April 2024. Technological snapshot.

3D printing in Catalonia

ACCIÓ Catalonia Trade & Investment

Generalitat de Catalunya
Government of Catalonia

CataloniaConnects

3D printing in Catalonia. Technological snapshot.

ACCIÓ
Government of Catalonia

Carried out by
Strategy and Competitive Intelligence Unit of ACCIÓ

Barcelona, April 2024

Contents

Executive summary: definition of 3D printing and key data

3D printing, also known as additive manufacturing, refers to a set of technologies that can create volumetric objects using digital models.

Featured categories

- *Material extrusion*
- *VAT photopolymerization*
- *Binder jetting*
- *Material jetting*
- *Powder bed fusion*
- *Sheet lamination*
- *Directed energy deposition*

Main applications

- Aerospace
- Energy
- Health
- Electronics
- Fashion
- Mobility
- Food
- Construction

Trends


Sustainability


Artificial intelligence


Bioprinting


Health


GVC resilience


4D printing

3D printing is **cross-industrial** in nature and feature both **flexibility** and the capacity to **personalize**. Moreover, it gives **added value** to the making of parts and can **streamline** the product design, development and manufacturing processes.

World Market

The 3D printing market is expected to be worth around 69.5 billion dollars by 2030.

The main applications of 3D printing are prototyping (66%) and end-use parts (21%). Polymers are most widely used, with an increase in the using of metals.

North America is the world leader in the 3D printing market due to its rapid adoption of the technology.

Europe is one of the major hubs for 3D printing technologies in the world. Germany has the largest market share in Europe.

The FDI in 3D printing has totaled 3.5 billion euros in the last 5 years, leading to the creation of over 15,000 jobs.

Executive summary: 3D printing in Catalonia

Segmentation of the **business value chain**

Technology providers

- Software
- Materials
- Manufacture of 3D printers
- Manufacture of parts
- Finished 3D parts

Service providers

- Makers, "fablab" and business model
- Engineering, consulting and certification
- Distribution services

156 companies along the value chain

32% more companies than in 2019.

Turnover totaling **€560 M** (**+72%**) and **2,092** jobs (**+58%**).

Companies include:

- Parts manufacturing (30.8%)
- Engineering, consulting and certification (13.5%)
- Distribution services (12.8%)
- Materials (10.9%)

Attractive for leading international 3D printing companies

2nd largest **foreign investment destination** in the **world** in the last five years

R&D excellence

4th largest region in terms of **Horizon Europe** funding

17 leading technological and research centers

Benchmarking Initiatives

XaRFA · IAM3DHUB · 3D INCUBATOR/ · think in3D MATARÓ · 3DML · 3DIGITAL MANUFACTURING LAB eurecat · DIH4CAT Digital Innovation Hub de Catalunya

Catalonia has a **powerful network** of technology centers, incubators, hospitals, companies and startups that innovate in the field of 3D printing applied to **health**.

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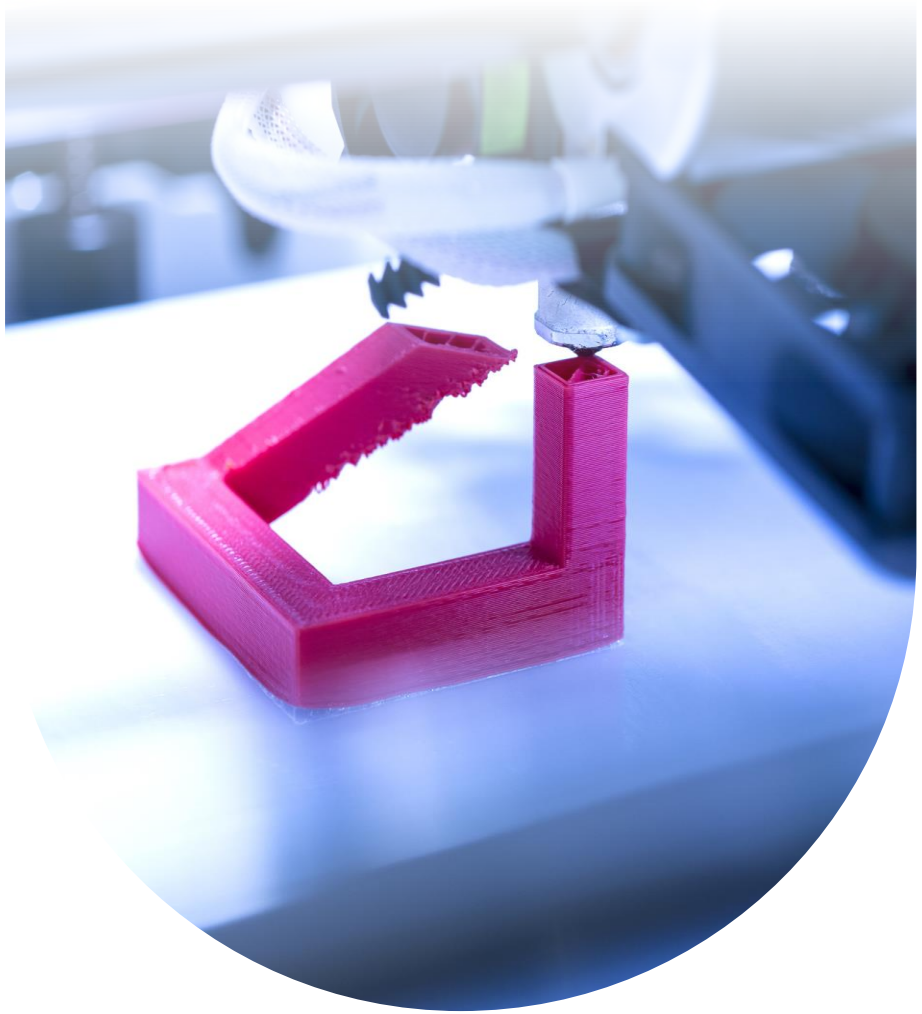
1. Definition and applications of 3D printing

Definition of 3D printing

3D printing, also known as additive manufacturing, refers to a set of technologies that can create volumetric objects using digital models.

Manufacturing is carried out with 3D printers which deposit the material, usually in layers, and consolidate it with different technologies until the end part is obtained.



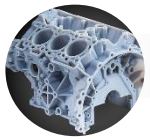
- There are seven **major 3D printing categories**:
  - *Material extrusion*
  - *VAT photopolymerisation*
  - *Binder jetting*
  - *Material jetting*
  - *Powder bed fusion*
  - *Sheet lamination*
  - *Directed energy deposition*
- Most widespread **use** of 3D printing:

Sources: 3D Hubs, GE Additive and Roland Berger

Applications of 3D printing

HEALTH

Dental implants
Pre-surgical models
Prostheses
Bioprinting
Medicines



INDUSTRY

Prototypes
Robotics
Components
Spare parts

FOOD

Chocolate
Confectionery
Printing of dishes using fresh food
Printing of ice cream

CONSTRUCTION

Precast concrete
Prefabricated infrastructures
Ceramic items with complex geometries
Prefabricated homes

FASHION

Bags
Bespoke glasses
Customized technical footwear
Dresses
Jewels

ENERGY

Prototypes and spare parts
Connectors
Solar panels
Components of wind turbines
Casings

AEROSPACE

Spare parts
Satellites
Rockets
Planes
Drones

ELECTRONICS

Electrical components and circuits
Conductive ink
Touch sensors
Electronic devices

MOBILITY

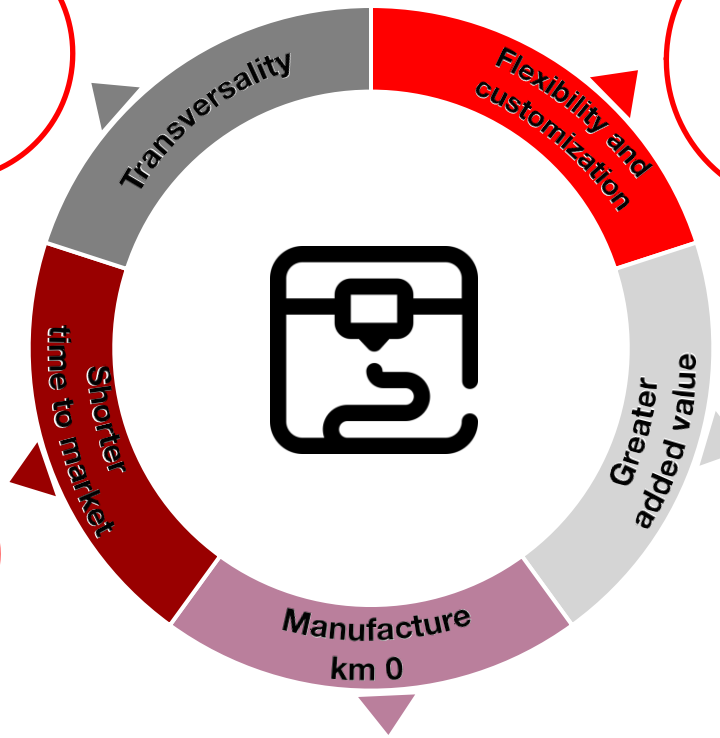
Prototypes and spare parts
Lightweight car parts
Customized parts
Racing cars and motorbikes

Sources: 3D Hubs, Stratasys and Formlabs

Importance of 3D printing in industry

This is a technology that can be applied to numerous fields, especially industry, either for end production or the manufacture of prototypes and tooling, but also to research, to conduct tests before looking for other means of production.

Both in terms of the size of the series and the materials used, or even the possibility of adjusting the manufacturing orders to handle design changes. It can meet the needs of the global trend of personalizing products in fields such as health and sport, in which it has acquired a clear competitive edge.



It can streamline the product's design and development process and the manufacturing. It is a highly attractive process for industrial sectors seeking to constantly innovate their products.

This technology can manufacture complex three-dimensional geometries that cannot be manufactured with other technologies and can reduce the number of parts in a set. It can also manufacture light structures and use special materials. It is therefore very important for an industry that wishes to manufacture more value-added parts.

The option of manufacturing short product runs that are highly adapted to the user provides for greater competitiveness in terms of quality, innovation and flexibility. The use of recycled materials, particularly plastics, is also important.

Source: ACCIÓ

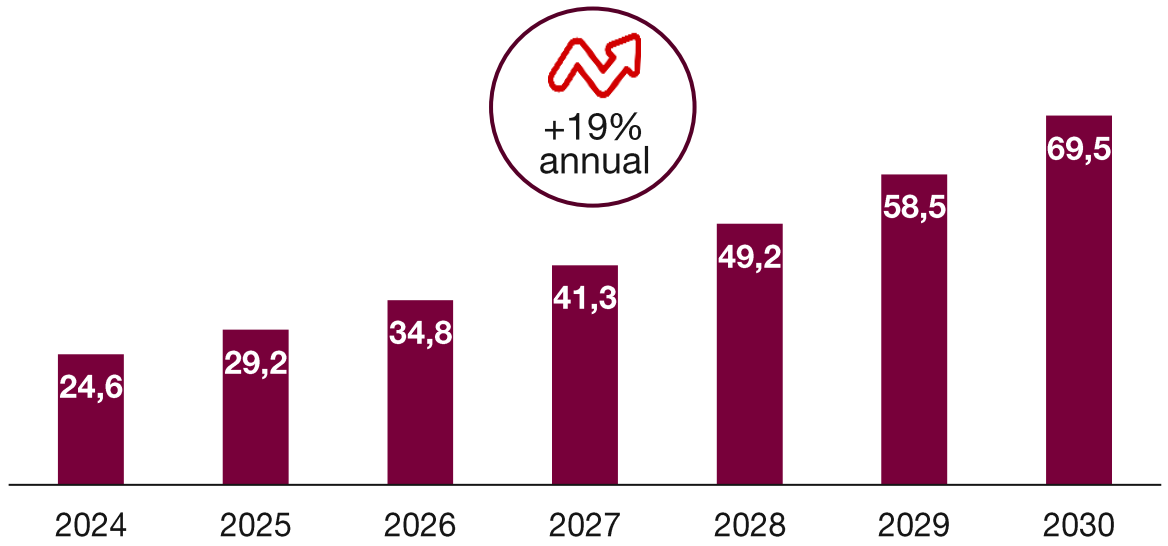
2. World 3D printing market

Global data and prospects for 3D printing

The growing contribution of 3D printing to the GDP will be determined by the technology's ability to streamline production and reduce dependence on international supply chains.

Size of the global 3D printing market

(billions of dollars)



With annual growth amounting to **19%**, 3D printing is expected to achieve a **69.5 billion dollar** market value by 2030.

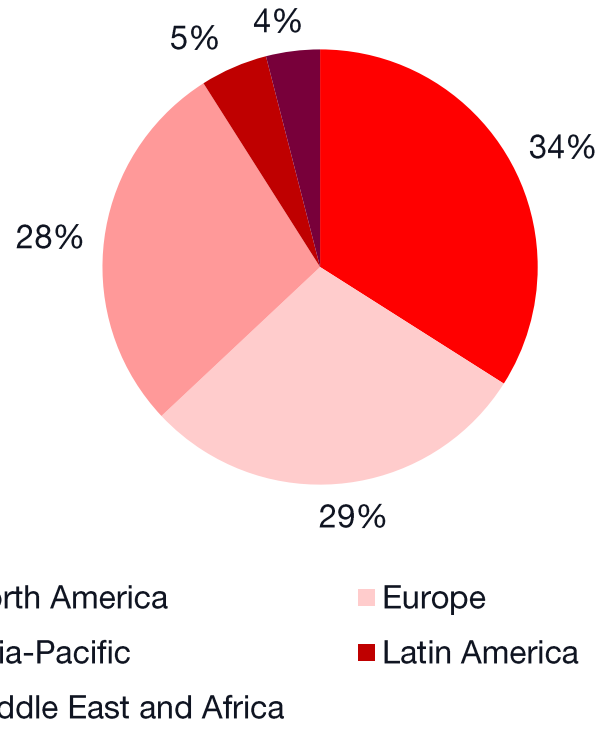
Polymer printing is the type with the largest market share, but the one expected to grow the most in the coming years is **metal printing**.

Sources: European Patent Office and Precedence Research

Global data and prospects for 3D printing by regions

North America is the world leader in the 3D printing market, chiefly due to its rapid adoption of the technology.

3D printing market volume, by regions (2022)



North America

Canada and the **United States** are the leaders and pioneers in innovations in different manufacturing processes. The two countries have established several national initiatives to promote research, technological development and the creation of startups.

Europe

Europe is undergoing rapid market growth and becoming one of the largest global hubs. **Germany**, with the largest market share in Europe, is home to the major innovative companies in this field. **France** has emerged in recent years and it excels in machinery and materials.

Asia-Pacific

China is becoming increasingly competitive in 3D printing technologies, while **India** is expanding thanks to its aerospace industry.

Sources: Precedence Research, Mordor Intelligence, Inkwood Research and Voxel Matters

Main global 3D printing hubs

Source: the authors, based on IN3DTEC, Voxel Matters and ACCIÓ

3. 3D printing trends

3D printing trends

Sustainability

3D printing delivers more **sustainable** production through the **reduction of waste**, enabling **local manufacturing** and the use of **recycled materials**. It also improves efficiency and contributes to the extension of the products' service life. The use of biodegradable materials reinforces global sustainability.

Bioprinting

Bioprinting has transformational potential to offer **new therapeutic and personalized options** in the field of **medicine**. The main applications are regenerative medicine, transplants and pharmaceutical, cosmetic and food products.

GVC resilience

The **disruptions** stemming from events such as COVID-19 and **rising protectionism** make 3D printing an alternative when it comes to **securing global value chains** (GVC) **in business**. At the same time, it makes a formidable ally for state **reindustrialization** policies.

Artificial intelligence

The convergence of 3D printing and AI is heralding a new era of **smart and efficient production**. It can minimize errors and optimize the 3D printing supply chain. Generative AI also facilitates the development of customized designs for 3D models.

Health

3D printing promises a **transformational impact** on the health sector. Its use extends to anatomical models, surgical guides, prostheses, implants and personalized medicines. It brings significant improvements to personalized treatments, patient care and the optimization of surgical interventions.

4D printing

4D printing can create **objects that change shape or properties** through the use of sensitive materials that react to external elements. It will extend to the fields of health, fashion, the automotive industry, aeronautics and packaging.

4. 3D printing in Catalonia

Business mapping of 3D printing in Catalonia

156 companies +32%*

€**560** million +72%*

2,092 jobs +58%*

84.6% are SMEs.

34.0% are less than 10 years old.

21.8% are startups.

50.0% invoice more than one million euros and **29.5%** invoice over 10 million euros.

46.2% are exporters.

The value chain features companies engaged in **parts manufacturing** (30.8%), **engineering, consulting and certification** (13.5%), **distribution services** (12.8%) and **materials** (10.9%).

*With respect to the mapping data obtained in 2019.

Source: ACCIÓ (2024 company data; turnover and number of employees in 2022)

Catalan companies in the 3D printing value chain

Technology providers

Software

Rhinoceros, SIEMENS, AUTODESK, alma, idneo, metrofort, captae, LABS3D, materialise, SHINING 3D, PRINT&GO, SCAN3D, ScanPhase, EDSER

Materials

DOW, BASF, We create chemistry, Ercros, Lubrizol, ELIX POLYMERS, ROVALMA, GST3D, mimetis, TRC, steelceram, ONYRIX, Dan*nip, redresins, ampere alloys, Air Liquide, HYPERION, NIPPON GASES

Manufacture of 3D printers

RICOH, hp, EPSON, BCN3D, Canon, RENISHAW, Roland, natural machines, S3D, Aridditive, DMG MORI, ARBURG, PowerDIW

Manufacture of parts

JABIL ALSTOM, CAD Projectes, S.L., Ineo, INNOMAQ, +GF+, PANTUR, Polifluor, AVINENT, Addwerk, Impress, EDSER, ADÆQUO, 3DHUB, odiseimusic, noumena, DIMA, IMES3D, FAE, S³Advanced, eceleni, WINDFORCE, 3D CLICK, 3DIGITAL FACTORY, spanatec, ADDITION, 3DC, Tailor Surgery, polyneo, liq, HOFMANN, GaltaRoja, ARRK, ALDORATECH, supernova, Sintered Metallic Components, igus, ROGASA, ESSENCE FOOD, MODELPAGES, Checkpoint, ADDiVAL, MMM Group, Prima Power, Gau3di

Finished 3D parts

GPAINNOVA, Abrast, AM SURFACE FINISHING, mks | Atotech, JOSEP MUNTAL, MECOS, DEFORMACIÓN DEL METAL, REINFORCE 3D, RÖSLER, finishing a better way ...

Service providers

Makers, "fablab" and business model

XIKELET, RMS, IDN, M( )B, FLUBETECH, NOVA MEAT, PodoTec3d, ASCIL BIOPHARM, BDN Lab, Tractivus, FAB LAB BCN, ultrasion, NICE TRAILS, ITARES INTERNATIONAL, Ball Head Technology

Engineering, consulting and certification

GIRBAU LAB, TR3SDLAND, CADTECH, MASTERTEC3D, INTEGRAL 3D PRINTING, sener, stratasys, INTECH3D, Applus+, SIOcast, Industrial Shields, drukatt, 3DU, EN TRESD, PROTO PENEDÈS, ADDITIVE SPACES, 3DSIX, DAMARD, SMART ENGINEERING, Archimedes, DPR AUTOMATISMOS, S.L.

Distribution services

intermaher, SOLIDPERFIL3D, STM PRINT - SCAN - IT - 3D, MAQUINSER, sedal CERAMICS, AsorCAD 3D Engineering & Metrology, CENTROTÈCNICA, EN TRESD, AGFA HealthCare, Join3d, SOLIDPERFIL3D, TRESDENOU, 3Dvisual, 3DZ, 3DSpider, XCELENCIAtech, SISTEMAS DIGITALES RICOH, COMHER, nexeo plastics, MAQ center

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Agents of the 3D printing ecosystem in Catalonia

Technology and Research Centers

AMADE Universitat de Girona · CIM UPC · CIT UPC Centre d'Innovació i Tecnologia · Centre de Disseny i Optimització de Processos i Materials · Parc Taulí Institut d'Investigació i Innovació I3PT · ICIQ · IMEM · IREC · SJD Sant Joan de Déu Institut de Recerca · CTM Centre Tecnològic · CIMNE · CPT · eurecat Technology Centre of Catalonia · IBEC · ICMAB · IQS Tech Transfer · LEITAT managing technologies

Universities and Training Centers

IQS Universitat Ramon Llull · UAB Universitat Autònoma de Barcelona · Universitat de Girona · Universitat Politècnica de Catalunya BarcelonaTech · Universitat Rovira i Virgili · ELISAVA Escola Superior de Disseny i Enginyeria de Barcelona · Institut Escola Industrial · ESDi Escola Superior de Disseny Universitat Ramon Llull · salesians Sarrià · TecnoCampus · Universitat de Barcelona · Universitat de Lleida · Universitat Ramon Llull · UVic Universitat de Vic Universitat Central de Catalunya · Institut Escola del Treball de Barcelona · Escola Massana Centre d'Art i Disseny · Iaac Institute for advanced architecture of Catalonia

Smart labs and accelerators

XaRFA · 3D INCUBATOR/ · think in3D Mataró · Healthcare Living Lab Catalonia · DIGIFACT · FAB LAB BCN · IAM3DHUB · DFACTORY Barcelona · 3DML 3Digital Manufacturing Lab eurecat · Ateneus de Fabricació · BDN Lab

Business associations and fairs

ciac Clúster de la Indústria d'Automoció de Catalunya · CataloniaBio & HealthTech Connecting companies · in-move · Enginyers Industrials de Catalunya · Advanced Factories Expo & Congress · graphispag 2024 · Mav · secpho · biocat · 4YFN · Barcelona Deep Tech Summit · Additiv Medical

Institutions and Public Administration

Generalitat de Catalunya · DIH4CAT Digital Innovation Hub de Catalunya · CERCA Centres de Recerca de Catalunya · Barcelona Activa · Fira Barcelona · ACCIÓ Catalonia Trade & Investment · Generalitat de Catalunya · tecnio Associació · Salut/ Institut Català de la Salut · ZF Consorci Barcelona Zona Franca

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Source: ACCIÓ

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Initiatives to promote 3D printing in Catalonia

XaRFA

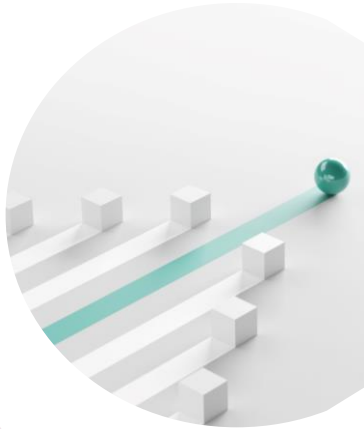
A network that brings together 28 research groups from 14 Catalan entities with the aim to streamline the transfer, valorization and internationalization of Catalan research into additive manufacturing.

IAM3DHUB

A digital innovation center specializing in additive manufacturing whose mission is to speed up its adoption in the EU industrial sector.

3D INCUBATOR/

An initiative whose aim is to promote the growth of innovative projects by creating a unique space for the incubation of companies and startups advocating 3D printing.



think in3D MATARÓ

An accelerator that seeks to promote the adoption of 3D printing as a vector of competitiveness and innovation through a distinctive environment.

3DML 3DIGITAL MANUFACTURING LAB eurecat Universitat de Girona

A collaborative space that seeks to promote knowledge transfer in 3D printing technologies, as well as the development of new technological solutions.

DIH4CAT Digital Innovation Hub de Catalunya

A connected network of assets, infrastructures and knowledge in Catalonia geared towards testing and experimenting with advanced digital technologies, including 3D printing.

The application of 3D printing to the health sector in Catalonia

Catalonia has a powerful network of **technological centers, incubators, hospitals, companies and startups** that innovate in health applications of the field of 3D printing.

1 Hospitals with specific units and laboratories

SJD Sant Joan de Déu Institut de Recerca

Parc Taulí Institut d'Investigació i Innovació I3PT

Salut/ Institut Català de la Salut

2 Technological centers working in RDI

CIM UPC Universitat Politècnica de Catalunya BarcelonaTech

eurecat Technology Centre of Catalonia

LEITAT managing technologies

3 Incubators and smart labs that encourage knowledge transfer

IAM3DHUB

think in3D Mataró

Healthcare Living Lab Catalonia

4 Companies and startups excelling with new business models

Tailor Surgery, hp, BCN3D, Impress, AVINENT, mimetis, Tractivus

Note: partial illustrative image

Relevant cases

In 2013 the Sant Joan de Déu Hospital planned an oncological surgical intervention with three-dimensional printing for a pediatric patient for the first time. Ten surgical specialties at the center currently use this type of technique.

The CIM-UPC provides services that include pre-surgical model-making and prosthetic printing, tissue 3D bioprinting and customized 3D printing machinery design and development and also works on the feasibility of specific new materials.

The IAM3DHUB specializes in the medical sector and excels in the creation of all kinds of anatomical models designed to facilitate surgery planning, reduce intervention times and improve post-operation results. It does so in partnership with the Parc Taulí Hospital.

Tailor Surgery, a spin-off of the I3PT (Parc Taulí Hospital), offers a comprehensive 3D digital surgery service for orthopedic surgical interventions and supplies specific instruments for each patient and fully customized implants.

Source: the authors

Foreign Direct Investment (FDI) in 3D printing in Catalonia

Catalonia was the **2nd largest destination for FDI in the world** and the **largest in southern Europe** in the 2019-2023 period, with investment totaling **87.5 million euros** and over **400 people employed** in **8 projects**.

Main FDI destination regions in the world, by projects (2019-2023)

	Region	Projects
1	Bavaria	11
2	Catalonia	8
3	Texas	8
4	Massachusetts	7
5	Baden-Württemberg	6

€87.5 M of invested capital.
423 jobs created.

- Catalonia, **3rd** most important European region in terms of invested capital (6.5%).
- Barcelona, the top European city in terms of 3D printing projects.

Agents investing in Catalonia (2019-2023)

ALSTOM · GST3D Global Solution Technology · hp · 3YOURMIND · SIEMENS · Fraunhofer

In 2023, **100%** of the investment in 3D printing projects in **Spain** was assigned to **Catalonia**.

Source: the authors, based on fDi Markets

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Technological hubs in Catalonia focused on 3D printing in 2023

140 technological hubs
of foreign companies

+11% compared with the previous year

5,200 new jobs

€500 M turnover

Hubs in Catalonia focused on 3D printing:

ALSTOM · AVINENT · BASF We create chemistry · FORWARD AM · Checkpoint · hp · IAM3DHUB · PEPSICO

United States
(with 28% of all hubs) the main source country for investment in these centers, followed by Germany (17%).

59% of hubs
come from companies in European countries.

3D printing (4%)
is one of the technological fields in which hubs are developing their services.

Sources: Mobile World Capital Barcelona and ACCIÓ

Catalan 3D printing research activities at Horizon Europe

Research into 3D printing in Catalonia within the framework of Horizon Europe

17 projects

9.1 million euros

3.4% of the European total
21.6% of the total in Spain

14 institutions

4th largest European region in terms of Horizon Europe funding

Horizon Europe

Note: includes Horizon Europe (2022-2023) projects related to 3D printing.

Source: Horizon Europe

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Catalonia, a dynamic 3D printing ecosystem

€560 M turnover

Local business ecosystem

156 3D printing companies, with **32%** growth

- Technological centers, incubators, hospitals, companies and startups that innovate in the field of health

A powerful network in the area of 3D printing applied to health

Attractive for leading international 3D printing companies

- **2nd largest** destination for foreign investment in the **world** in the last five years

R&D excellence

Initiatives that stimulate local 3D printing

XaRFA · IAM3DHUB · 3D INCUBATOR// · think in3D MATARÓ · 3DML 3DIGITAL MANUFACTURING LAB eurecat Universitat de Girona · DIH4CAT Digital Innovation Hub de Catalunya

4th largest region in terms of **Horizon Europe** funding

5. Success Stories in Catalonia

Success stories on Catalonia

Aridditive, the spin-off of the CIM-UPC seeking to revolutionize the construction sector with 3D printing

AsorCAD brings 3D scanning, engineering and metrology to the construction of a nuclear fusion reactor.

BCN 3D, a leader in 3D printing solutions, has created Supernova, specializing in VLM

HP is consolidating its 3D printing hub in Catalonia with the opening of a new innovation and design center

AldoraTech, the Catalan startup that creates drones using 3D printing for last-mile package deliveries

Stratasys is arriving in Barcelona to join the industry 4.0 ecosystem

A 3D laboratory enables the doctors at Tortosa Hospital to simulate complex surgeries

Ocean Ecostructures uses 3D printing for the construction of marine ecosystem regeneration structures based on an innovative biomaterial

Avinent proposes digitization and 3D printing in the health and dental implant sector

INTECH3D creates software which quadruples the speed of networked 3D printers

Acknowledgments of institutions

We would like to thank the following for the availability and provision of data and information for the drawing up of this technology report:

Aridditive

AsorCAD

BCN3D

Intech3D

CIM-UPC

Thinkin3D

XaRFA

Thank you!

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accio.gencat.cat
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@Catalonia_TI

linkedin.com/company/acciocat/
linkedin.com/company/invest-in-catalonia/

More information about the sector, news and opportunities:
https://catalonia.com/key-industries-technologies/technologies/3d-printing-in-catalonia

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