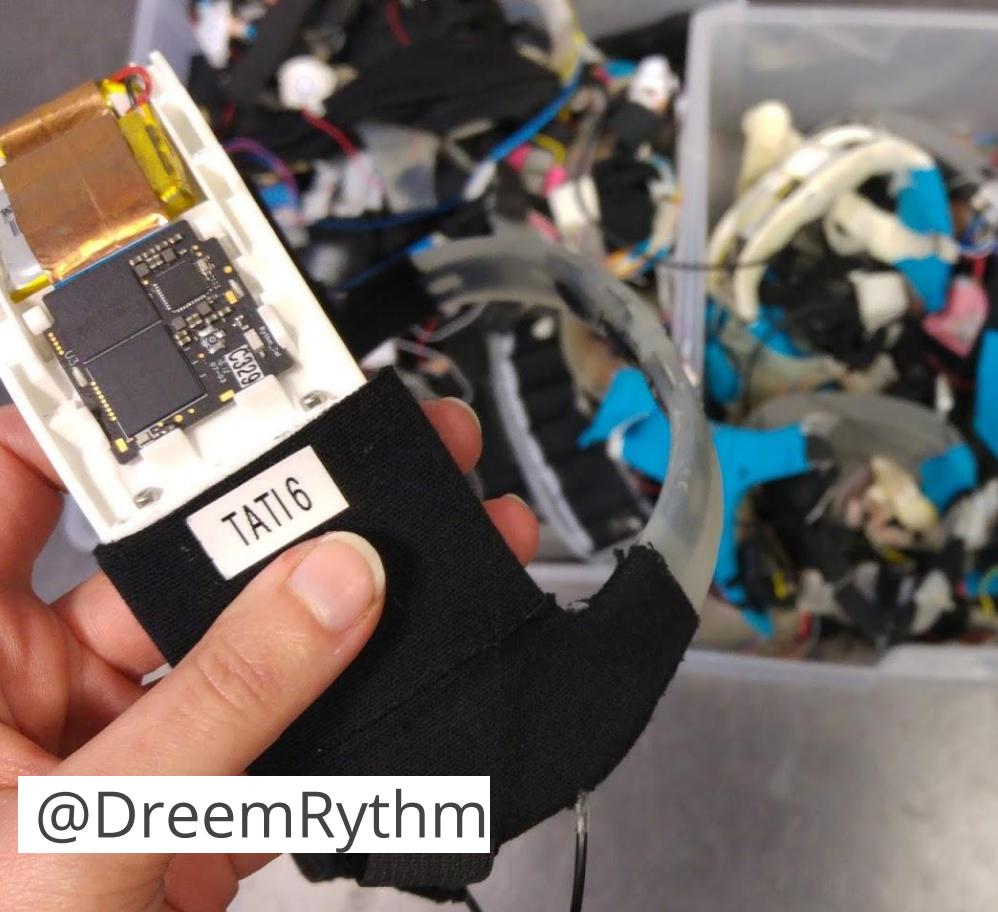
# Maker Faire®

Tatiana Reinhard | FabManager/Prototypist





Ana Reinhard | FabManager/Prototypist



@DreemRythm



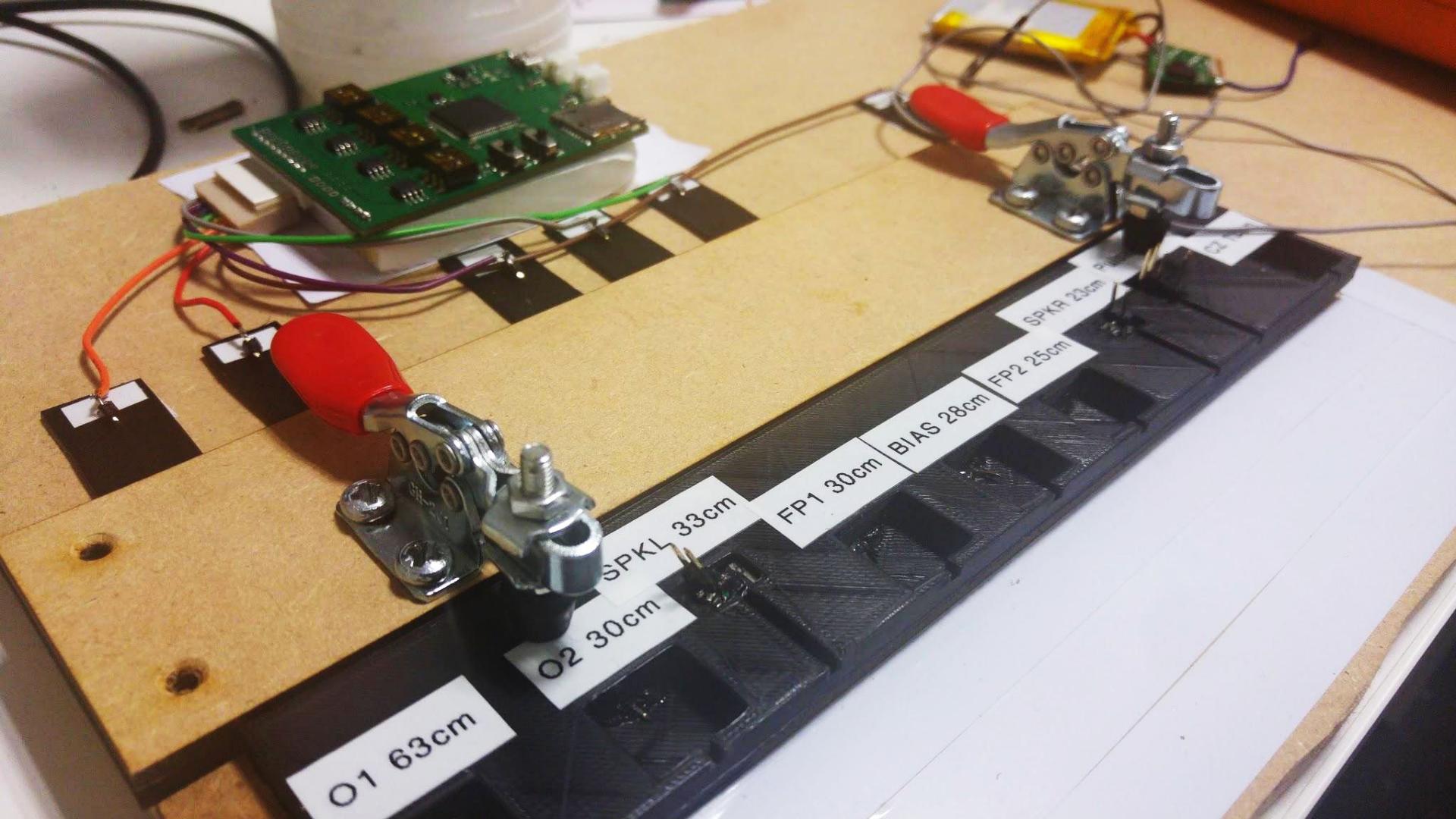


*form*labs













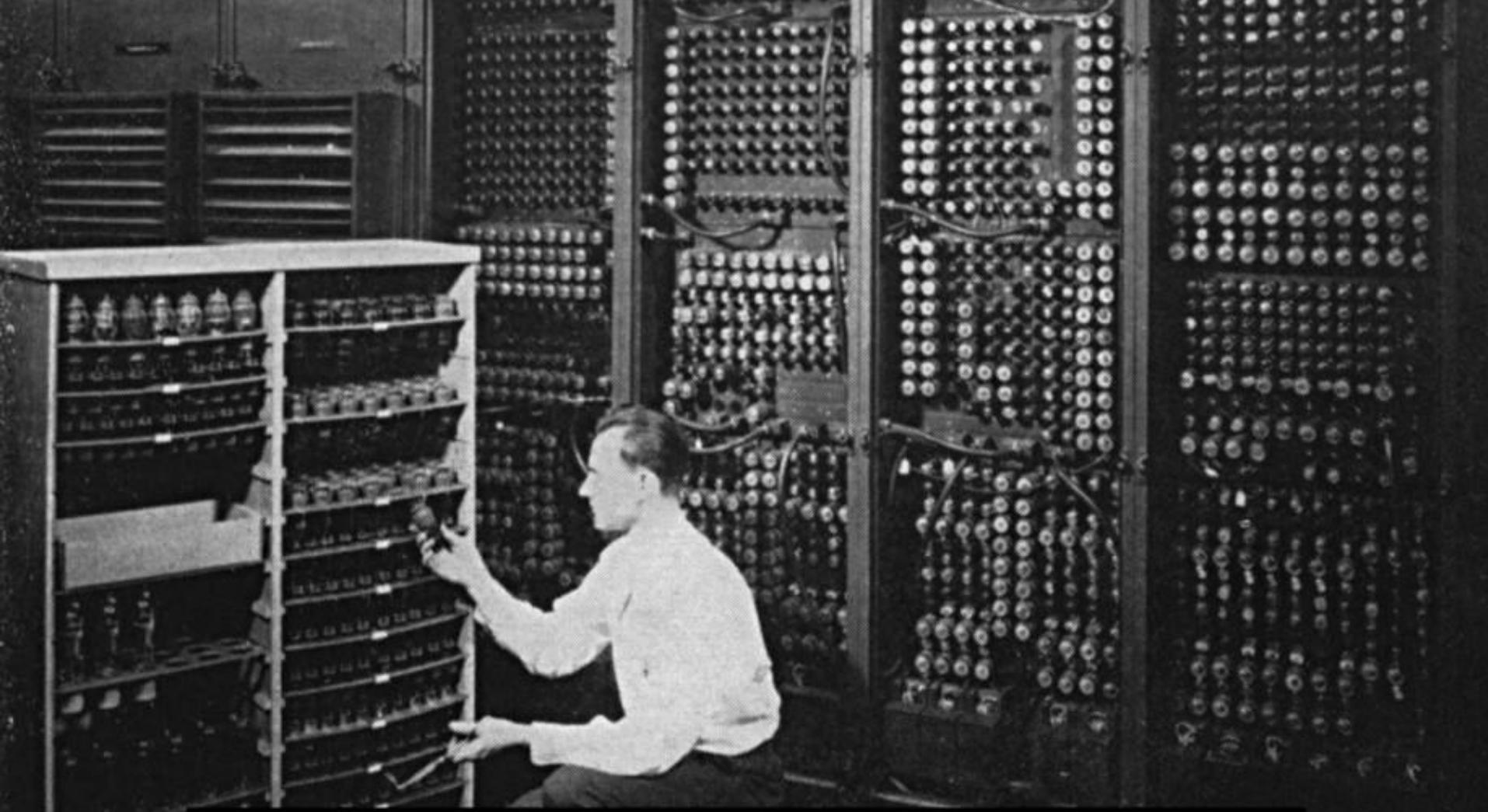
# The Maker Movement Matters





em  
**lyon**  
**business**  
**school**

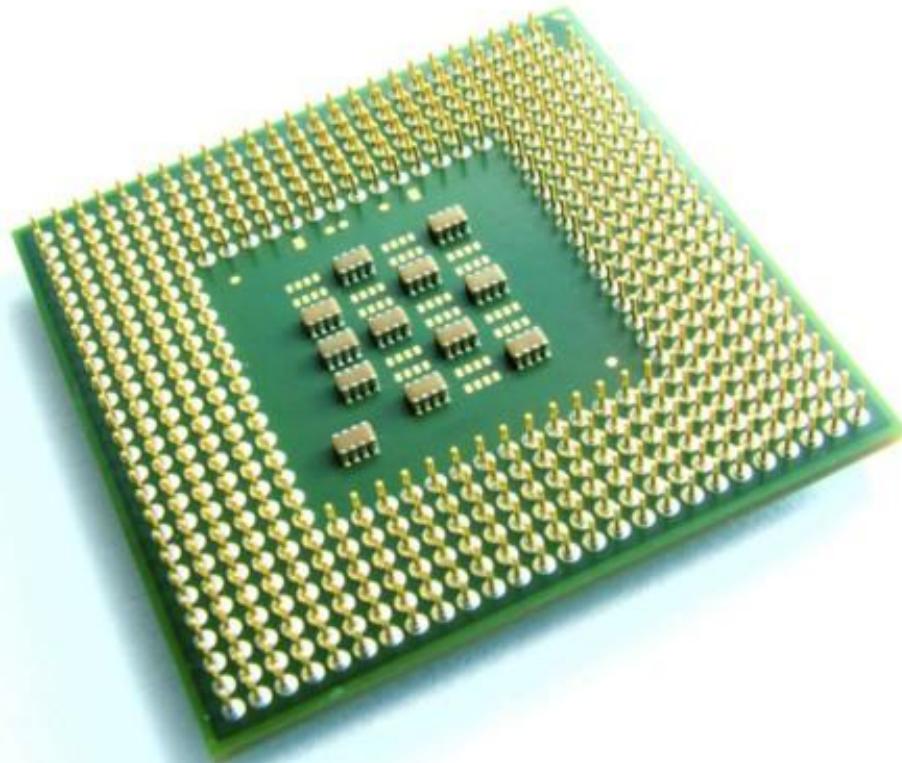
# Pourquoi les entreprises doivent intégrer l'impression 3D à leur ADN ?



ENIA "changing\_a\_tub" by M Weik is in the public domain.



'80



Industrial Arts

Hands-on Science

**Makers**

Green Tech

**Tinkerers**

Alternative Energy

**Robotics**

**Artists**

Chemistry "Magic"

Engineering

Musicians

**DIY**

Recycling

**S.T.E.A.M.**

Young Makers

**Crafts**



Digi-tech



TRZ A2

Mais attends,  
ce n'est pas déjà le cas ?

01

## DIGITAL FABRICATION LABORATORIES

ARE PLACES WHERE RELATIONSHIPS ARE SET UP TO INSPIRE PEOPLE TO TURN THEIR IDEAS INTO NEW PRODUCTS



02

**HOW?**  
BY GIVING PEOPLE ACCESS TO A RANGE OF **ADVANCED DIGITAL MANUFACTURING TECHNOLOGIES** AND KNOWLEDGE



3DPRINTER



3DSCANNER



ARDUINO



LASERCUTTER



CNCMILL



PLOTTER



MAKING TOOLS

# FABL<sup>A</sup> LAB

## MAKING IDEAS



03

## IT'S MORE THAN 3D PRINTING.

IT IS AN EVOLVING SUITE OF CAPABILITIES TO TURN DATA INTO THINGS AND THINGS INTO DATA



04

**HOW WILL WE LIVE, LEARN, WORK, AND PLAY WHEN ANYONE CAN MAKE ANYTHING, ANYWHERE?**



THE REVOLUTION IS ALREADY WELL UNDER WAY

en quoi c'est une  
révolution ?

# **10 avantages de la Fabrication Additive**



la complexité ne coûte rien

# la variété est “gratuite”



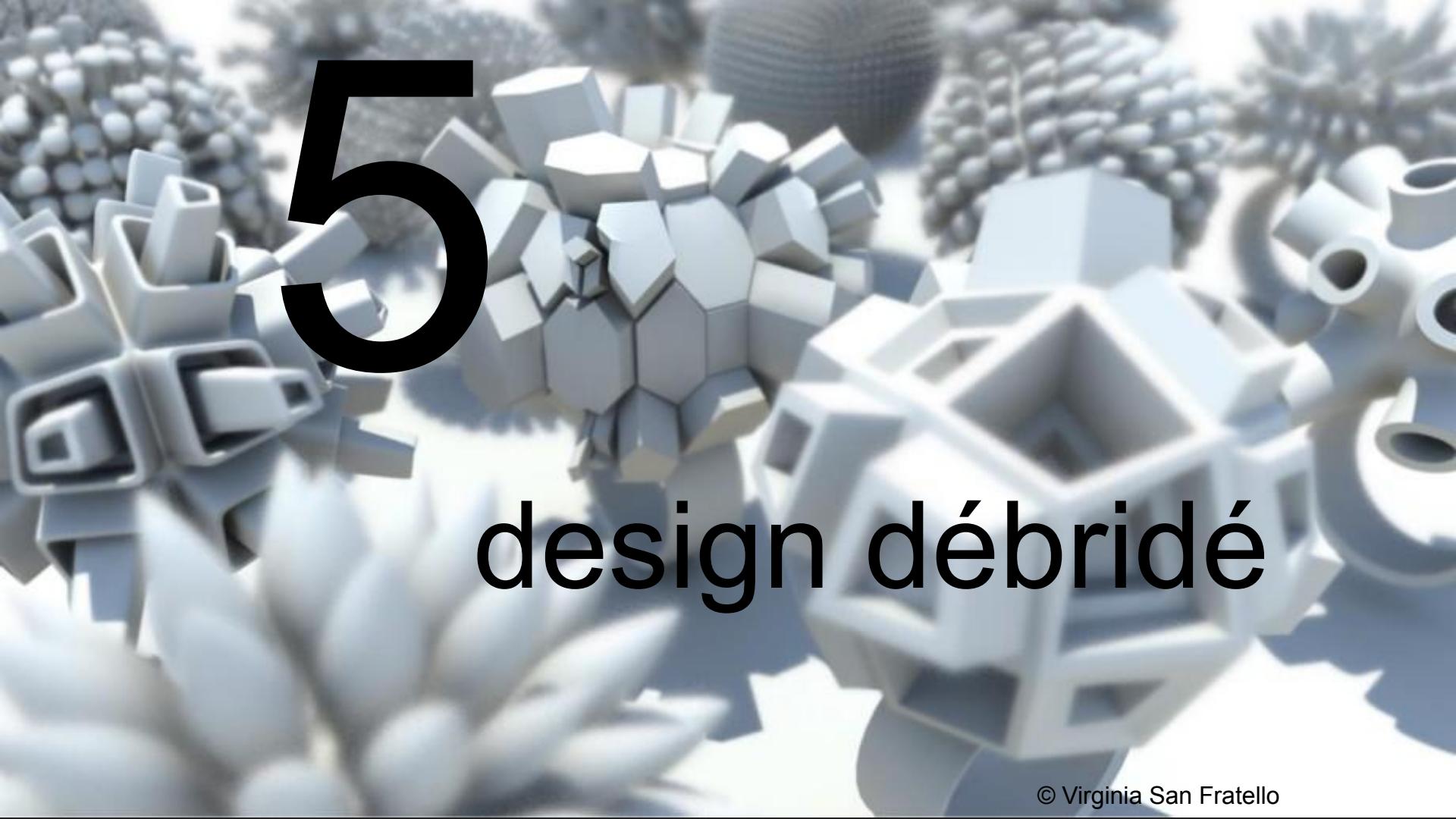
# pas d'assemblage



3

# 4

délai de fabrication “nul”

A close-up, low-angle shot of a complex, abstract geometric sculpture. The sculpture is composed of numerous white, faceted, three-dimensional shapes that resemble shards of broken glass or crystalline structures. The shapes are arranged in a way that creates a sense of depth and movement, with some pieces pointing towards the viewer and others receding. The lighting is bright, casting soft shadows and highlighting the sharp edges of the facets.

5

design débridé

6



compétences “déplacée”

7

pas de gâche

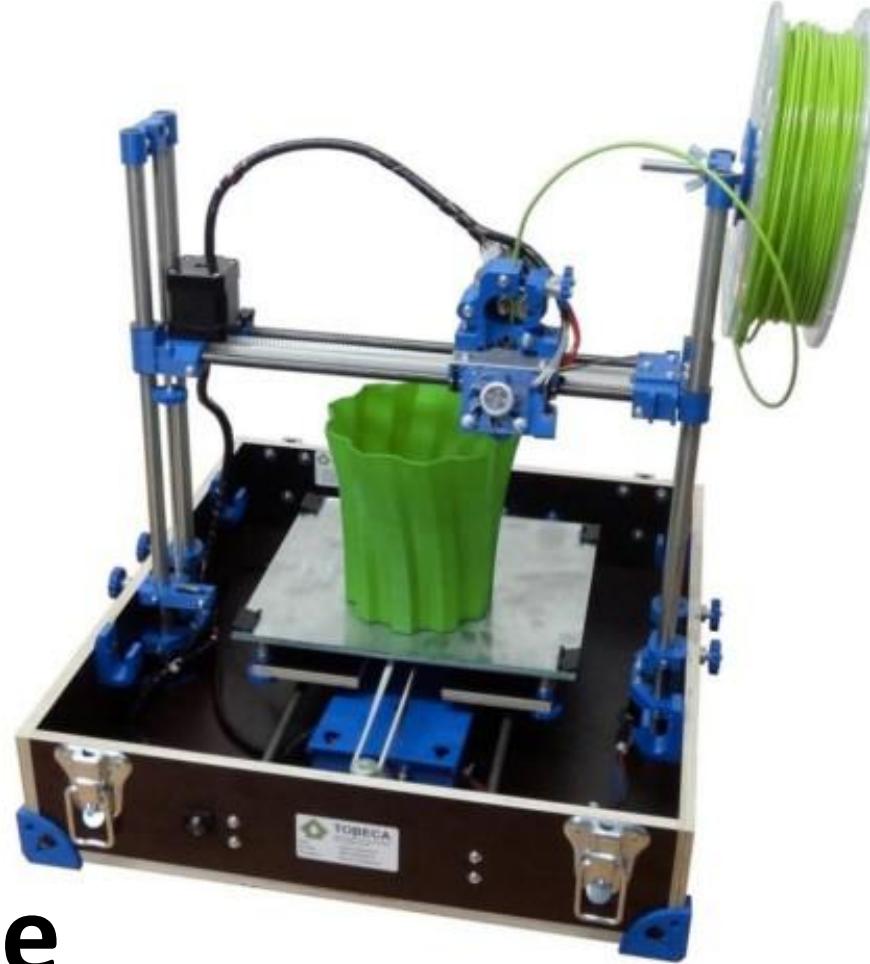


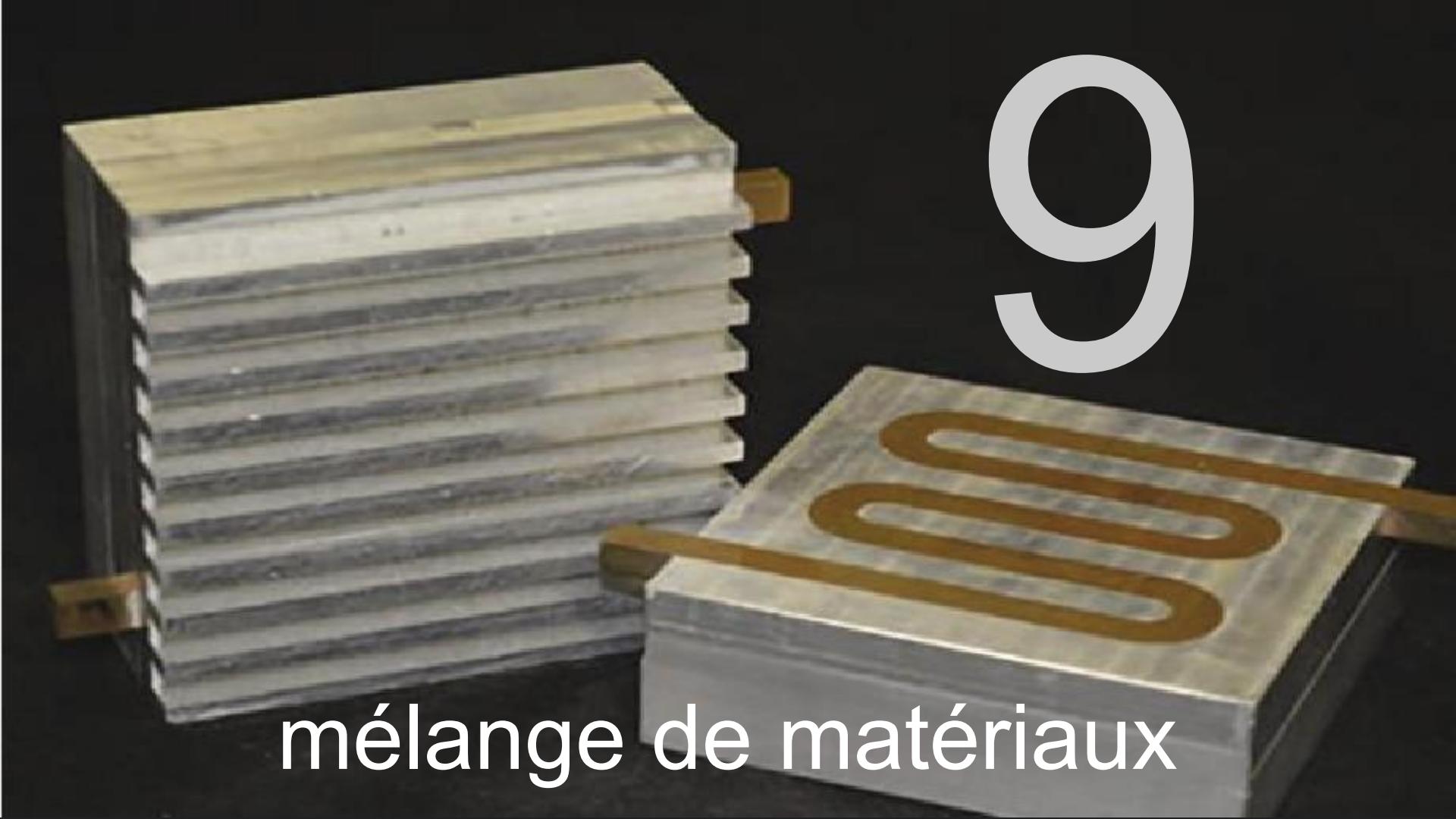


**compacte et portable**

# 8

**compacte et portable**



A photograph of a stack of books and a metal coil on a dark background. The books are stacked vertically, showing their spines and covers. A metal coil, possibly from an old telephone or similar device, lies in front of the books. The lighting creates strong shadows and highlights on the metallic surfaces.

9

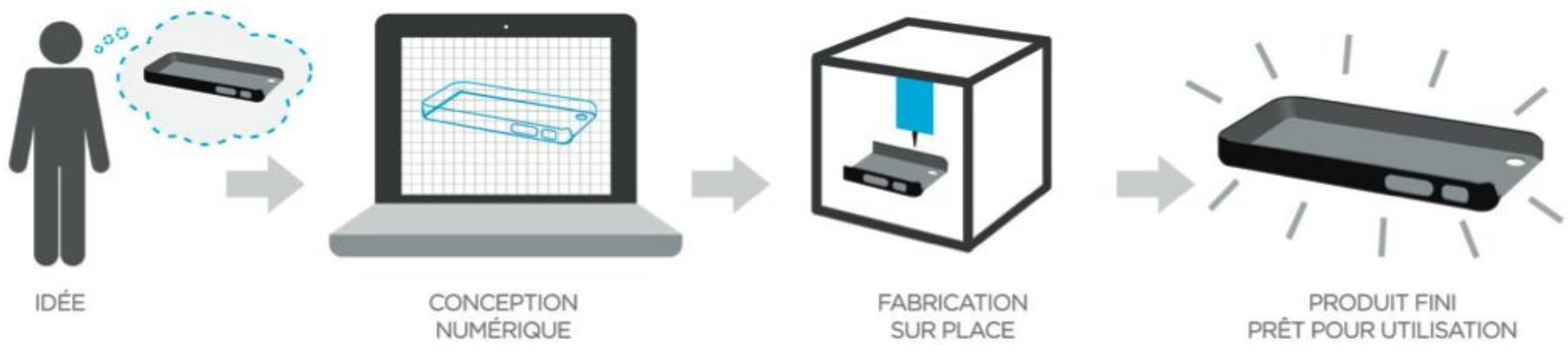
mélange de matériaux

relocaliser

10

# Comment ça marche ?

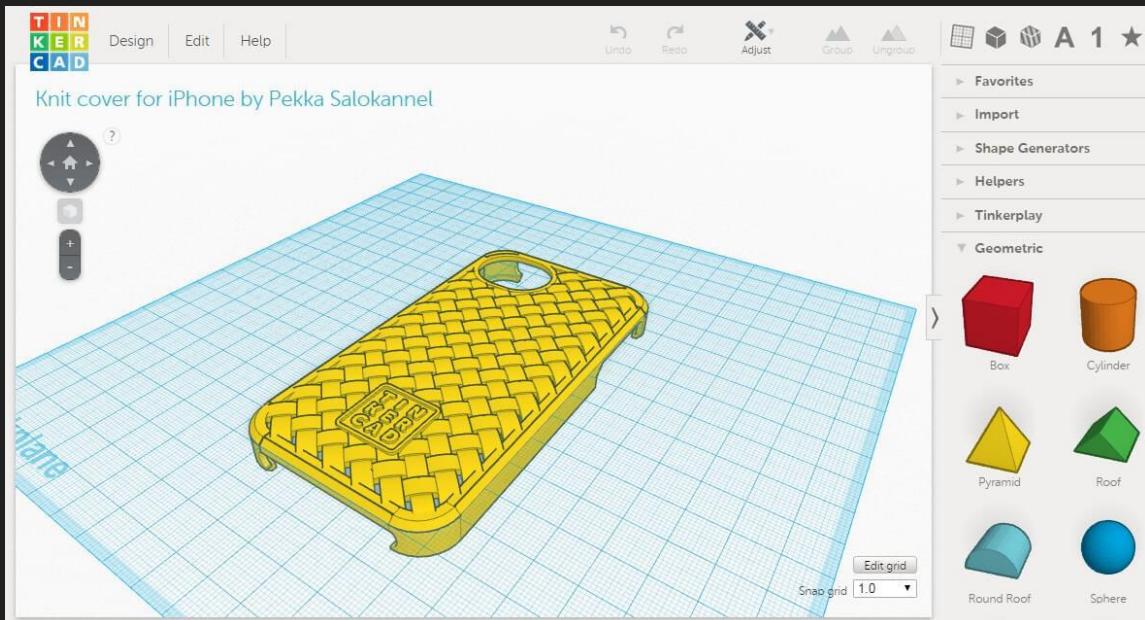


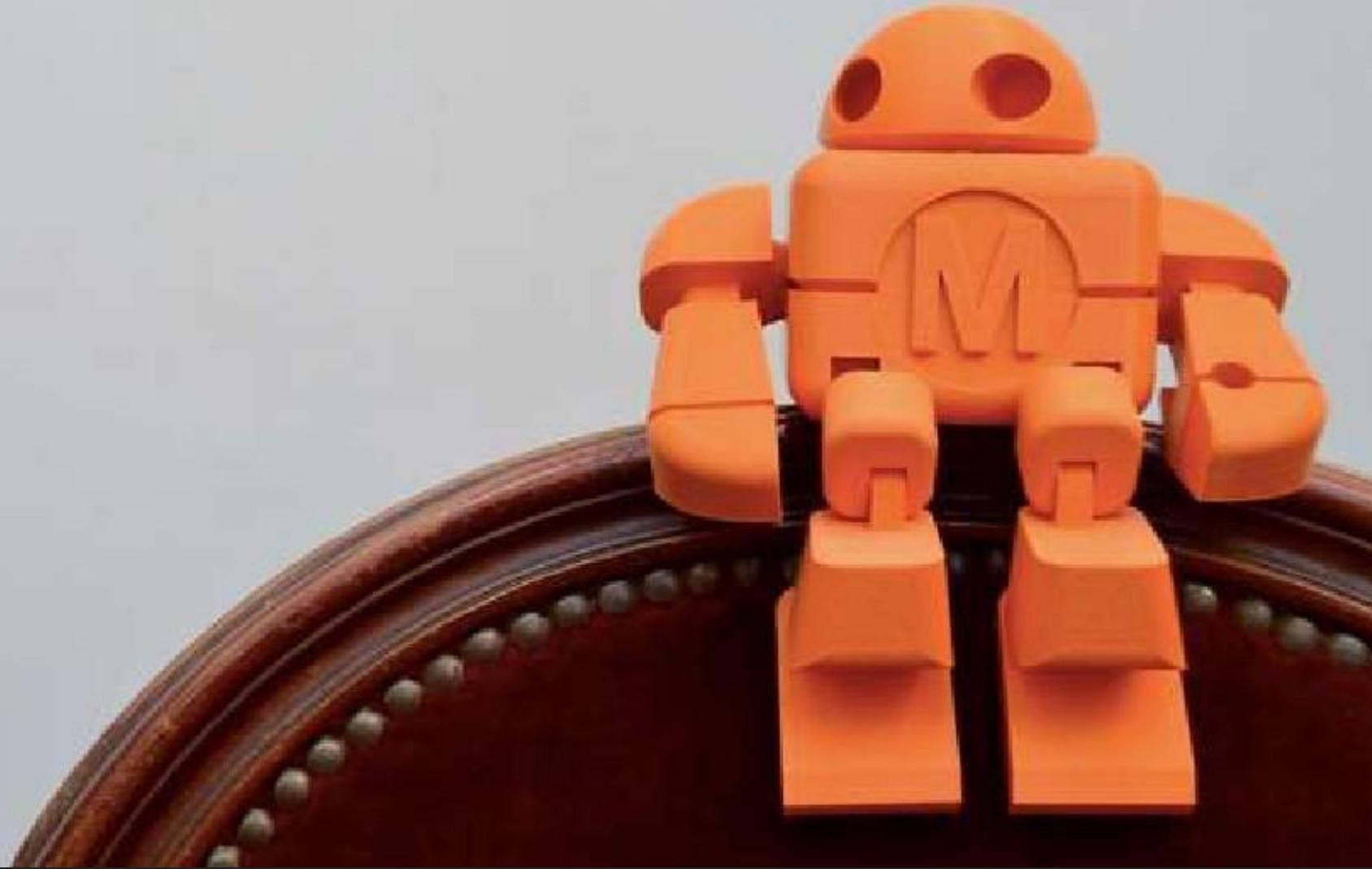


Comment avoir un fichier 3D ?

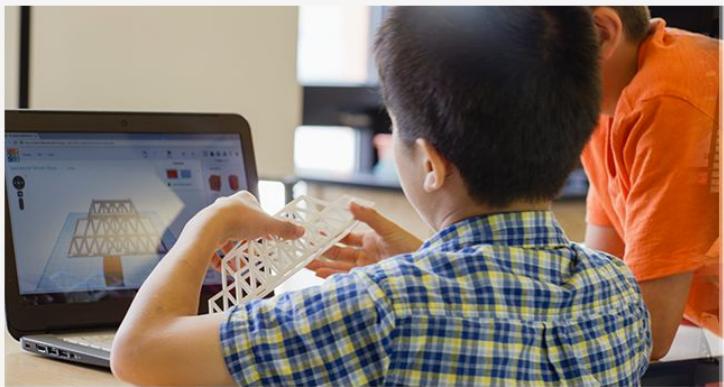
# 1 - Conception

# 1 - Conception





- 1 - Conception
- 2 - Téléchargement

● ● ● ●

## Global Feed

Latest Thingiverse Activity



BlackFyre collected Save pangolins



fritzfrosch collected TBS Crossfire Immortal T Antenna Mount for Armattan Rooster and Chameleon Ti



fe12 collected Articulated Slug



Oumuamua collected Christmas Tree/ Pine Tree



EIDavePhoto collected Orco 32mm scale



coline34070 liked Cell Phone Wall Charger/Holder\_ European

## Featured Collections

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BOW 11/11-11/17



BOW 11/4-11/10



BOW 10/28-11/3

see more



BOW 10/21-10/27



BOW 10/14-10/20



Halloween



BOW 10/7-10/13

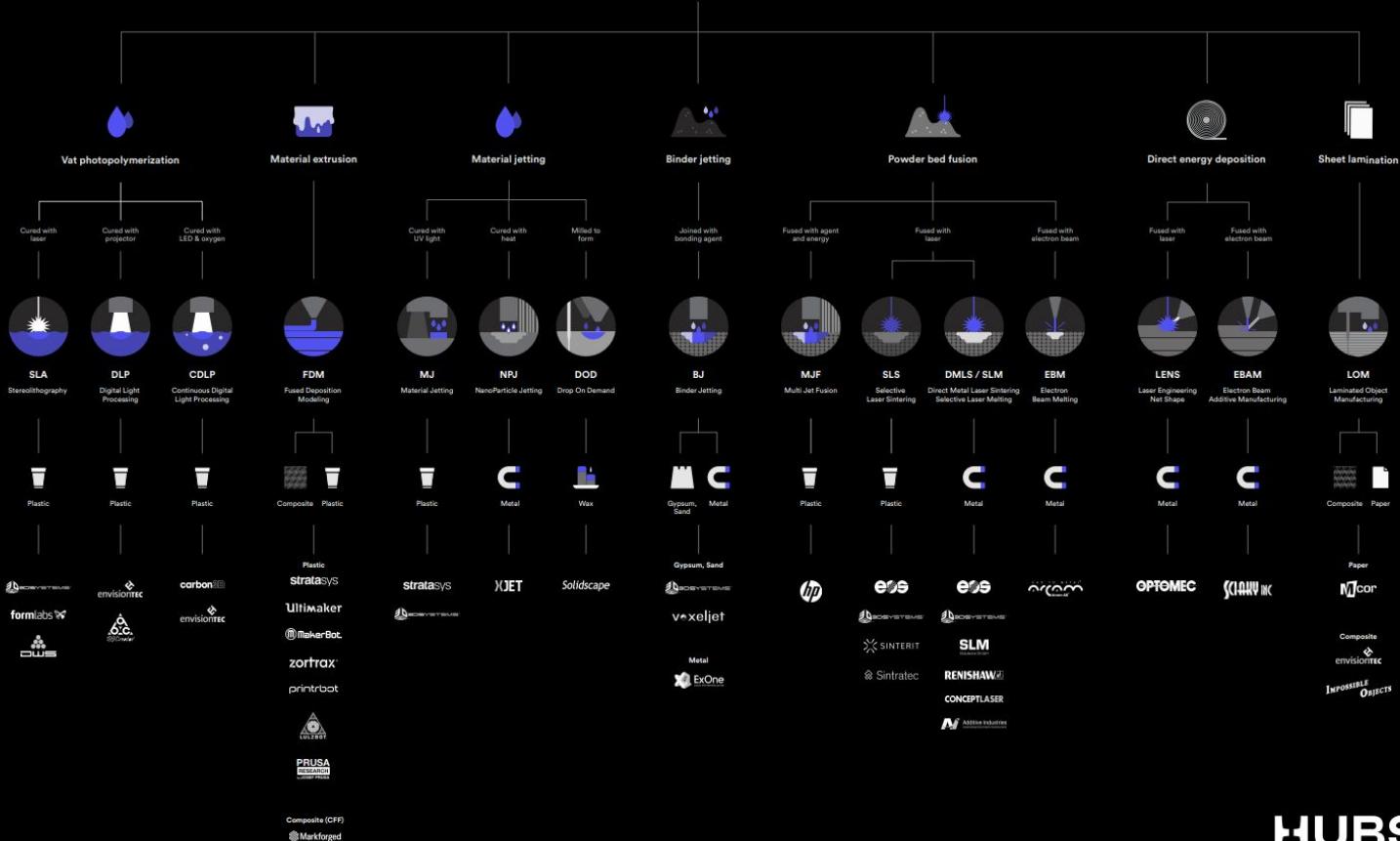
- 1 - Conception
- 2 - Téléchargement
- 3 - Scan 3D





**les principales  
technologies  
d'impression**

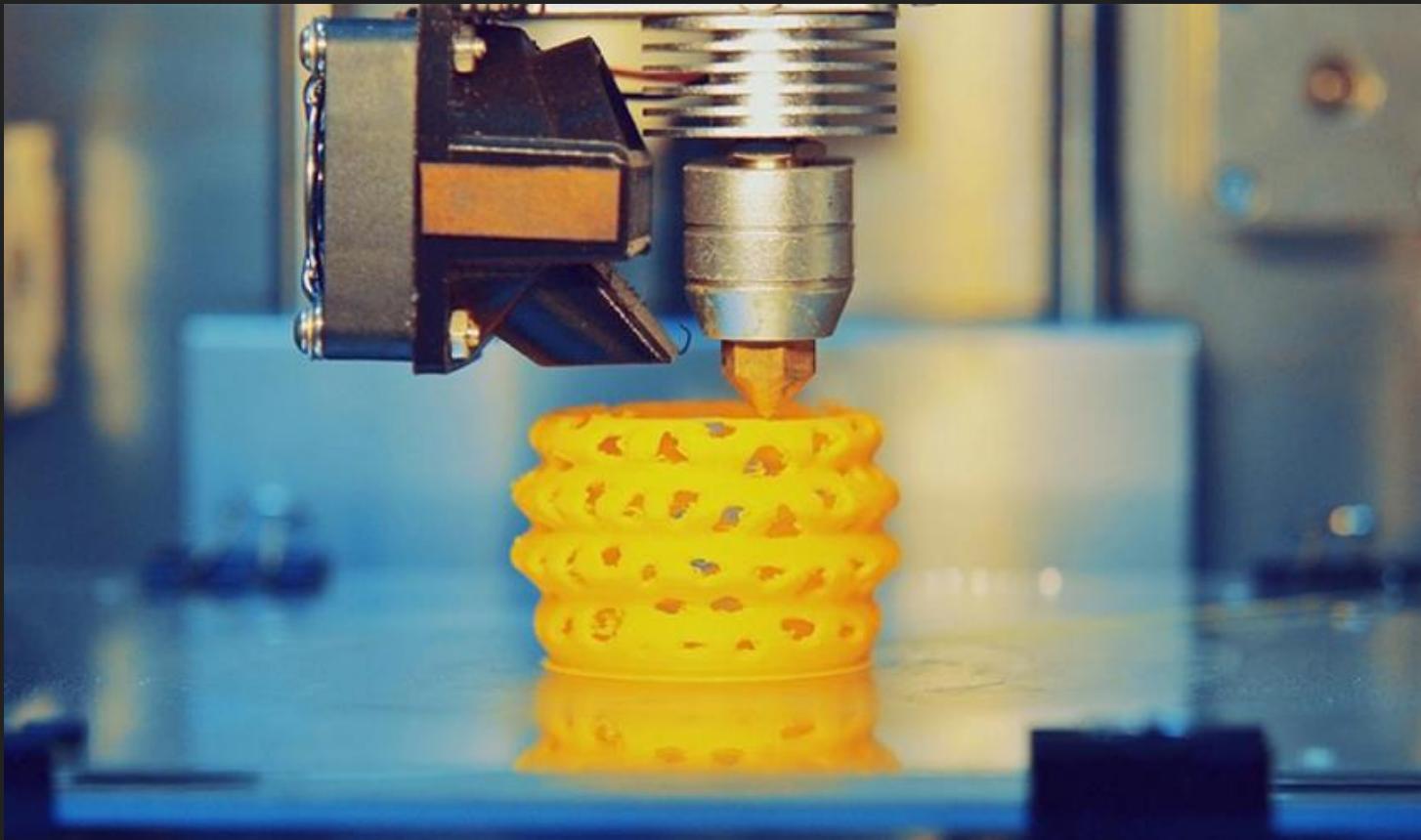
# ADDITIVE MANUFACTURING TECHNOLOGIES



HUBS

# Dépot Fil Chaud

Fused Depositing Modeling (FDM)

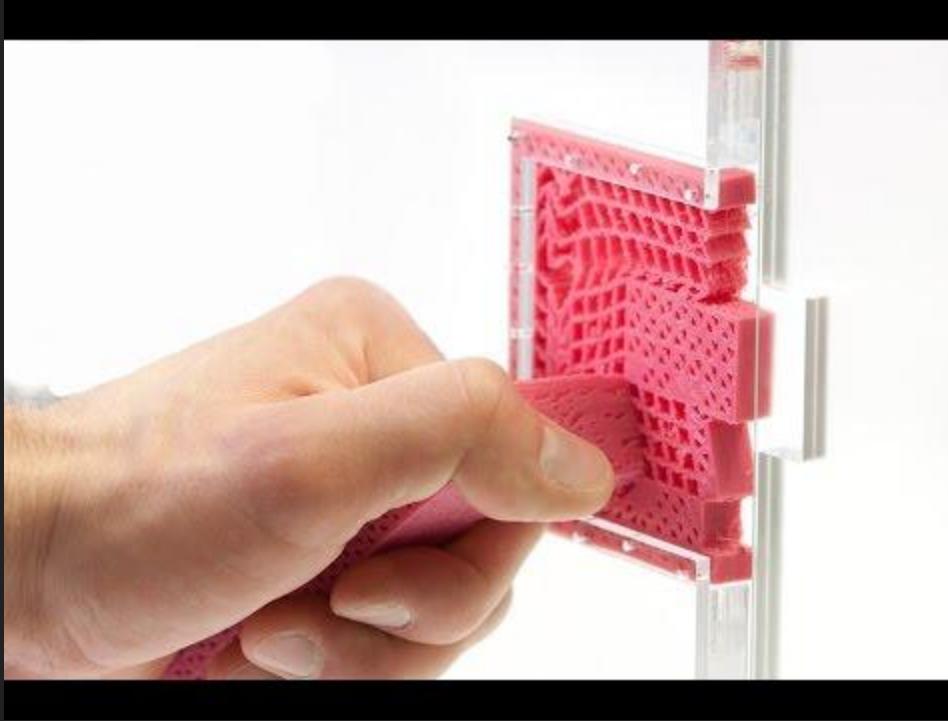






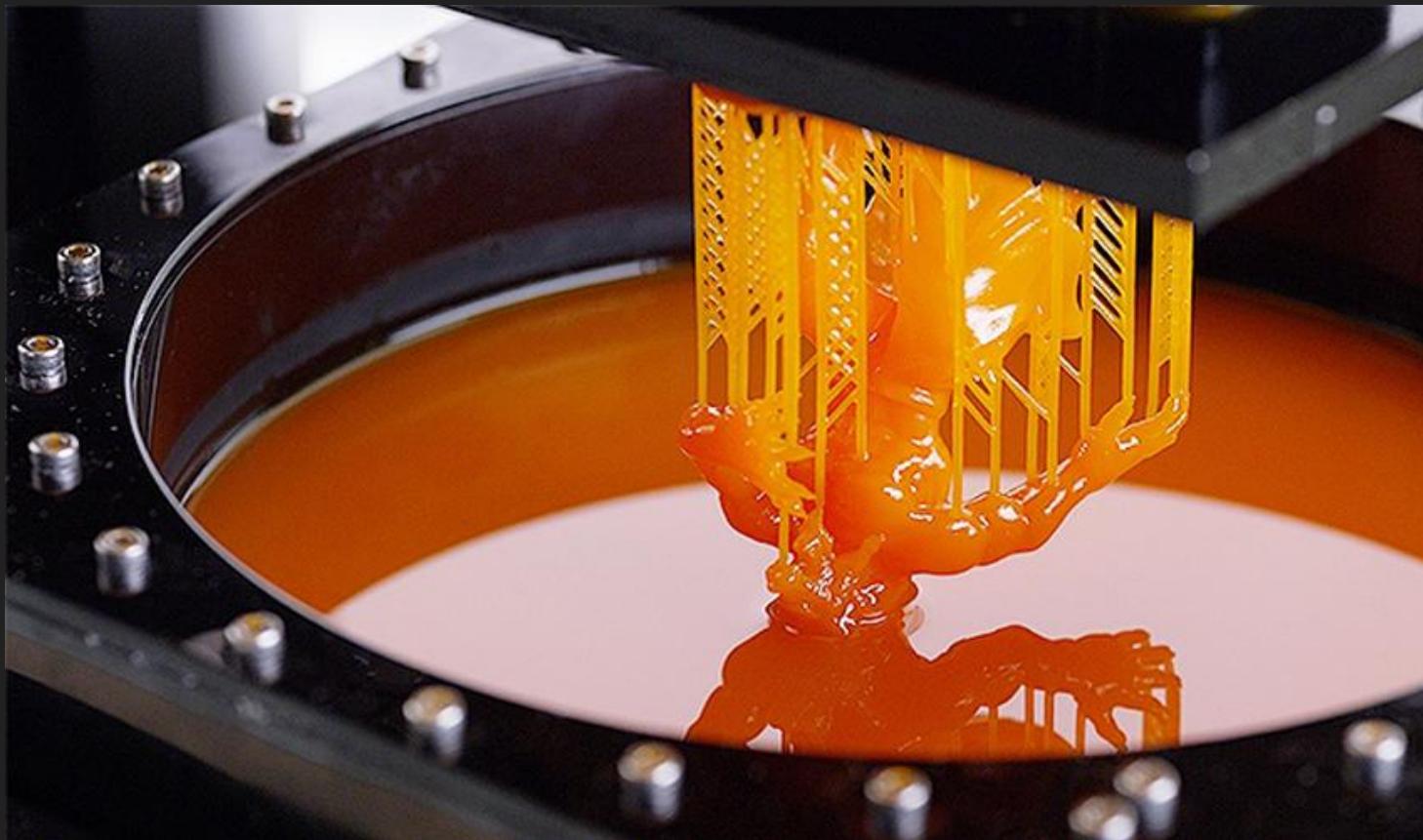
Serial 3D Printing  
With Connected Multi-Head

multi-head

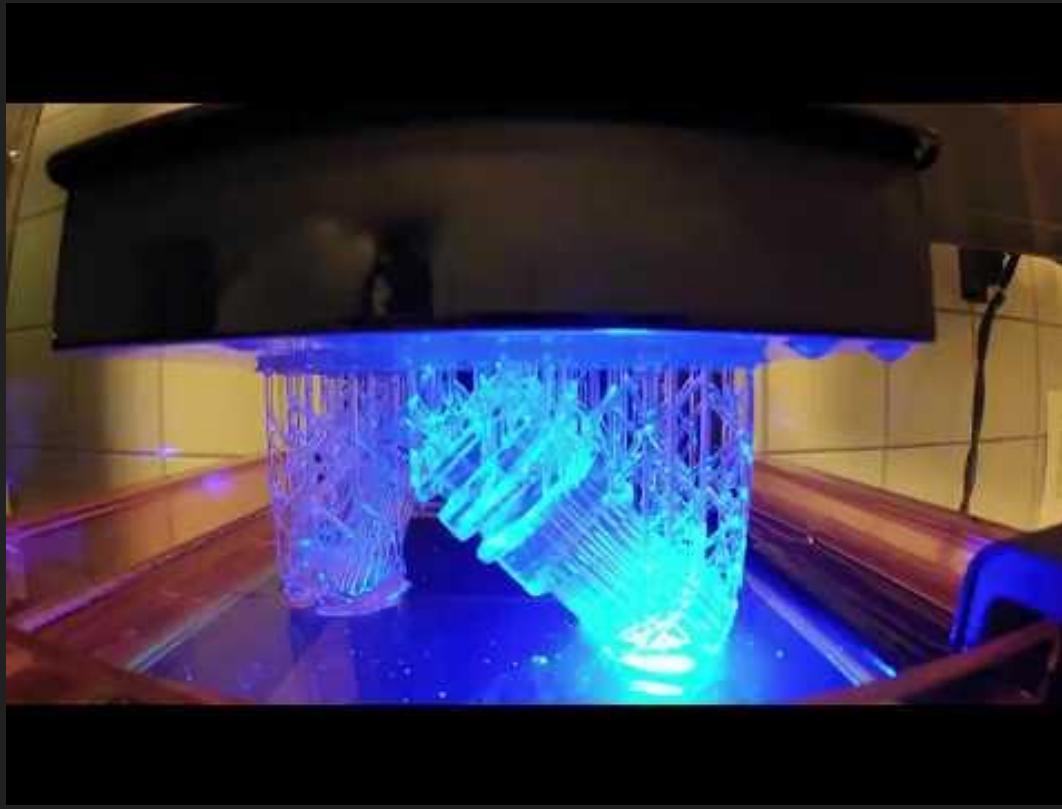


# Stéréolythographie

Stereo Lithography Apparatus (SLA)







## Frittage Laser Sélectif (SLS)







**matériaux**

A close-up photograph of a pile of colorful plastic LEGO bricks. The bricks are in various colors including red, yellow, green, blue, and grey, and are stacked in a somewhat disorganized manner. The background is dark, making the bright colors of the bricks stand out.

plastiques

métaux



**céramique / verre**

A close-up photograph of a worker's lower body and a wheelbarrow. The worker is wearing blue jeans, a white t-shirt, and dark boots. They are pushing a wheelbarrow filled with concrete, which is being poured onto a gravel surface. The background shows a fence and some greenery.

béton

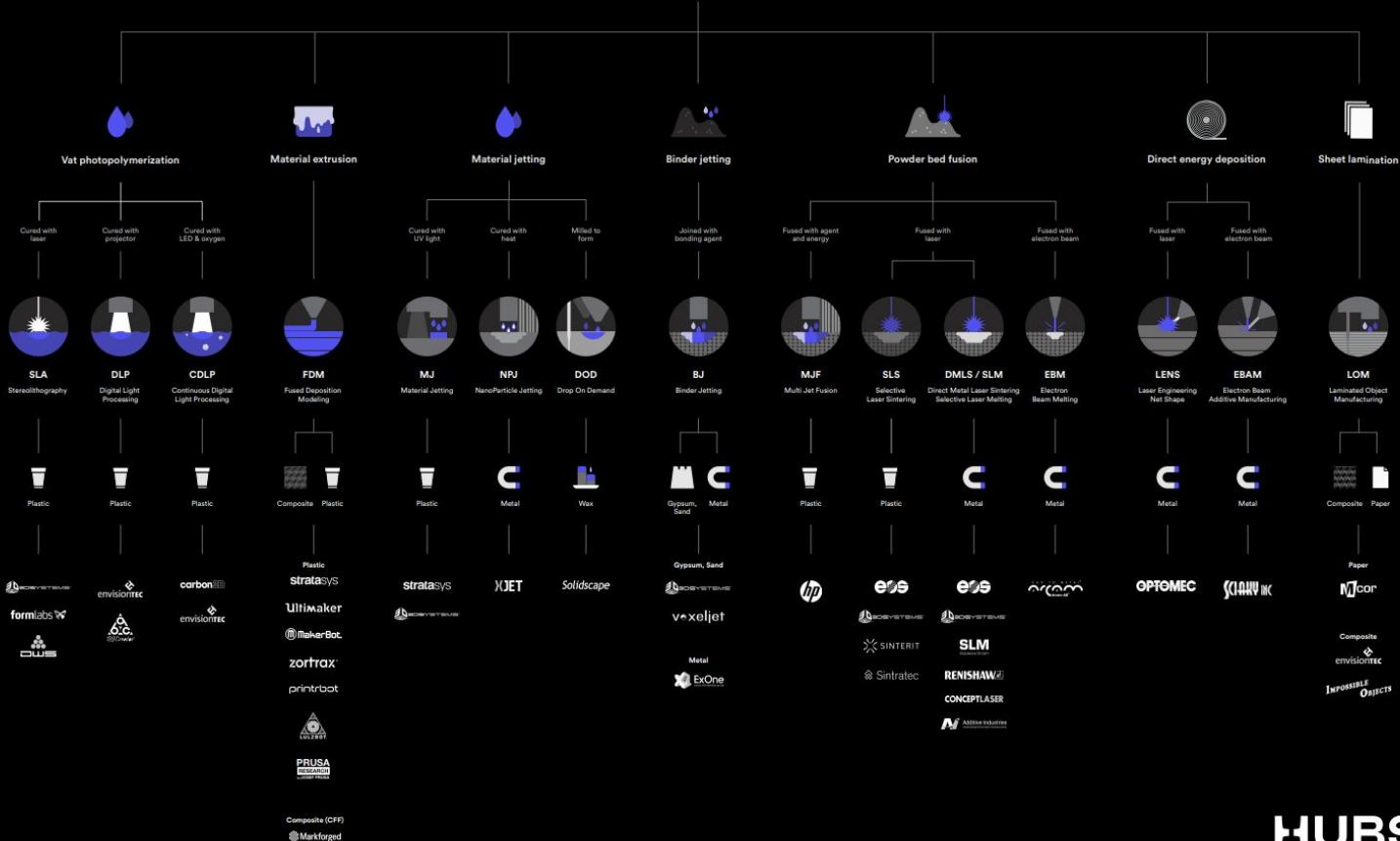


encre  
biologique

# Couleur



# ADDITIVE MANUFACTURING TECHNOLOGIES



HUBS

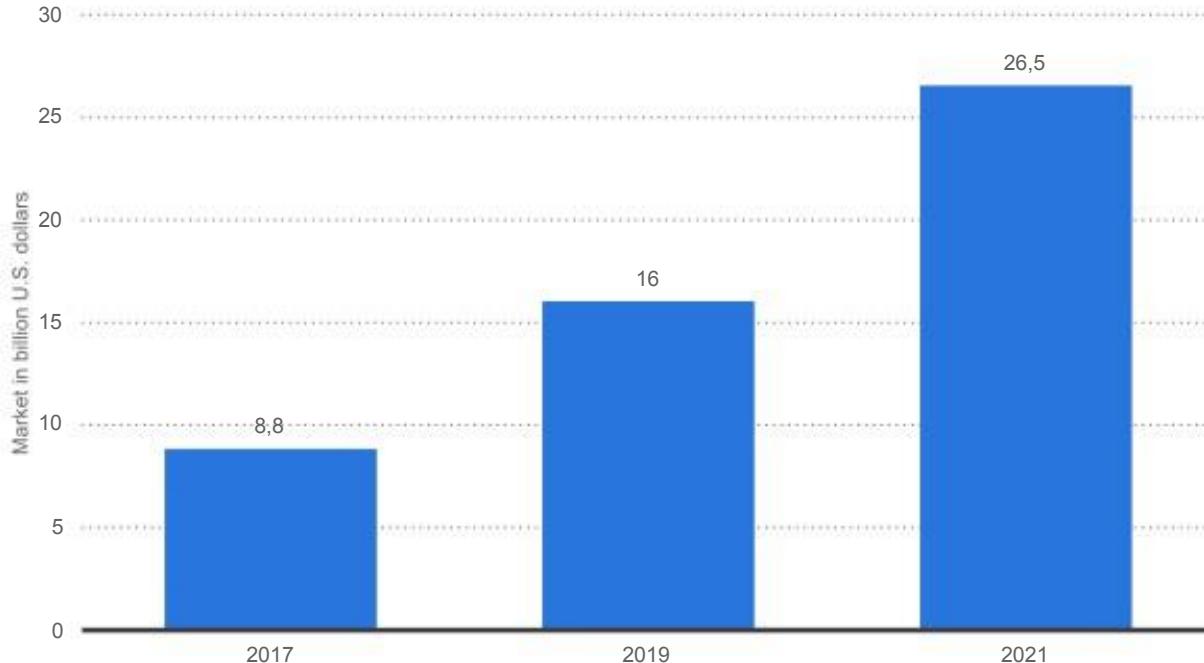
# le marché de la Fabrication Additive

Electronics

 **Value of the additive manufacturing (3D printing) market worldwide from 2017 to 2021 (in billion U.S. dollars)\***

Forecast: 3D printing market value 2017-2021

## Value of the additive manufacturing (3D printing) market worldwide from 2017 to 2021 (in billion U.S. dollars)\*



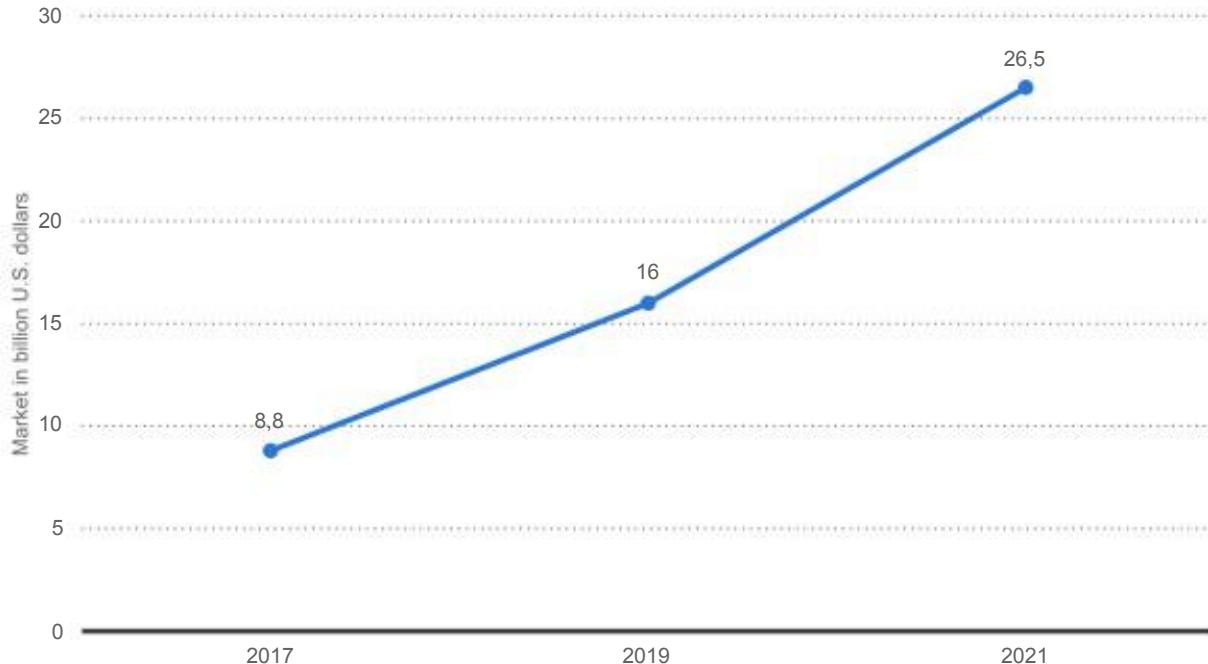
Note: Worldwide; 2017

Further information regarding this statistic can be found on page 8.

Source: Oerlikon; Website ID 261693

Forecast: 3D printing market value 2017-2021

## Value of the additive manufacturing (3D printing) market worldwide from 2017 to 2021 (in billion U.S. dollars)\*



Note: Worldwide; 2017

Further information regarding this statistic can be found on page 8.

Source: Oerlikon; Website ID 261693

**4** Milliards \$

**2014**

**26** Milliards \$

**2021**

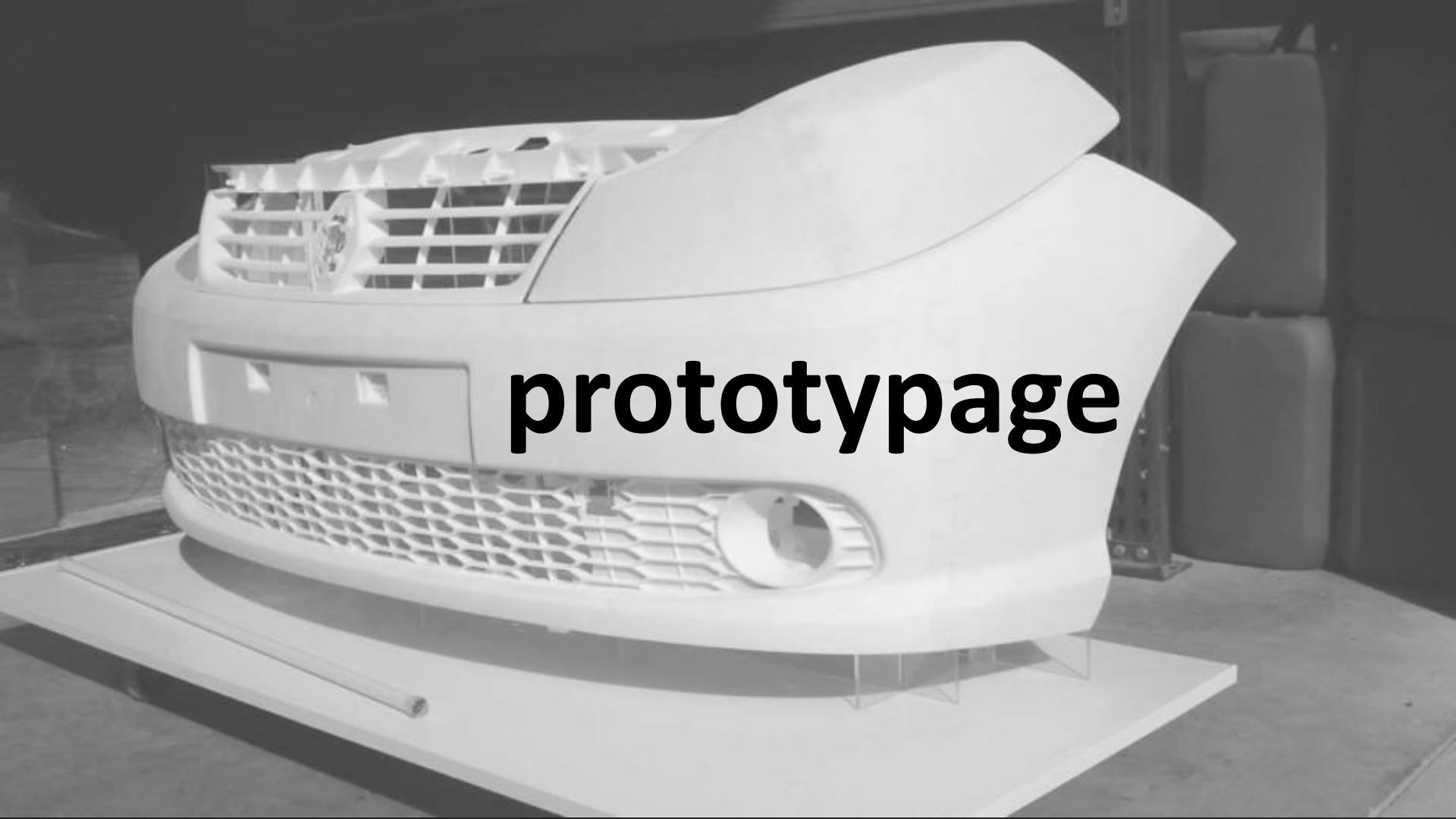
# **La FabAdd pour quoi ?**

**Prototypage (24,5%)**

**Développement produits (16,1%)**

**Innovation (11%)**

# applications

A black and white photograph of a 3D-printed car front end prototype. The model is white and features a large, curved hood, a front grille with a honeycomb pattern, and a circular headlight. It is mounted on a light-colored rectangular base. The background is a workshop setting with various tools and equipment visible.

**prototypage**



Ogden-Weber Technical College  
**CAD - Computer Aided Design**

Prototype XBOX controller design 3D printed on an HP 580 color MJF 3D printer [Source: Ogden-Weber Technical College]

Mais aussi en industrie !

A close-up photograph of a high-performance V8 engine. The engine block is black with 'V8' embossed on it. Red accents include a large air intake duct, various piping, and a prominent red cylinder head cover. The engine is set against a dark background.

automobile

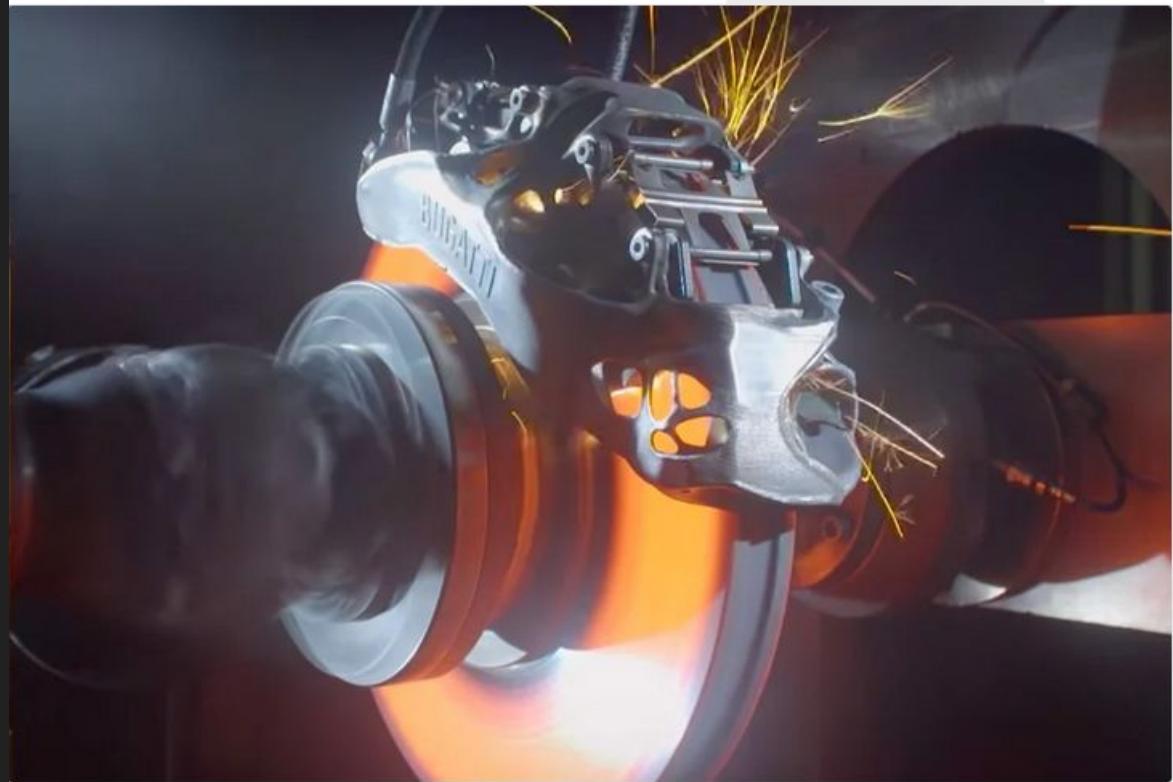
# HRE: World's First 3D Printed Wheels



HRE3D+ 3D printed wheel fitted to a McLaren P1 hypercar Source: HRE Wheels

3D PRINTING AUTOMOTIVE APPLICATIONS

## Bugatti's Titanium Brake Caliper



Bugatti's 3D printed brake caliper pictured during testing Source: Engadget

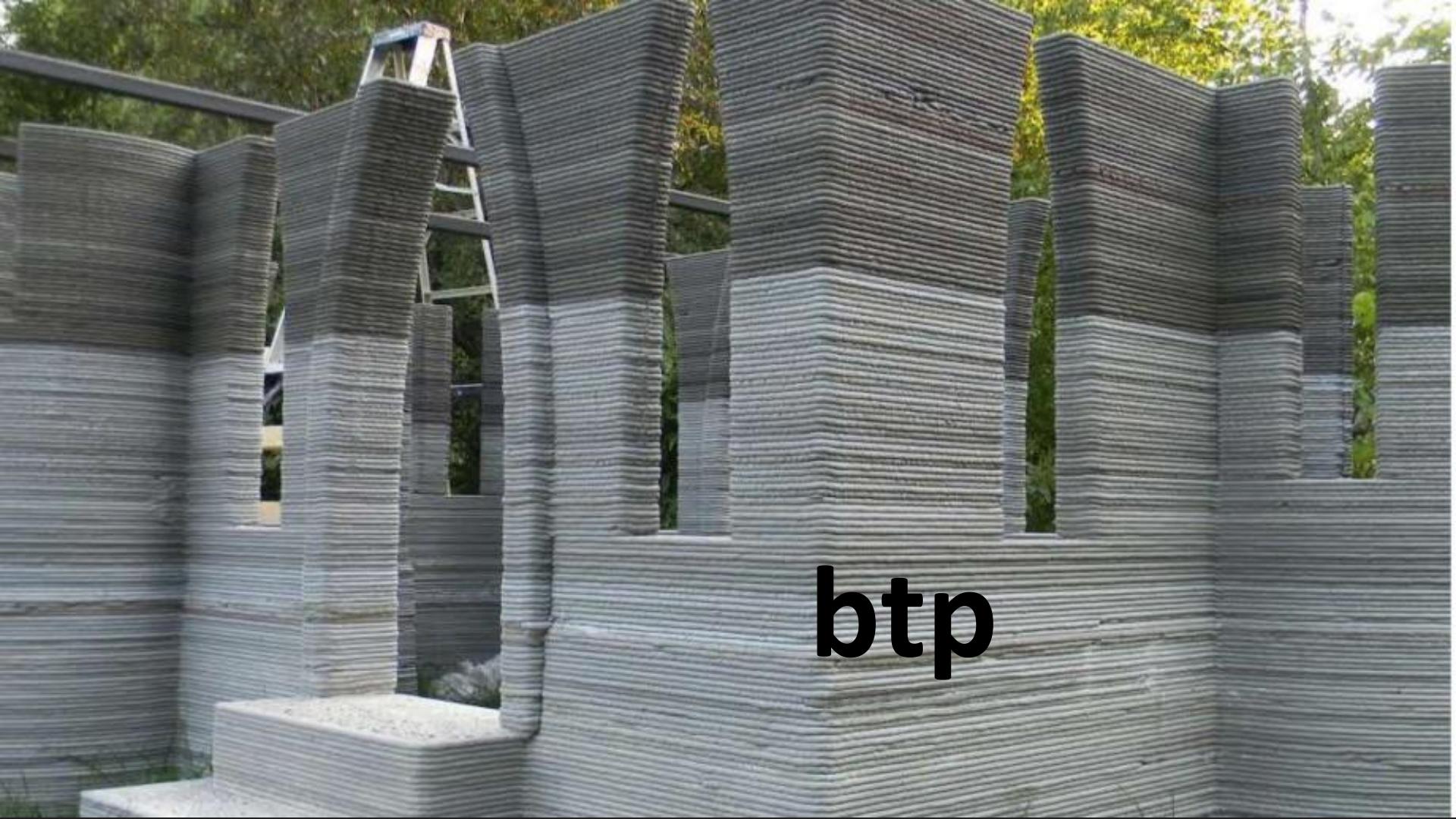


architecture

## **TECLA, the 100% green building from WASP**

Italian company **WASP** has invested in many projects related to 3D printing and the construction industry. In 2016, it announced plans to erect the homes of an experimental Italian village, named Shambalha, using additive manufacturing. More recently, WASP 3D printed a 100 percent eco-friendly home from recyclable materials. Called **TECLA**, the building was designed to address the climate crisis by providing low-carbon housing. To build it, the Italian company used the Crane WASP The Infinity modular 3D printing system.



A photograph of a modern, 3D-printed concrete house under construction. The walls are made of numerous thin, horizontal layers of concrete, giving them a textured, ribbed appearance. The house features large windows and a prominent overhanging roof. A white ladder leans against the left wall, and a metal scaffolding system is visible on the right side. The background shows green trees.

btp

## Twente Additive Manufacturing's Affordable Housing

Twente Additive manufacturing (TAM), based in the Netherlands, is dedicated to the development of 3D concrete printers. It recently launched an architectural project with the aim of providing **affordable housing** for the homeless. In collaboration with the World Housing organization, they aim to create a small community of houses in Canada that are more accessible to everyone. The houses have a surface area of 65 square meters (700 square feet), with two bedrooms and a roof covered in vegetation. The latter allows the village to blend seamlessly into the Canadian landscape. This project clearly shows the potential and benefits of combining architecture and 3D printing in one place, as it also speeds up working times while reducing production costs, making the houses affordable for everyone.



*Photo Credits: World Housing*

# design



# design



# joaillerie





# alimentation



Rep<sup>tv</sup>



# mode







X  
UBERANCE  
倾致盛放

X  
UBERANCE  
倾致盛放

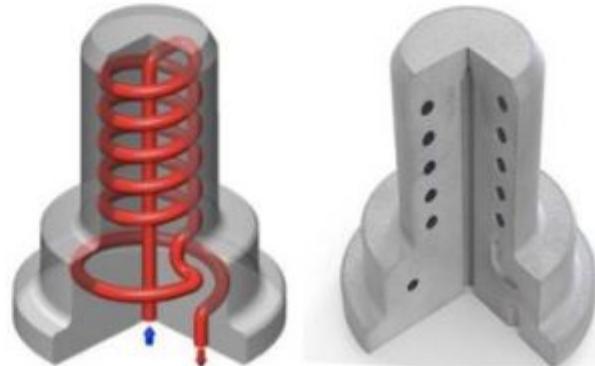
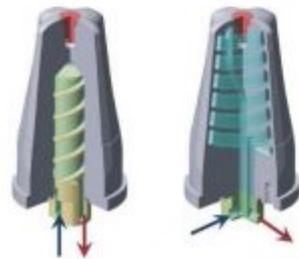
quelques projets illustrant les  
avantages de l'impression 3D





**70%**

**de gain de productivité**





# aéronautique et



# spatiale

# A 63% Lighter Titanium Aerospace Part

GE Aviation [3D printed their famous fuel nozzle](#) in one piece. They are one of the many companies that understand the huge impact 3D printing technology can have on the aerospace industry, not only in terms of supply chain, but also in terms of weight reduction. A lighter airplane means lower fuel costs.

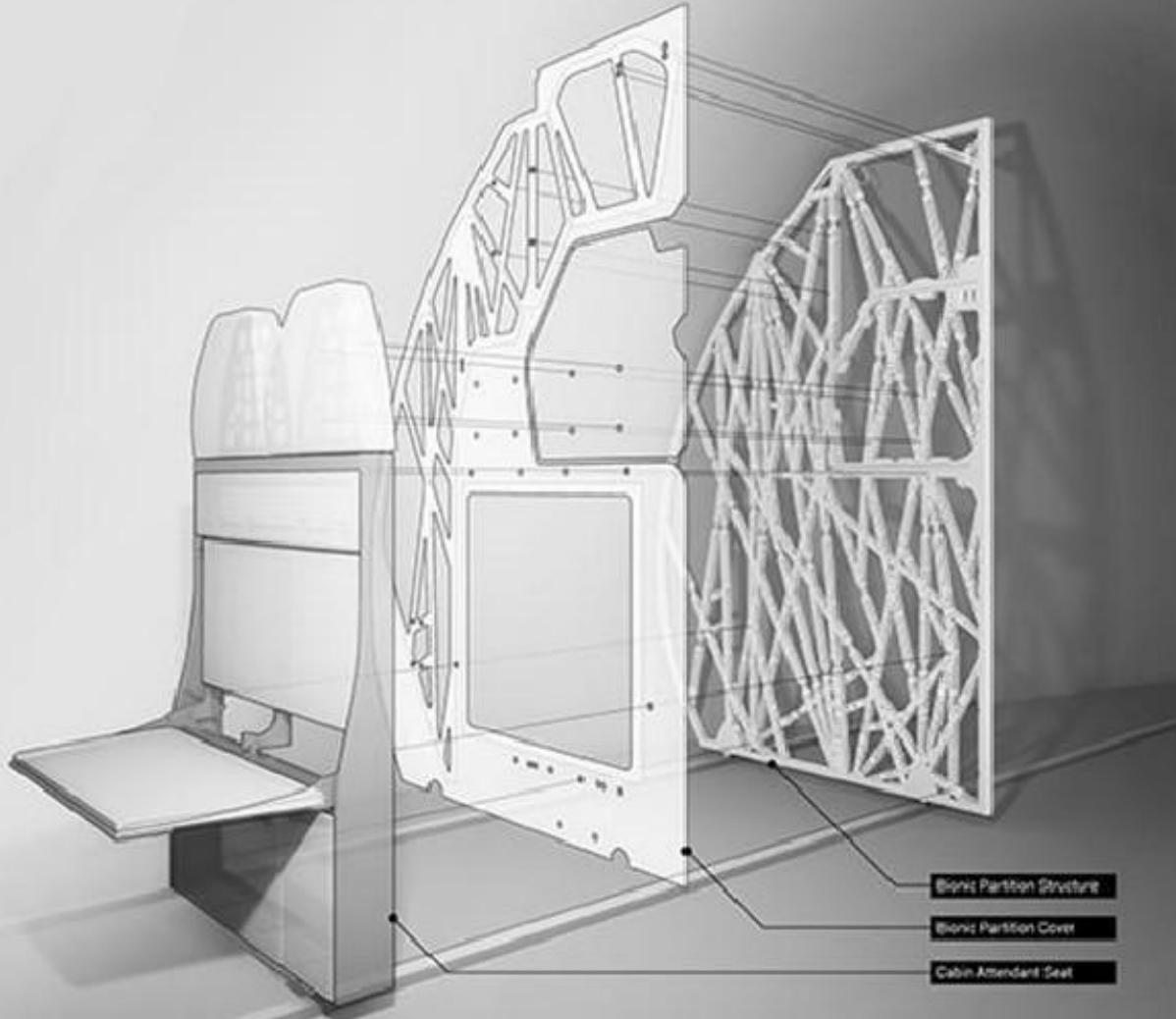


## 1. A lighter plane seat

Andreas Bastian is an engineer working at Autodesk who has manufactured a 3D printed aircraft seat. This structure weighs 766 grams (54%) less than a normal aircraft seat due to additive manufacturing. Andreas first 3D printed the plastic mold of the seat to create a ceramic mold to obtain the final piece. Andreas Bastian explains that this manufacturing method could save significant amounts of fuel during flights due to the weight reduction.



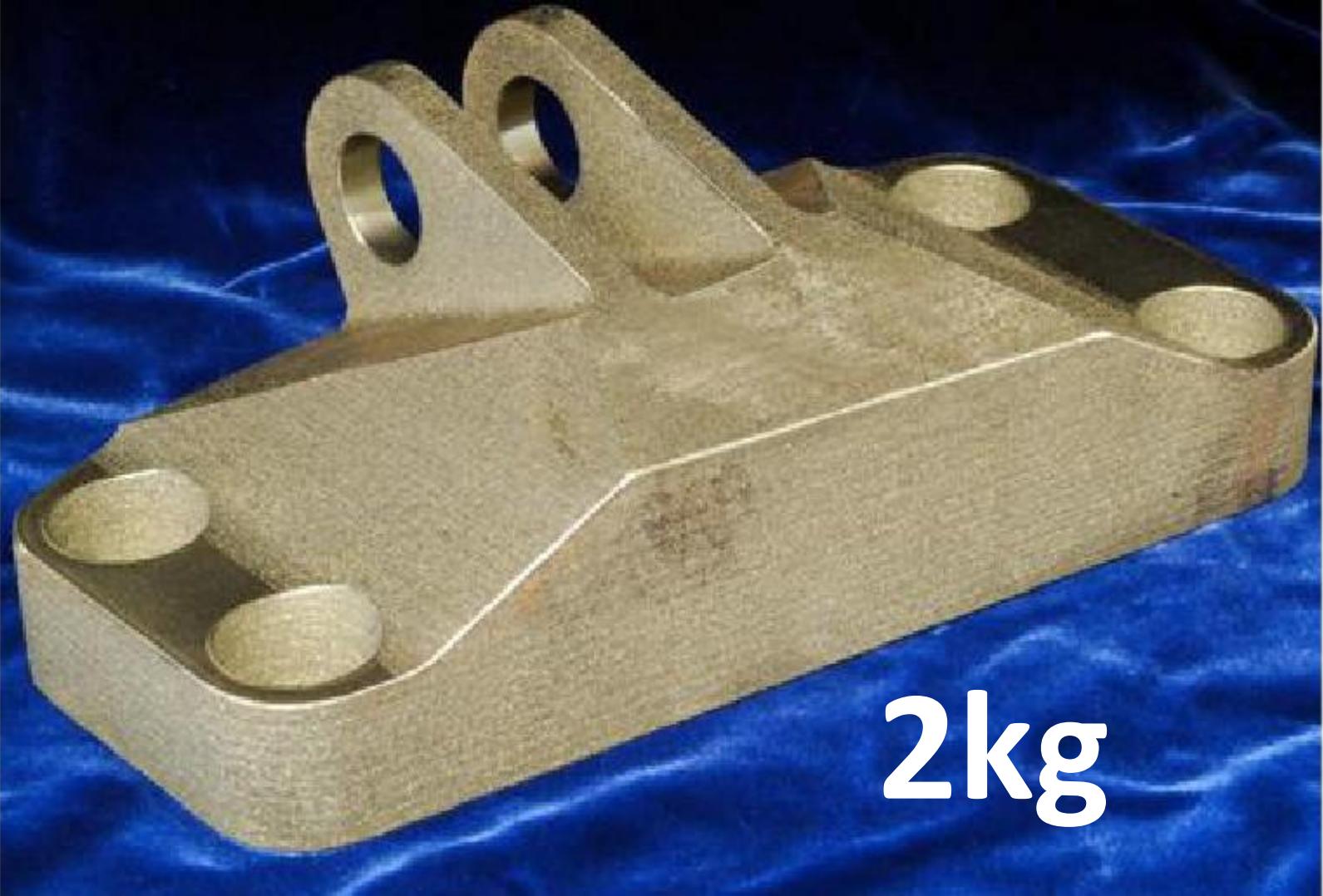
*3D printing means manufacturers can save weight, and in turn, costs.*



Bionic Partition Structure

Bionic Partition Cover

Cabin Attendant Seat



2kg



327 gr.

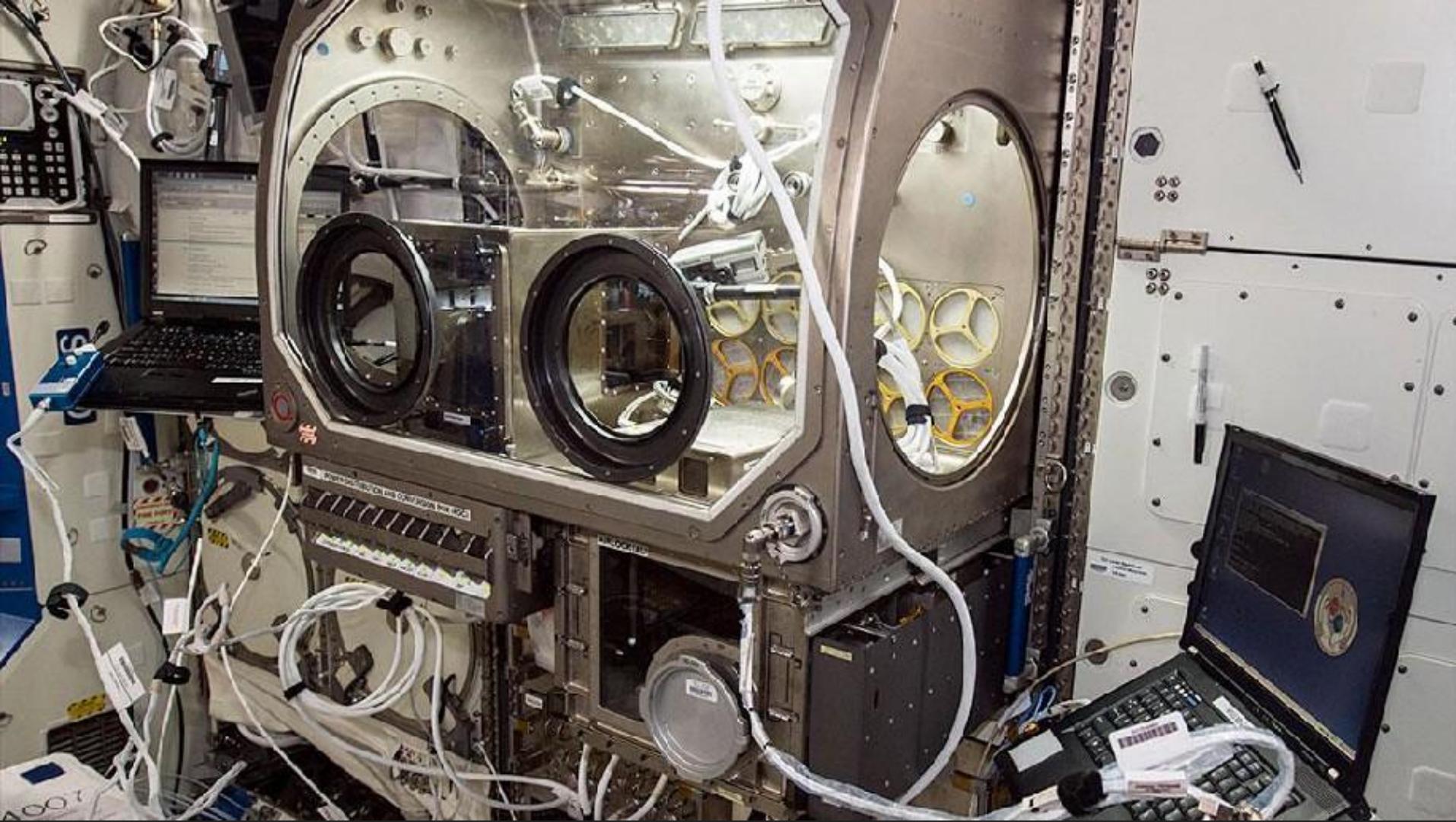


des équipes d'ingénieurs vers l'infini ...



... Et au delà !





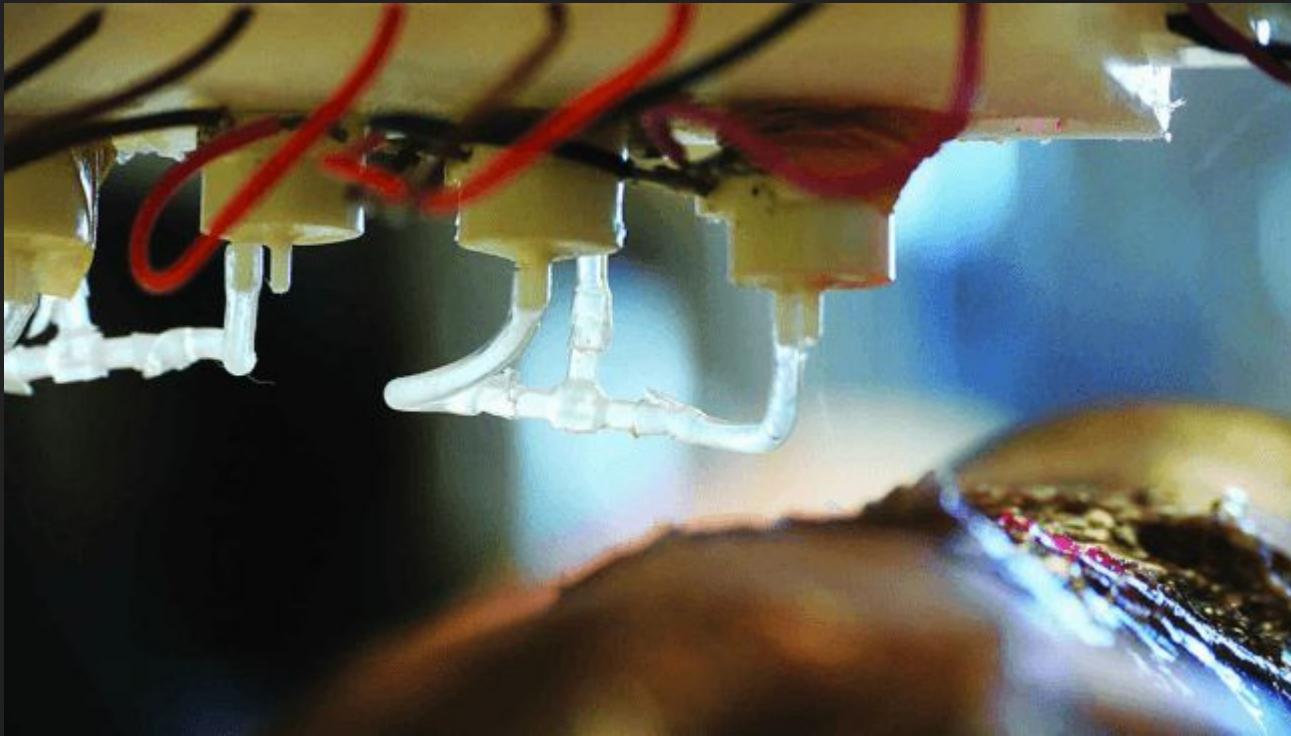




# Médical







Dans moins de 10 ans ?

**2014**

**580**

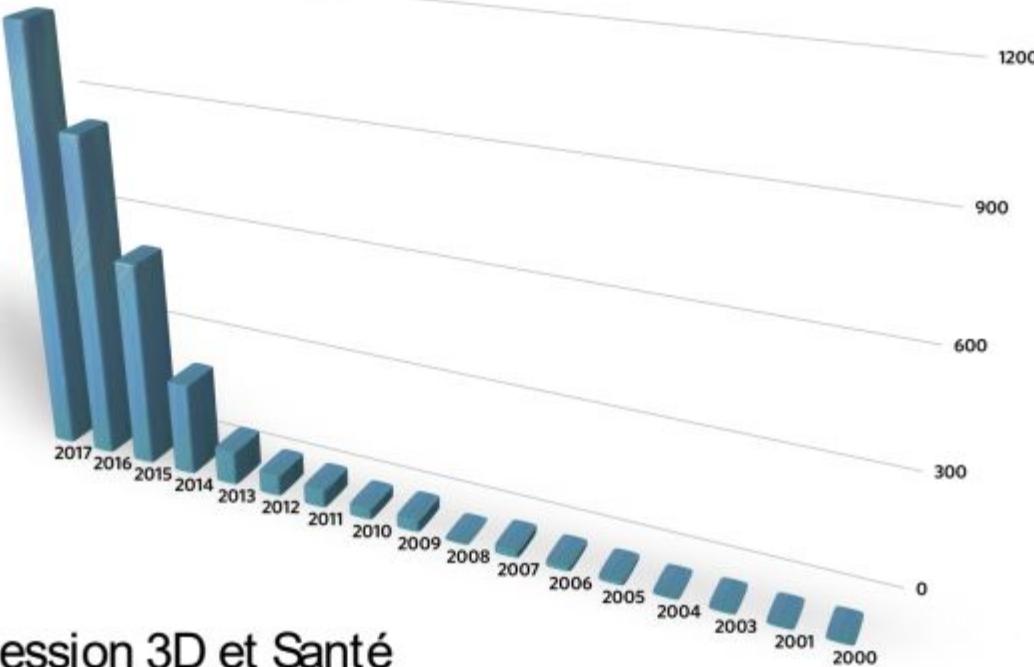
**Millions de \$**

2020

2,5

Milliards de \$

+ de 400%



## Impression 3D et Santé

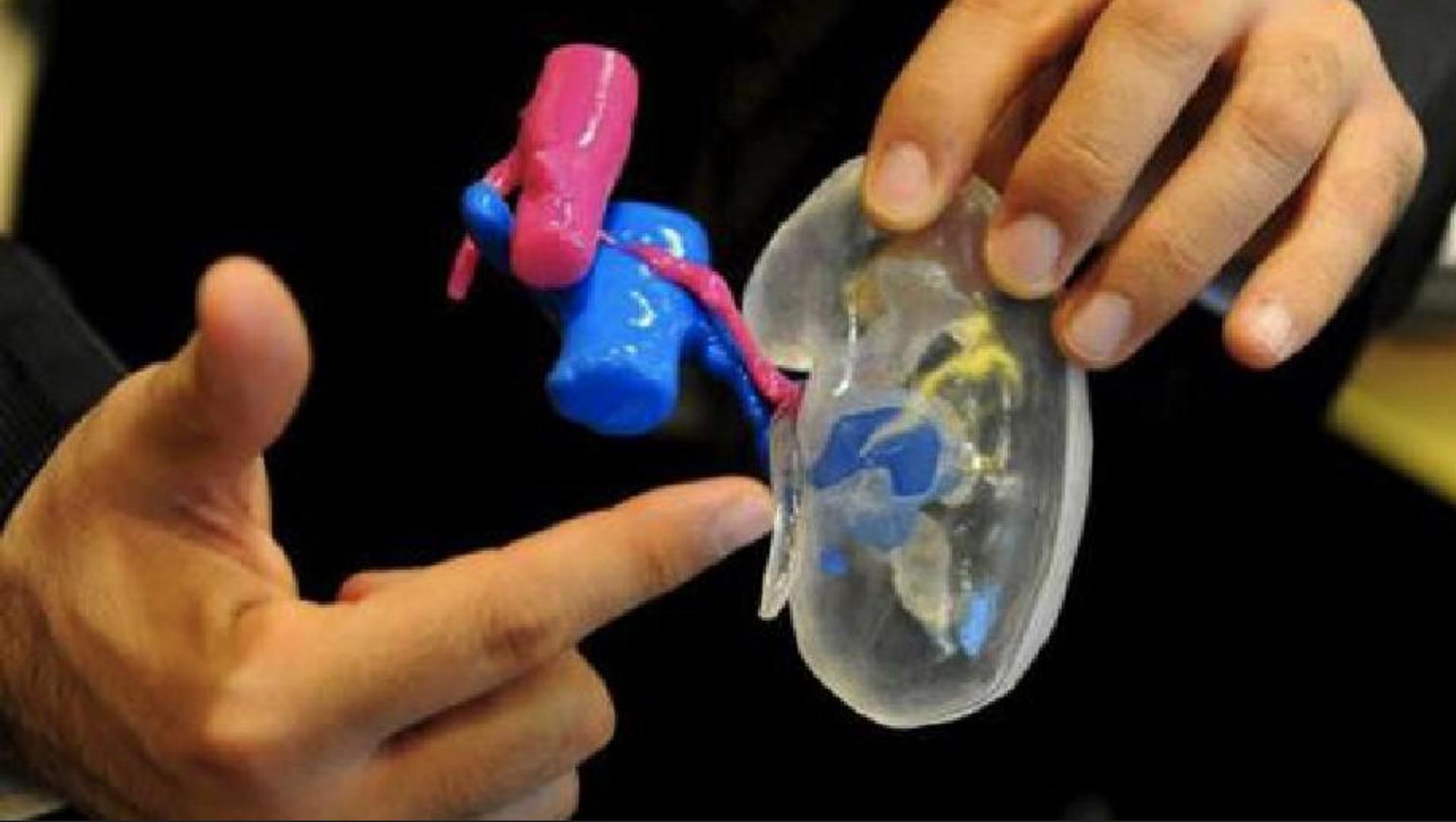
Nombre de publications médicales contenant l'expression #3DPrint

(©PubMed)

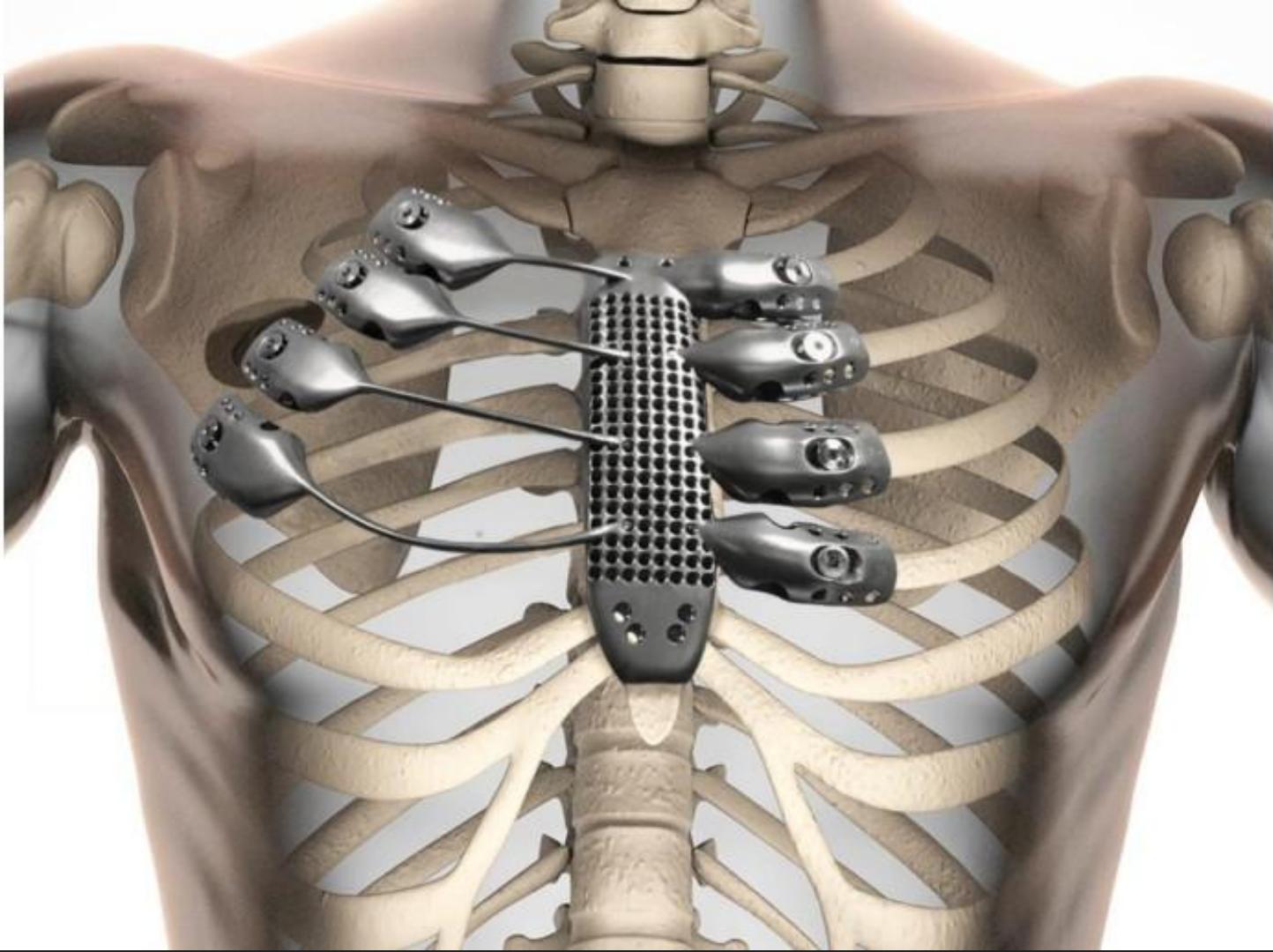
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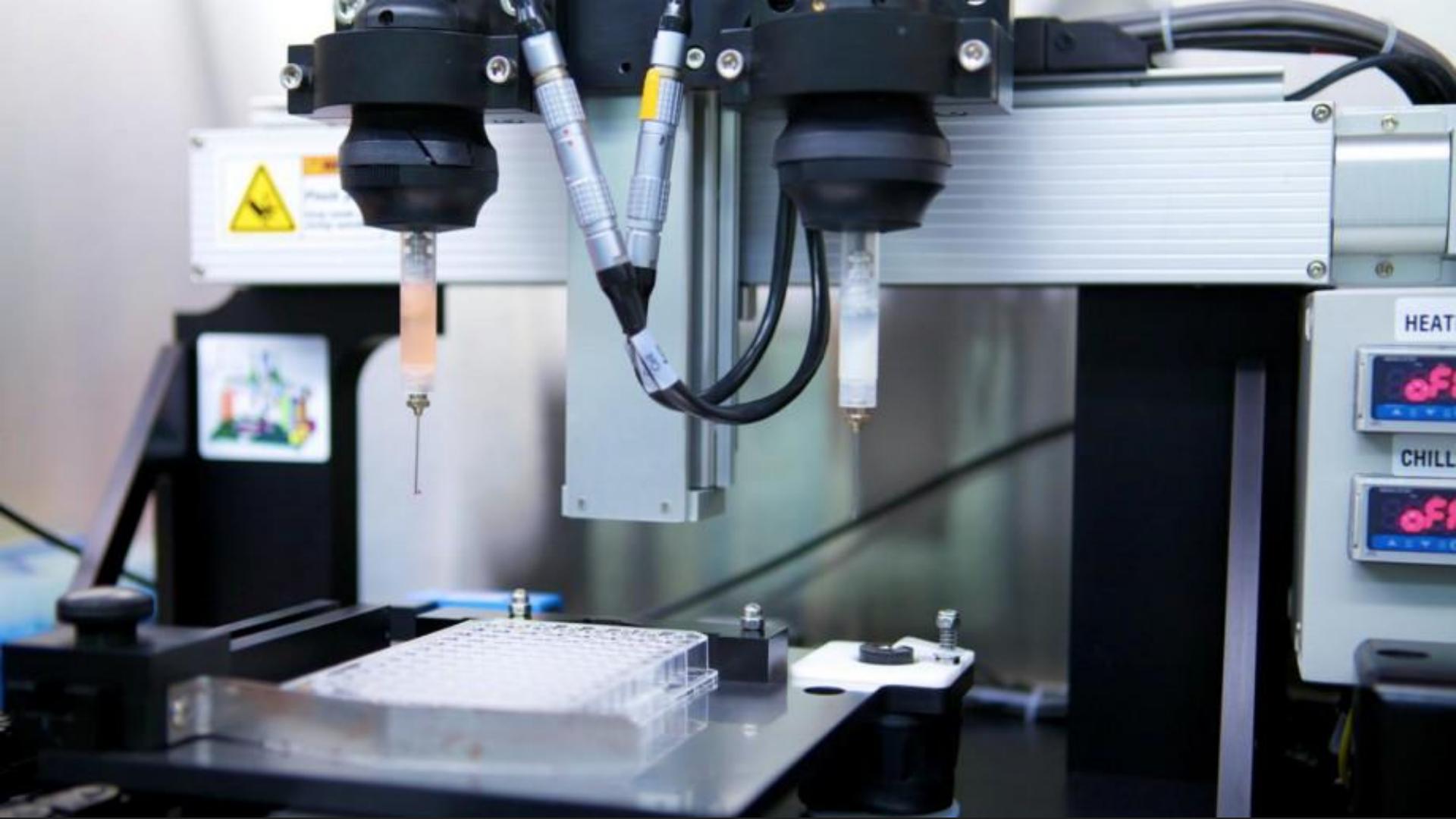


















SPRITAM® levetiracetam, for oral use: 750 mg (foreground) and 1000 mg (background).  
Product images not shown at actual size.

SPRITAM® is manufactured by Aprecia Pharmaceuticals Company, East Windsor NJ 08520  
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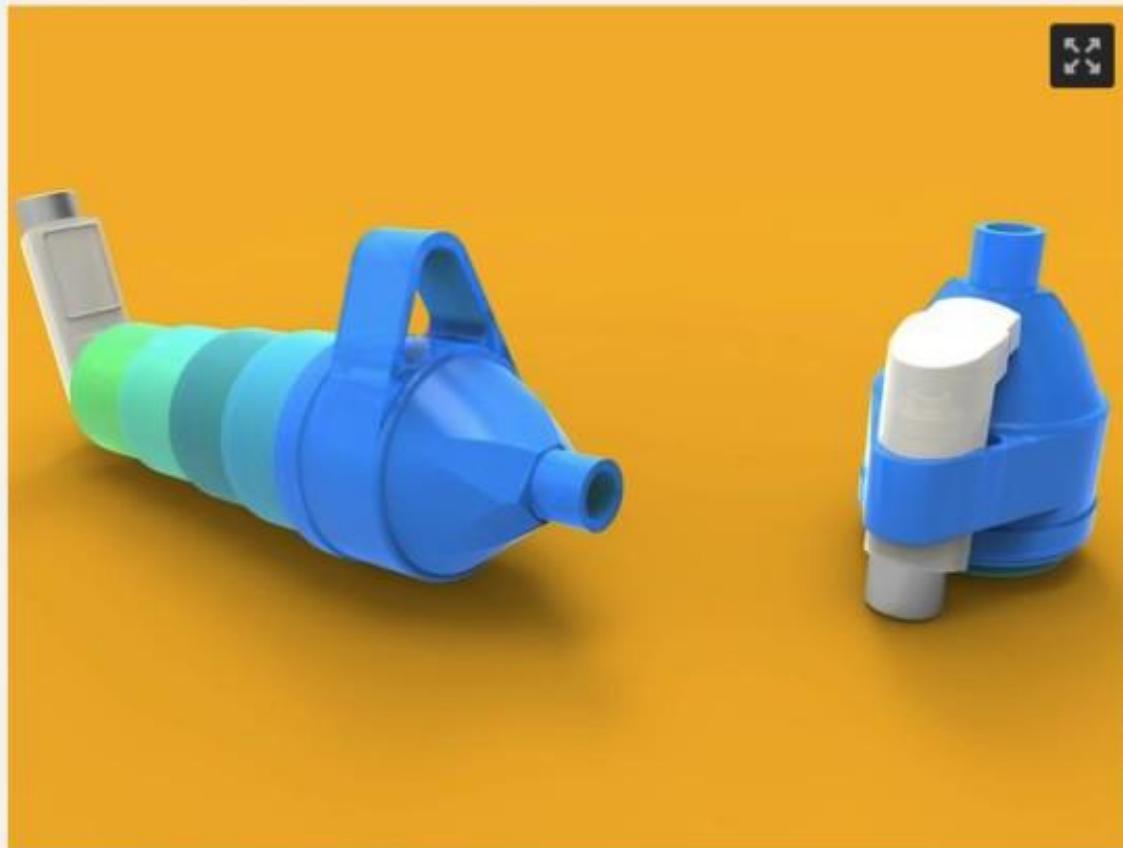
**APRECIA™**  
PHARMACEUTICALS





# Tubee v02

by cparrapa, published Nov 12, 2015



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**fablab**



XXème

consommation

# usage

XXI<sup>ème</sup>



open source

DIY

Hakerspace

Maker

Fablab

l'age de faire

puisqu'on parle de compétences...



i k



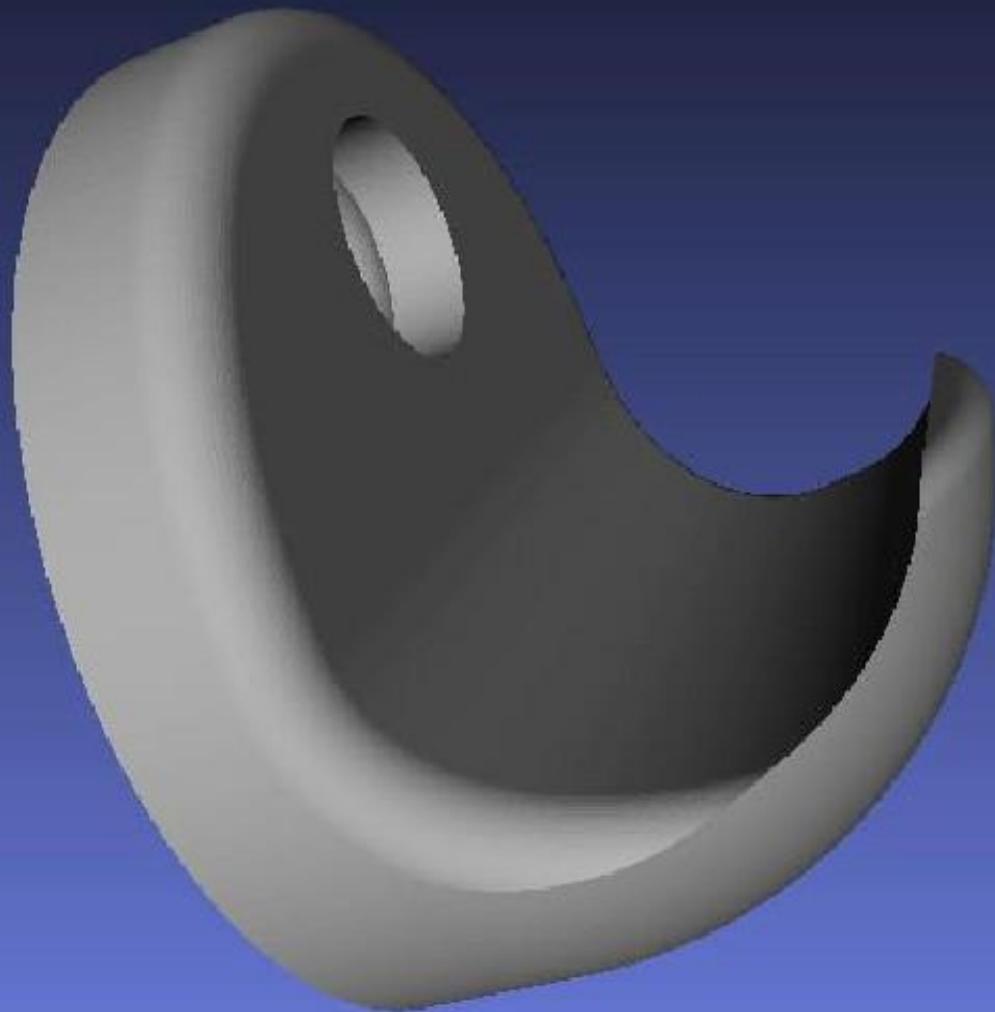
Facebook  
fanpage



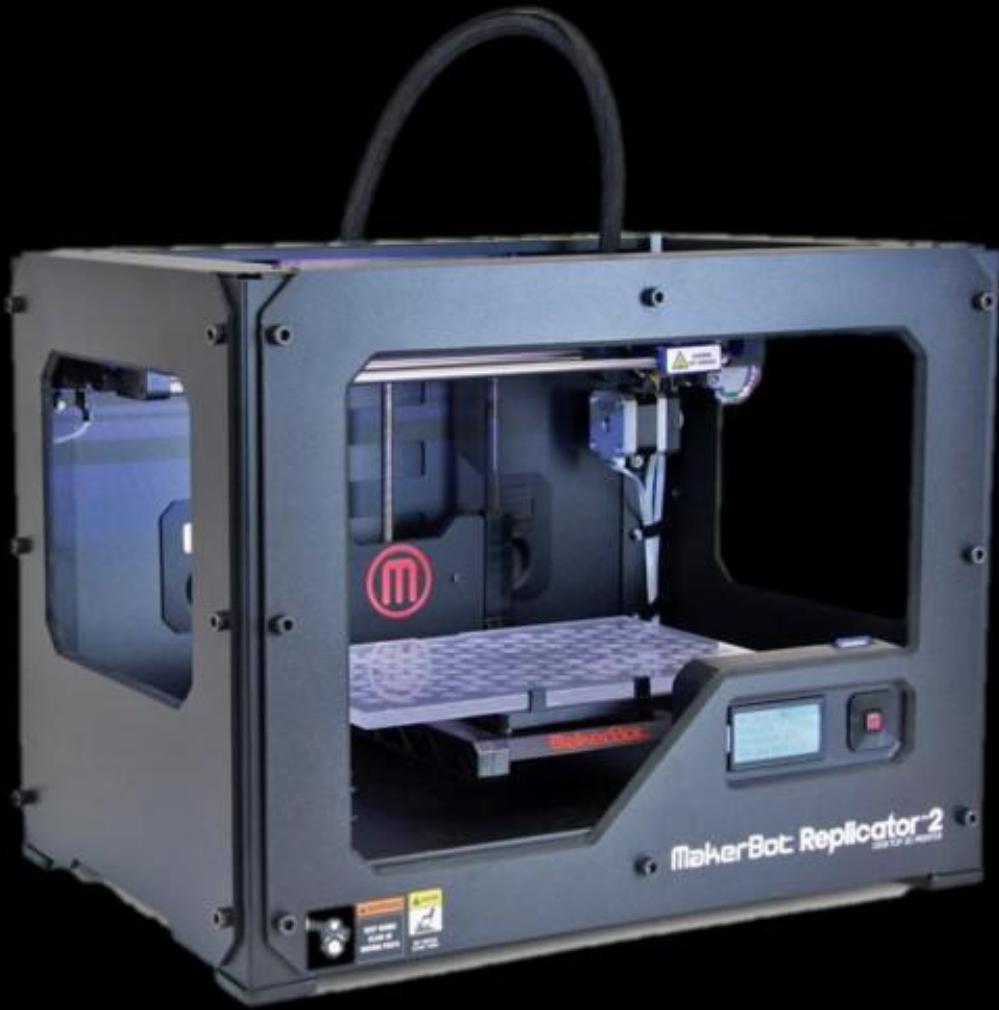
wix.com

“Papa, je peux imprimer un  
porte-manteau ?”

T

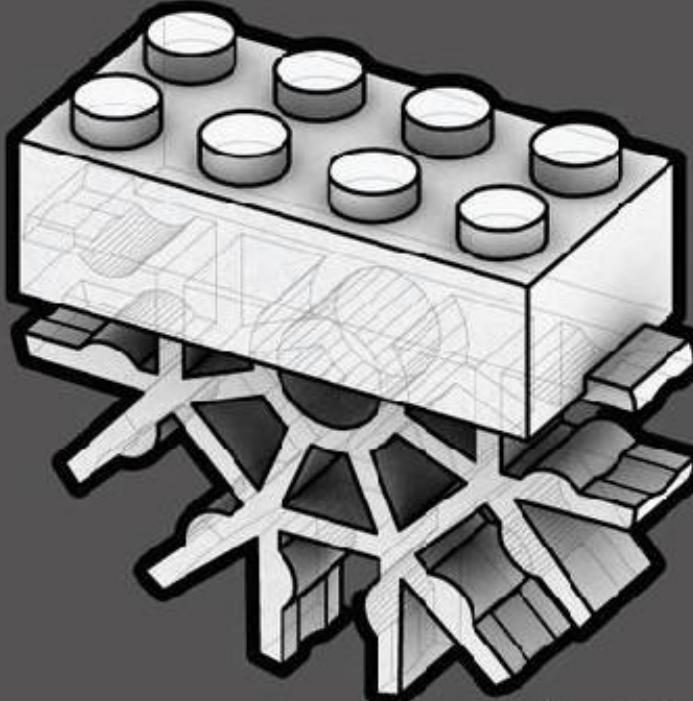




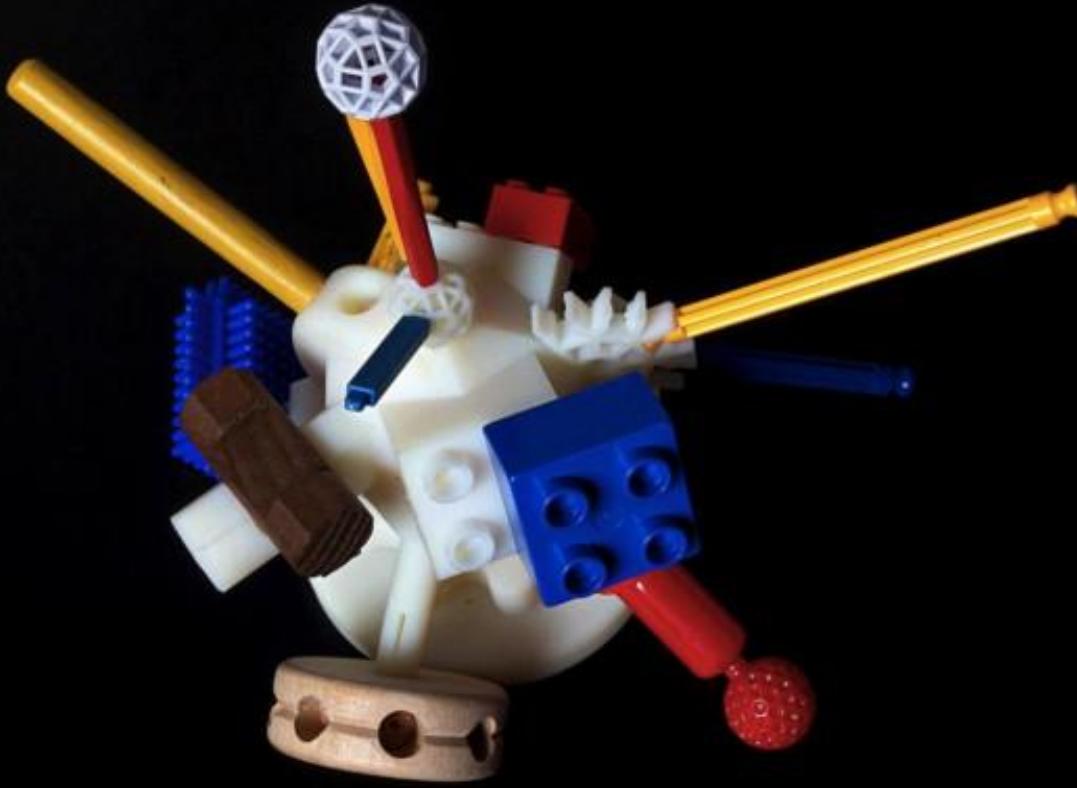




30 minutes plus tard



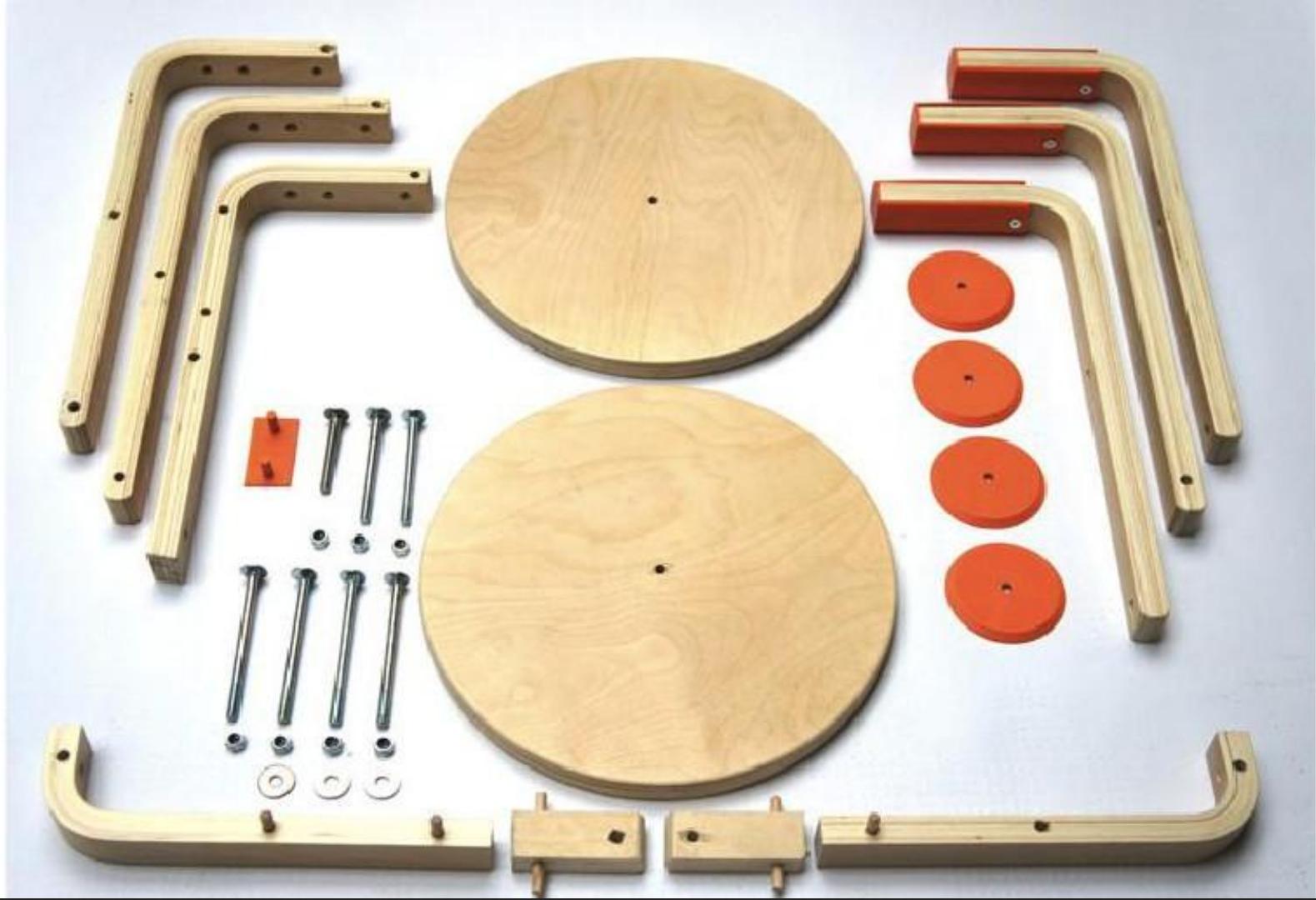
**A-PI**  
FREE UNIVERSAL CONSTRUCTION KIT



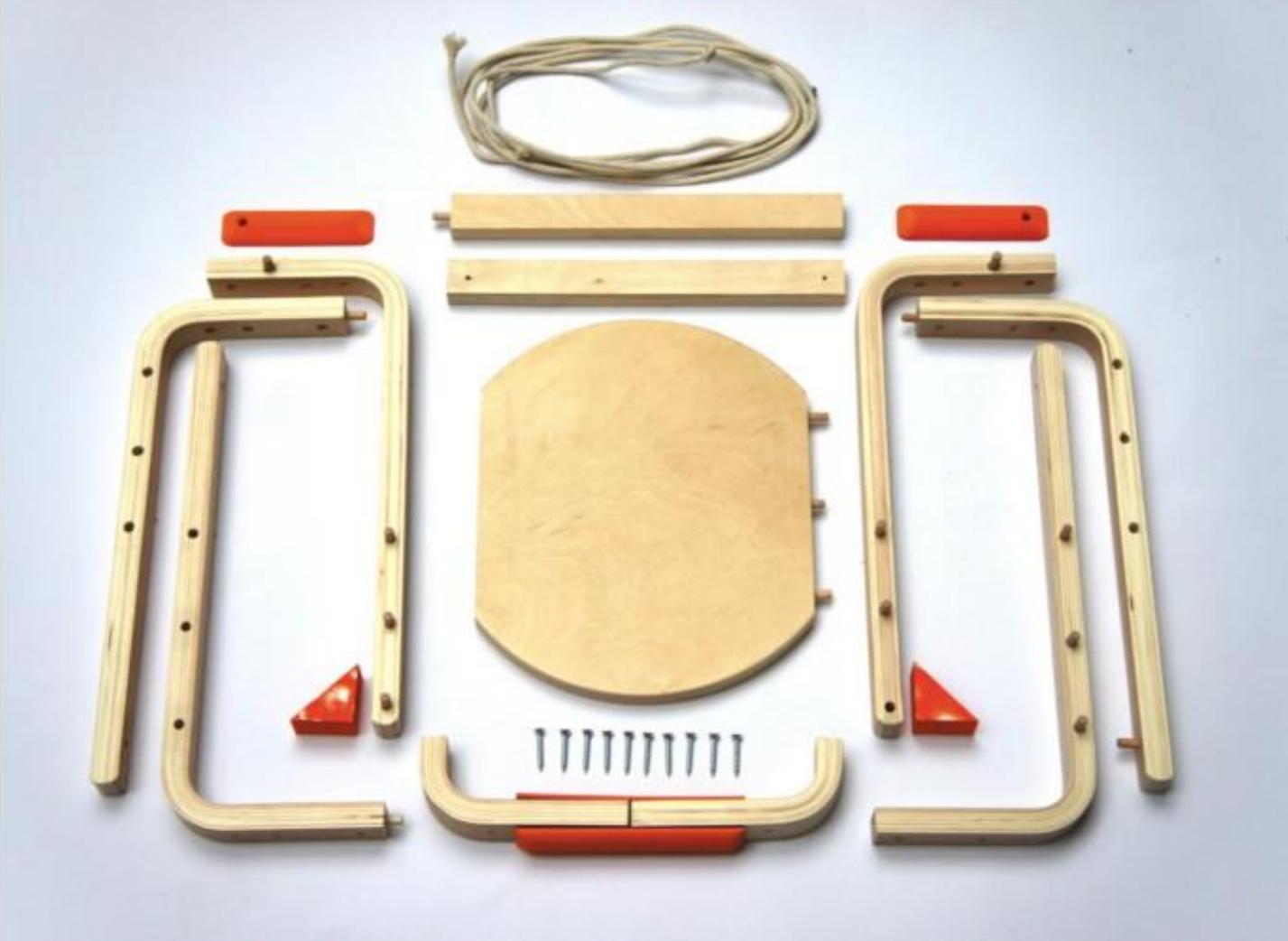


**par Samuel Bernier**













GoPro®  
Be a *HERO*. 

**GoPro** Bienvenue sur GoPro

PRODUITS CANAL ASSISTANCE Q

ACCUEIL PRODUITS CAMÉRAS SYSTÈMES DE FIXATION ACCESSOIRES LOGICIEL ET APP PARCOURIR PAR ACTIVITÉ



**NOUVEAU** The Handler (Poignée Rotative)

HERO4, HERO3+, HERO3, HERO, HD HERO2, HD HERO Original

\$29.99

★★★★★

AJOUTER AU PANIER

COMPARER



**NOUVEAU** Fetch (harnais pour chien)

HERO4, HERO3+, HERO3, HERO, HD HERO2, HD HERO Original

\$59.99

Sal Price!

AJOUTER AU PANIER

COMPARER



**NOUVEAU** Fixation x Sportsman »

HERO4, HERO3+, HERO3, HERO, HD HERO2, HD HERO Original

\$69.99

★★★★★

AJOUTER AU PANIER

COMPARER



**NOUVEAU** 3-Way

HERO4, HERO3+, HERO3, HERO, HD HERO2, HD HERO Original

\$69.99

★★★★★

AJOUTER AU PANIER

COMPARER

# Mounts + Accessories

FILTER (Hide)

Sort By



MOUNTS LOOKBOOK

RESULTS

34

CLEAR ALL FILTERS

## CAMERA COMPATIBILITY

- HERO4 BLACK
- HERO4 SILVER
- HERO4 SESSION
- HERO3+
- HERO3
- HERO+ LCD
- HERO+



3-Way™



Head Strap + QuickClip



Harness (Chest Harness)

# Mounts + Accessories

FILTER (Hide)

Sort By

MOUNTS LOOKBOOK



CAMERA COMPATIBILITY

HERO4 BLACK

HERO4 SILVER

Thingiverse

DASHBOARD

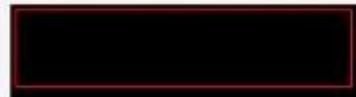
STORE

COLLECTIONS

CREATE

Enter a search term

You



gopro

SEARCH

FILTER BY

Things (4,916)

Users (32)

Collections (2,437)



4916







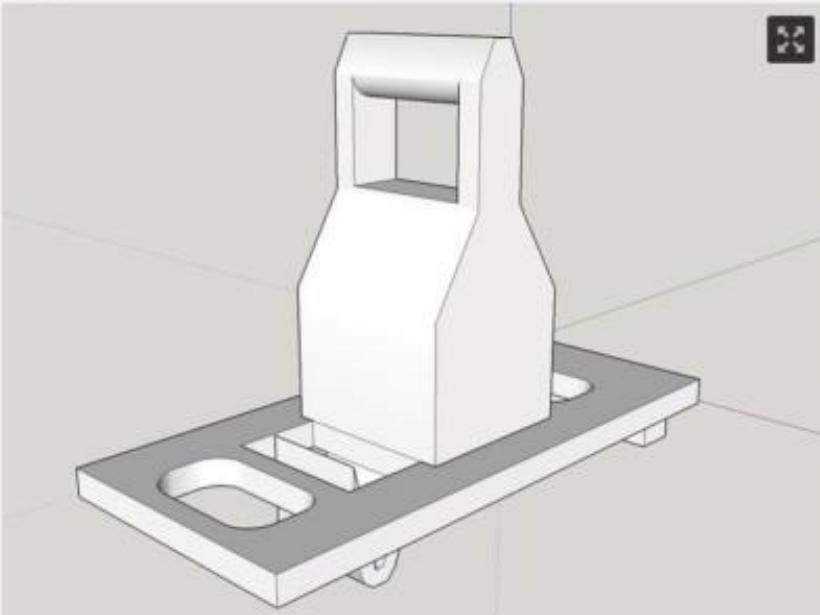






## Whirlpool 8181651 Door Strike

by EGD1984, published Aug 30, 2015



Like

2

Collect

2

Comment

4

I Made One

0

Watch

0

Remix It

0

Share



Download This Thing!



## Pusher lid for an Moulinex © kitchen machine

by guytc, published Aug 29, 2015



Like 1

Collect 0

Comment 0

I Made One 0

Watch 0

Remix It 0

Share

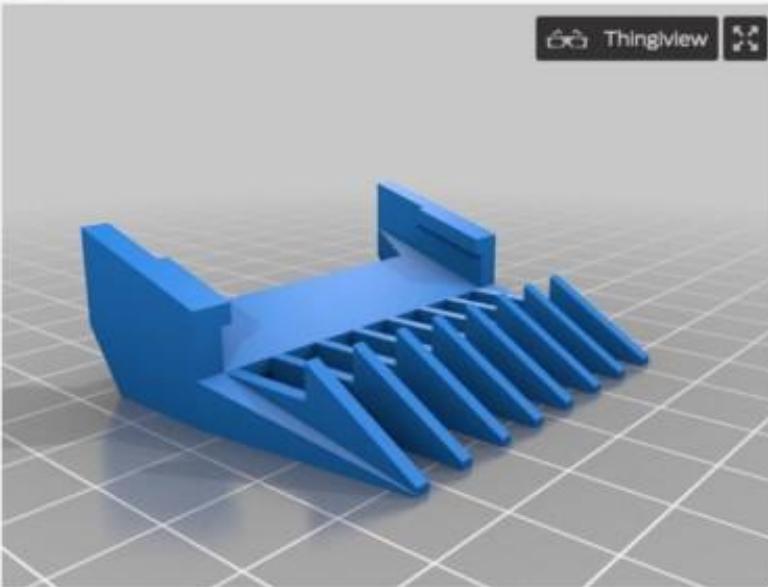
Download This Thing!



## Short Guard for Oster 76 [modified]

by luismanion, published Aug 23, 2015

Thingview



Like 3

Collect 9

Comment 0

I Made One 0

Watch 0

Remix It 0

Share

Download This Thing!



Thing Info



Instructions



Thing Files

0

Comments

0

Made

9

Collections

0

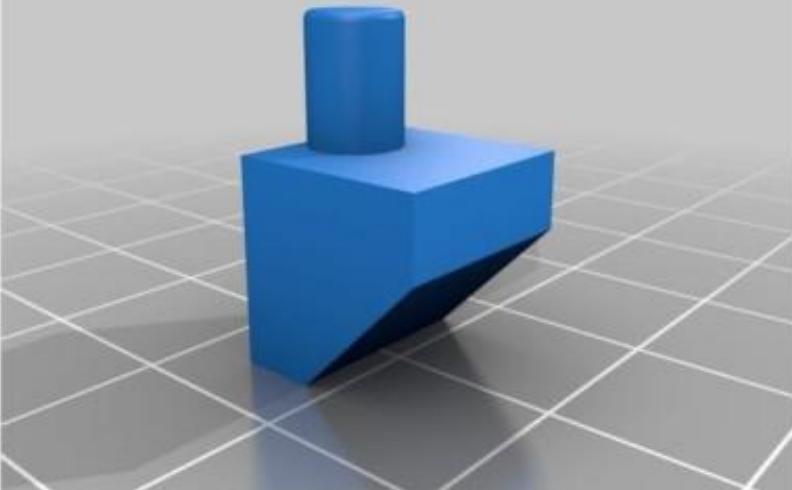
Remixes



## Soporte Balda Armario

by 3DHCA, published Aug 23, 2015

Thingview



Like 2

Collect 2

Comment 0

I Made One 0

Watch 0

Remix It 0

Share

Download This Thing!



Thing Info



Instructions



Thing Files

0

Comments

0

Made

2

Collections

0

Remixes



CRÉATIONS | PROMOTIONS | NEW À LA DEMANDE | COMMUNAUTÉ | BLOG | PRESSE

Rechercher...



AJUTER

ART MODE BIJOU MAISON ARCHITECTURE GADGET JEU OUTIL COQUIN DIVERS IDÉES CADEAUX DE NOËL

ALÉATOIRE

PHOTOS

VUE 360°

J'aime



## EMBOUT ASPIRATEUR DYSON

### DESCRIPTION DU MODÈLE 3D

embout long pour atteindre les endroits inaccessibles.

### PARAMÈTRES D'IMPRESSION 3D

200/33.98/34 (mm)

0.10mm

205°C

renforce

TÉLÉCHARGER

GRATUIT

### MOTS-CLEFS

DYSON

### CRÉATEUR



ABONNÉS 1  
ABONNEMENTS 0

SUIVER



## Customizable Vacuum Tool

by Zivbot, published May 18, 2016



DOWNLOAD ALL FILES

	Like	3531
	Collect	4053
	Comment	35
	I Made One	7
	Watch	51
	Remix It	429
	Share	



### Thing Apps Enabled



Open in Customizer



View All Apps



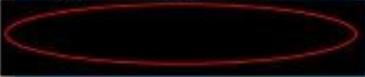




Print

Print Job

YM



Ultimaker



## **Sachant que :**

- Le PLA coûte 35 € le kilo dans le commerce
- Qu'une imprimante 3D de bureau coûte 2000 Euros soit 33c de l'heure pour 2 ans à 250 jours an et 12 heures jour
- Que la consommation électrique représente 10 c €
- La pièce coûte :

- de 2 €



### [bouton bac à glace - Accessoires Réfrigérateur Congélateur](#)

from Fnac - GROUPE DRAGON

Modèles d'appareils concernés : MTB45D1NF MTB45D2NF C00174939 FF4DK UK FF4DSBUK FF4DX UK FTM70S MTB4711NFFR NMTM1911FWBHA 54131 HOTPOINT-ARISTON 81541310100 MT4511NFTK = ...

[See more details at Fnac - GROUPE DRAGON »](#)

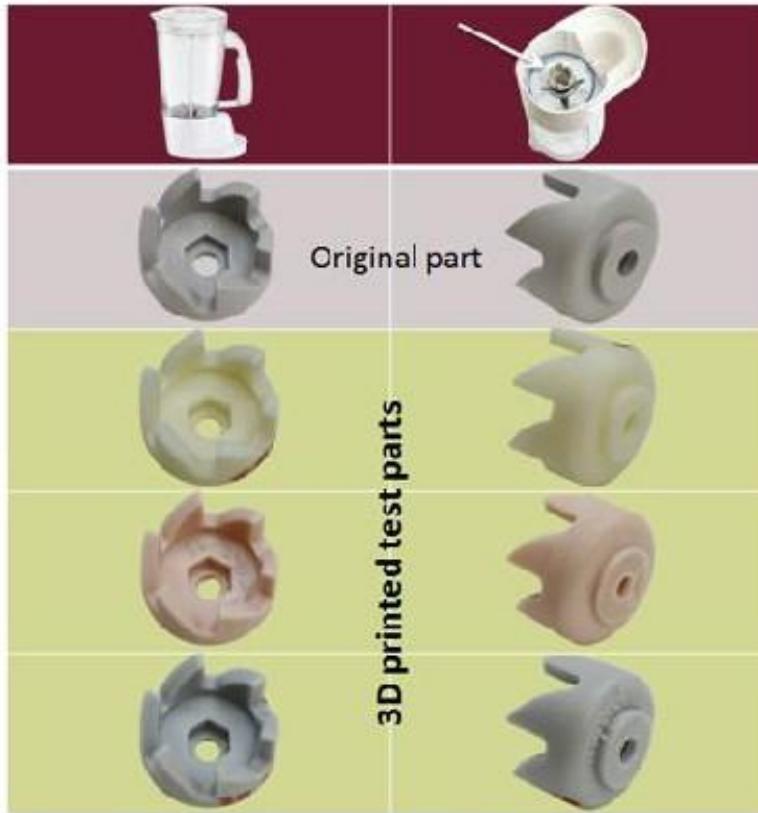
**€18.90**

+€8.84 shipping

Fnac - GROUPE DRAGON

[Shop](#)

[Save to Shortlist](#)



- "L'objectif c'est de les remettre à des consommateurs qui réparent des produits tout seuls. Nous les contactons ensuite tous les 15 jours pour savoir comment évolue la pièce", Alain Pautrot.

et améliorer votre expérience sur le site. C'est toujours plus et mieux, vos paramètres... ▶



happy 3D

by boulanger

CRÉATIONS | COMMUNAUTÉ | DÉCOUVERTE 3D | FORUM | PRESSE | FORMATION | BOULANGER

Rechercher...



AJOUTER

CUISINE MAISON HIGH-TECH DIVERS



CRÉER, REMPLACER, PERSONNALISER.

À LA UNE



Bienvenue sur happy3D, la nouvelle plate-forme communautaire de Boulanger.

Nous nous lancons dans une démarche Open source qui vise à mettre à disposition librement des modèles 3D de pièces détachées des produits de nos marques.

Il est désormais possible d'imprimer les objets disponibles sur cette plate-forme chez vous ou chez un tiers pour réparer.

adopter le  
hack

le promouvoir

le solliciter

le gérer

donner les outils  
pour faire de ses  
clients des

consomhacker

# Les entreprises ont-elles le choix ?

PUBLIC

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0

[Issues](#)

1

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A load generator, built for engineers — [Read more](#)

<http://twitter.github.com/iago/>

[Clone in Mac](#)[ZIP](#)[HTTP](#)[Git Read-Only](#)<https://github.com/twitter/iago.git>[Read-Only access](#)[branch: master](#)[Files](#)[Commits](#)[Branches](#) 2[Tags](#)[Downloads](#)

⌚ Latest commit to the **master** branch

Merge pull request #3 from jwaldrop/master ...



jwaldrop authored 2 days ago

commit 33ff293fba

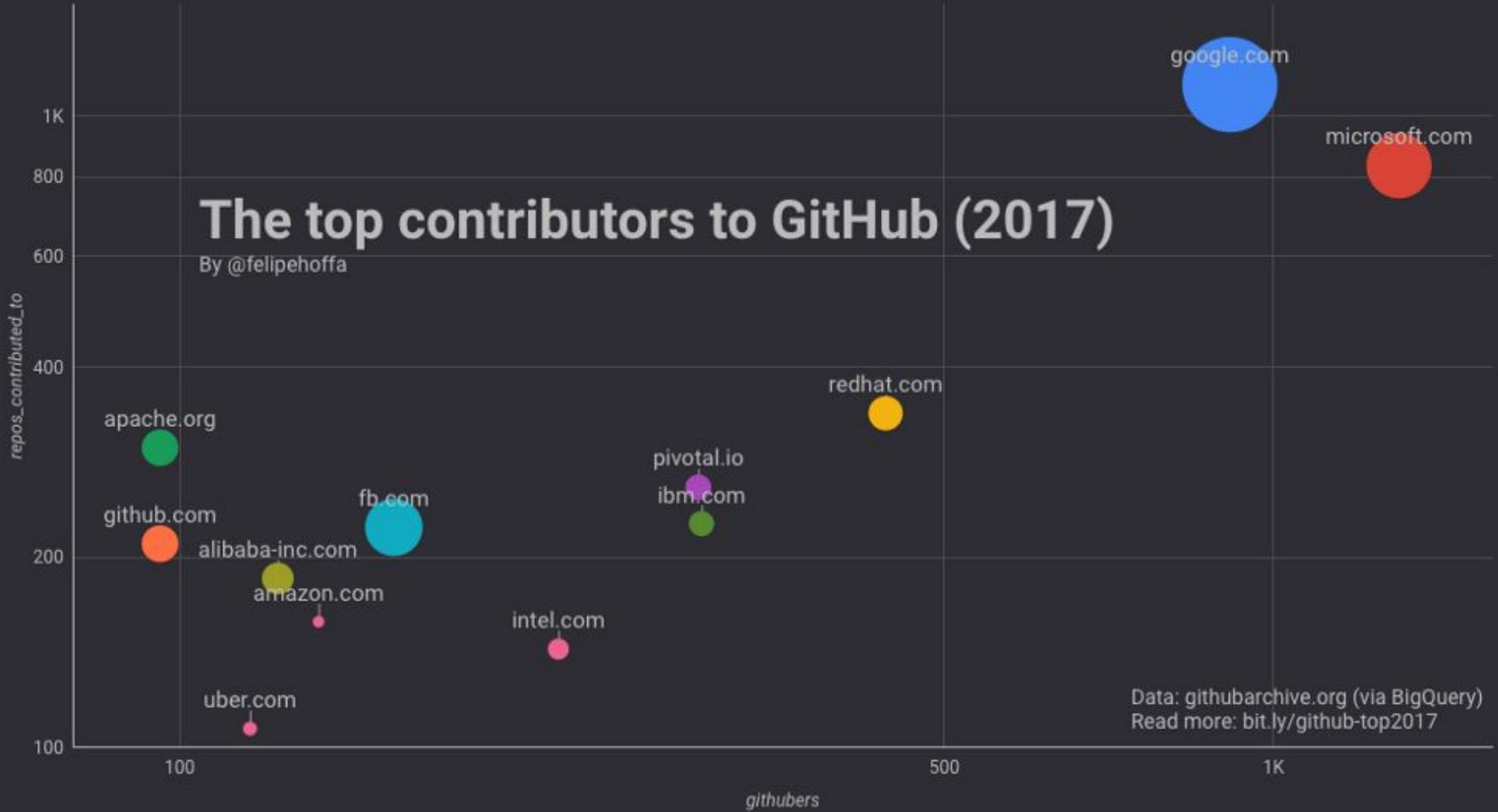
[iago /](#)

name	age	message	history
config	3 days ago	open source release [James Waldrop]	
src	2 days ago	better default parser [James Waldrop]	
.gitignore	6 days ago	Initial Iago Import [James Waldrop]	

CAC 40  
5 301,24 PTS**-0,12%** ▼+ FORTES HAUSSES CAC 40  
CREDIT AGRICOLE +3,56%  
SAINT GOBAIN +3,09%+ FORTES BAISSES CAC 40  
STMICROELECTRONICS -6,62%  
Unibail-Rfd Unibail -3,29%DOW JONES -0,13%  
NASDAQ 100 -0,58%  
FTSE 100 +0,57%Or +0,23%  
OAT 10 ans +1,13%  
Pétrole Brent +6,69%[Home](#) > Technos & Médias > Internet

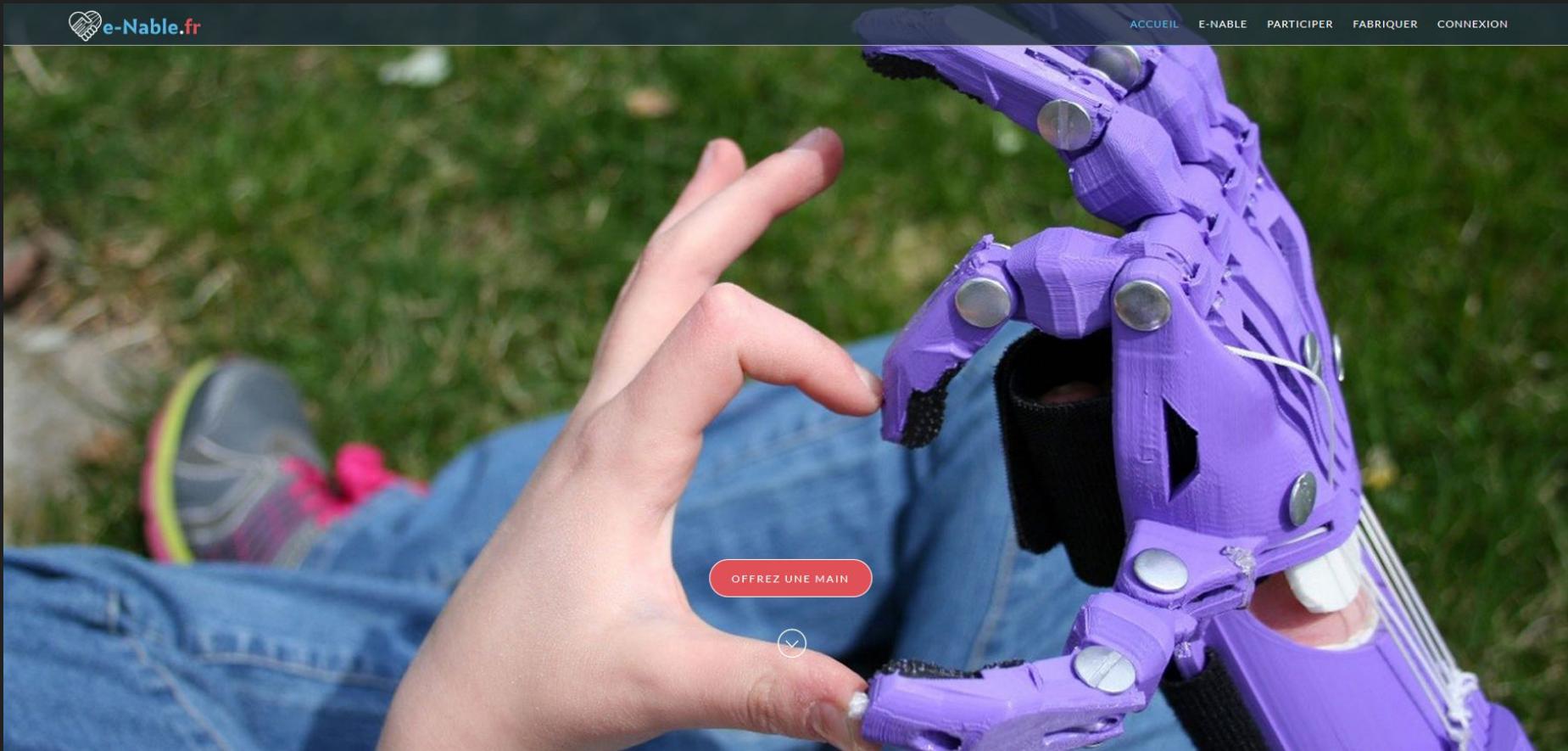
# Pourquoi le rachat de GitHub par Microsoft pour 7,5 milliards de dollars choque Internet

Par **Sylvain Rolland** | 05/06/2018, 7:00 | 746 mots



la communauté ?





OFFREZ UNE MAIN





Ia #FabAdd

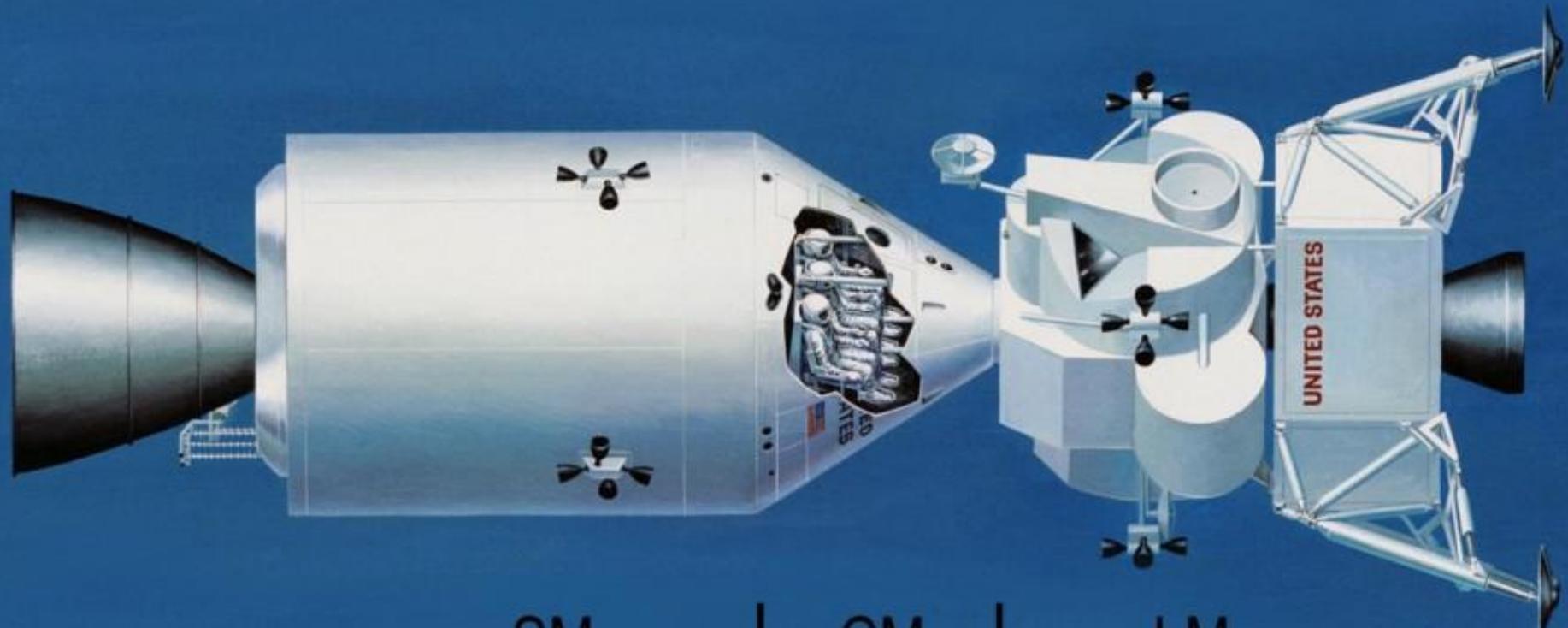
n'a que 30  
ans !

et si je peux vous donner  
une dernière leçon...



F HD



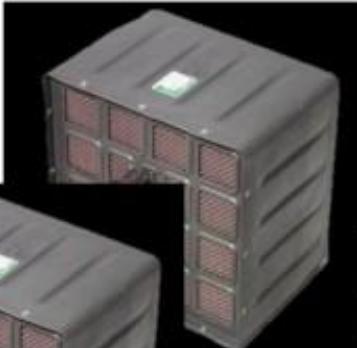


SM

CM

LM







“the contraption wasn’t very  
handsome, but it worked.”

jim lovell

Le bidule n’était pas très beau, mais il a fonctionné

# merci

Tatiana Reinhard

@iarn

lien pour télécharger la présentation :

[bit.ly/3dp-efap](https://bit.ly/3dp-efap)