

# VT

PATENTES

# IMPRESIÓN 3D

9



OBJETIVOS  
DE DESARROLLO  
SOSTENIBLE



Vigilancia  
Tecnológica  
1<sup>er</sup> trimestre 2022

NIPO: 116-19-050-9

En este Boletín de Vigilancia Tecnológica se recogen, de manera trimestral, los avances acontecidos en el campo de la tecnología de Impresión 3D que se materializa en forma de solicitudes de patente en todo el mundo.

Aunque en los años 80 comenzaron a desarrollarse los primeros equipos y materiales sobre la tecnología de impresión 3D también denominada fabricación aditiva, no fue hasta 1986 cuando aparece en el mercado la primera impresora 3D comercial, patentada por Charles W. Hull, premiado por la Oficina Europea de Patentes

como inventor del año en 2014 en la categoría de inventores no europeos.

Cuando trataba de buscar un sistema para mejorar el proceso de realización de prototipos de pequeñas piezas de plástico que utilizaba para testar nuevos diseños de productos, desarrolló una máquina de impresión 3D que conseguía realizar en pocos minutos procesos que por aquel entonces llevaban semanas.

## Contenido



PROCESOS



MATERIALES



DISPOSITIVOS



PRODUCTOS



PROCESAMIENTO  
DE DATOS

Desde entonces, la tecnología no ha parado de evolucionar, especialmente en los últimos años, alcanzándose a partir de 2017 un verdadero auge, cuando se incorpora la automatización utilizando software de inteligencia artificial que permite industrializar la fabricación aditiva y multiplicar la capacidad de los sistemas.

En los últimos años de evolución de la impresión 3D hemos visto pasar del desarrollo conjunto de nuevas tecnologías y materiales innovadores aplicados principalmente a la creación de prototipos y diseños personalizados, a la consecución de productos casi impensables hace tan solo una década. Gracias a esta increíble tecnología hemos visto imprimir, órganos, coches e incluso edificios.

Desde la Oficina Española de Patentes y Marcas, y en cumplimiento de su doble objetivo de proteger y fomentar la innovación tecnológica en nuestro país, así como de divulgar la información técnica que contienen las patentes a través de sus servicios de Información Tecnológica, se realiza este nuevo Boletín de Vigilancia Tecnológica, que se suma a los dieciséis *Boletines VT* que venimos publicando desde el año 2000 con periodicidad

trimestral. Nuestro objetivo es dar a conocer las nuevas solicitudes de patentes que se publican a nivel mundial relacionadas con la tecnología de impresión 3D.

En este Boletín, se incluye una selección de las solicitudes de patentes publicadas a nivel mundial durante el primer trimestre de 2022, distribuidas en cinco apartados: procesos, materiales, dispositivos, productos y procesamiento de datos.

Para cada patente se incluye su número de publicación, con un enlace que permite la consulta del documento completo, el solicitante, el país de origen y su título.

Esperamos que la información aportada en este Boletín de Vigilancia Tecnológica, sirva para identificar tendencias tecnológicas y sus actores, así como para contribuir a la utilización del conocimiento contenido en los documentos de patente como punto de partida para emprender nuevas actividades de investigación y desarrollo. Para suscribirse a este Boletín basta con cumplimentar este *formulario de suscripción*.

# Procesos



Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
ES2890303	UNIVERSIDAD DE LEÓN [ES]	Procedimiento para la mejora de las propiedades de piezas conformadas de yeso
KR20220029801	3D KOREA CO LTD	3D printing method of a dummy for simulation with skeletons similar to the skeleton human body
US2022016828	STRATASYS INC [US]	Method for printing three-dimensional parts with crystallization kinetics control
CN113580560	PANZHUIHUA 3D TECH CO LTD	Manufacturing method of 3D printing customized metacarpophalangeal joint intelligent rehabilitation training device
CN113821848	UNIV WUHAN SCIENCE & TECH	Isoparametric transformation mixed structure of bionic bone scaffold and 3D printing method thereof
EP3950274	BOSCH GMBH ROBERT [DE]	Method for producing an energy converter housing
CN113844024	UNIV ZHEJIANG	4D-printing-based self-assembly intelligent structure and preparation method and assembly method thereof
WO2022028874	SIGNIFY HOLDING BV [NL]	Mechanically stable core-shell fdm prints containing porous core
CN113580576	ZHEJIANG PROVINCIAL PEOPLES HOSPITAL	3D printing simple liver model for preoperative planning and intraoperative navigation and manufacturing method
US2021402678	UNIV CALIFORNIA [US]	High-fidelity 3D printing using flashing photopolymerization
WO2022011456	HABIBI MOHSEN [CA]; PACKIRISAMY MUTHUKUMARAN [CA]; FOROUGH SHERVIN [CA]	Ultra active micro-reactor based additive manufacturing
WO2022004405	OTSUKA CHEMICAL CO LTD [JP]	Modeled object and method for producing same
WO2022017821	SIGNIFY HOLDING BV [NL]	Method for including voids in polymer filaments for fdm printing
US2021394434	UNIV CENTRAL FLORIDA RES FOUND INC [US]	Method of forming high-throughput 3D printed microelectrode array
DE102020117248	GUDEMO GMBH [DE]	Method for producing three-dimensional molded unit
CN113752587	SAIC VOLKSWAGEN AUTOMOTIVE CO LTD	Method for manufacturing air outlet of automobile air conditioner
US2022072771	CONTINUOUS COMPOSITES INC [US]	Method and apparatus for continuous composite three-dimensional printing
CN113829623	SHENZHEN PULINGMU TECH CO LTD	Printing method and device capable of controlling interbody fusion cage thin-wall part
CN113478813	UNIV SHANGHAI; WUYI STING3D TECH CO LTD	Reactive monomer in-situ polymerization 3D printing method and reactive monomer in-situ polymerization 3D printing device
US2021323226	PARRIS GEORGE EDWARD [US]	Methods and Materials for Creating Three-Dimensional Objects within a Fluidized Bed

Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
EP3960454	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing with polyolefin and metal oxide build materials
US2021340341	AIRTECH INT INC [US]	Polymer compositions for extrusion and additive manufacturing processes
WO2021262927	GEN ELECTRIC [US]; HAYDEN PAUL TREVOR [DK]	Method for manufacturing a composite structure and composite structure
WO2021224816	DE MARCO CARMELA [CH]	High resolution 3D printing process of complex structures
CN114101688	XIAN SPACEFLIGHT ENGINE CO LTD	A kind of preparation method of stainless steel component
EP3961557	SIEMENS AG [DE]	Quality inspection method and assembly for quality inspection
US2021320572	GEN ELECTRIC [US]	Additive manufacturing for segmented electric machines
GB2595976	HONDA MOTOR CO LTD [JP]	Iron alloy manufacturing method
WO2022047385	THE COOPER GROUP LLC [US]; COOPER BRIAN M [US]	Historically accurate simulated divided light glass unit and methods of making the same
WO2022013215	OSRAM OPTO SEMICONDUCTORS GMBH [DE]	Method for producing a component, and optoelectronic component
DE102020119013	HUETTENES ALBERTUS CHEMISCHE WERKE GMBH [DE]	Manufacture of article providing binder system containing particulate amorphous silica
EP3925718	FERRARI SPA [IT]	Method for the production of a cylinder head for an internal combustion engine
DE102020116037	SAUER GMBH [DE]	Method for producing component with cooling channel

VOLVER A  
CONTENIDO



Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
ES2899333	UNIVERSIDAD DE CANTABRIA [ES]	Morteros de conchas marinas trituradas para impresión en 3D
WO2022019876	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing
WO2022010417	UNIV SINGAPORE TECHNOLOGY & DESIGN [SG]	3D printing of milk-based product
WO2021262172	HEWLETT PACKARD DEVELOPMENT CO [US]	Shear thinning build material slurry
WO2022053890	3M INNOVATIVE PROPERTIES CO [US]	Investment casting compositions and methods
US11235514	UNIV UNITED ARAB EMIRATES [AE]	High flexible sandwich panel made of glass fibre reinforced nylon with super elastic rubber core using fused filament fabrication (FFF)
US2022033554	CANON KK [JP]	Photocurable resin composition
EP3960426	XEROX CORP [US]	Polymer filaments comprising an aqueous-soluble imide polymer and use thereof as a sacrificial printing material in additive manufacturing
US2022033998	US ARMY RES LABORATORY ATTN RDRL LOC I [US]	Multi-material polymer filament for three-dimensional printing
EP3945100	RICOH CO LTD [JP]	Composition for hydrogel solid freeform fabrication, method of fabricating hydrogel solid freeform fabrication object, and set
CN113563627	SHENZHEN ESUN IND CO LTD; XIAOGAN ESUN NEW MAT CO LTD	Controllable light-weight foaming material for FDM printing as well as preparation method and application thereof
JP2022000534	GENERAL ELECTRIC CO	Additional manufacturing of water-based binders and parts
WO2022009880	MITSUI CHEMICALS INC [JP]	Photocurable composition, three-dimensional shaped article, and dental product
CN113493603	UNIV BEIJING CHEM TECH; SHANDONG LINGLONG TYRE CO LTD	Heat-resistant polyurethane material for 3D printing as well as preparation method and printing method of heat-resistant polyurethane material
KR20210128785	UNIV SOGANG RES & BUSINESS DEVELOPMENT FOUND [KR]	Bio ink composition for manufacturing cartilage mimetic and method for manufacturing cartilage mimetic using the same
WO2021247137	PPG IND OHIO INC [US]	Additive manufacturing compositions and methods including resin stabilized pigments
WO2022019882	HEWLETT PACKARD DEVELOPMENT CO [US]	Three-dimensional printing with wetting agent
CN113523307	NANJING CHAMLION LASER TECH CO LTD	Special metal 3D printer for dentistry
EP3912816	DAIDO STEEL CO LTD [JP]	Metal powder
WO2022049716	MITSUBISHI POWER LTD [JP]	Cobalt-based alloy material and cobalt-based alloy product

Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
WO2022045090	MITSUBISHI CHEM CORP [JP]	Support material for laminated molding, and methods for manufacturing laminated molded object and three-dimensional structure using same
CN113976659	UNIV SHANGHAI ENG & TECHNOLOGY	Material for a method for manufacturing metal pipes based on field-assisted additive manufacturing
EP3915786	GEN ELECTRIC [US]	Water-based binder solutions for use in additive manufacturing processes

VOLVER A  
CONTENIDO

# Dispositivos



Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
DE202021106791	LEIBNIZ INST FUER FESTKOERPER UND WERKSTOFFFORSCHUNG DRESDEN E V IFW DRESDEN E V [DE]	Powder reservoir useful in device fo additive manufacturing of components
WO2022036301	3D SYSTEMS INC [US]	Three dimensional printing system that minimizes use of metal powder
GB2596816	LPW TECHNOLOGY LTD [GB]	Arrangements for blanking a coupling member
WO2022025867	SIEMENS ENERGY INC [US]	Method of and apparatus using a split wiper for the reparation of objects protruding above a powder bed
DE102020115420	TRUMPF LASER & SYSTEMTECHNIK GMBH [DE]	Suction channel in generative manufacturing
KR102347543	TAE SUNG SOFTWARE & ENG INC [KR]	3D method for manufacturing waveguide apparatus according to 3D printing additive scheme
US2021402480	VULCANFORMS INC [US]	Plate mounting in additive manufacturing
JP6974894	MATSUURA KIKAI SEISAKUSHO [JP]	Three dimensional shapping apparatus for forming sintered surface by irradiation of laser beam or electron beam
DE102020115414	TRUMPF LASER & SYSTEMTECHNIK GMBH [DE]	Manufacturing device with large-area lowering gas flow
US2021362419	FORMLABA INC [US]; FORMLABS INC [US]	Techniques for powder delivery in additive fabrication and related systems and methods
WO2021229308	IO TECH GROUP LTD [GB]	System and methods for negative 3D printing machine at high resolutions
FR3111286	SAFRAN [FR]	Additive manufacturing machine with gas flow system
EP3922439	TOREM LABS [CA]	Tooling system with a system tool displaceable along a closed path
WO2022047133	ESSENTIUM INC [US]	Nozzle for producing extrusion trhee dimensional printed materials
KR102372002	KOREA CARBON IND PROMOTION AGENCY [KR]	3D Fiber reinforced material extrusion nozzle device for 3D printer
WO2022045917	OBSHESTVO S OGRANICHENNOJ OTVETSTVENNOSTYU ADDITIV PRODAKSHN GRUPP [RU]	Printing head for 3D printing with multiple materials
US2016318247	WARSAW ORTHOPEDIC INC [US]	3D printing devices and methods
WO2018218060	TDBT IP INC [US]	Aspect printer system including dual-arm mechanism
DE102020122449	ZEISS CARL AG [DE]	Device and method for generating images of a light source array
EP3957480A1;	SIEMENS AG [DE]	Assembly for material extrusion for the additive manufacturing of a three-dimensional object
US2022018071	HEWLETT PACKARD DEVELOPMENT CO [US]	3D printed articles for use in pulp molding die

Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
US2019105833	ADVANCED SOLUTIONS LIFE SCIENCES LLC [US]	Methods and systems for 3D printing with a 3D printing platform including printing tool coupling components
US2021362415	MEDICO SUPPLIES INC [CA]	Apparatus, system and method for creating prosthetics
US2022032002	MEDTRONIC INC [US]	System and methods for manufacturing 3D printed medical devices
US2018311899	DESKTOP METAL INC [US]	Rod feeder for three-dimensional (3D) printing
US2021370599	RAYTHEON CO [US]	Heating fixtures for 5-axis printing
FR3111839	SAFRAN HELICOPTER ENGINES [FR]; SAFRAN TRANS SYSTEMS [FR]	Circular modular tray for the additive manufacturing of a part with an axis of revolution on a powder bed
US2020108562	UNITED TECHNOLOGIES CORP [US]; RAYTHEON TECH CORP [US]	Kinetic disassembly of support structure system for additively manufactured rotating components
EP3950276	OSSBERGER GMBH CO KG [DE]	Funnel-shaped conveyor device and a conveyor-separating method for a component particle material mixture
WO2022013646	REDAELLI PAOLO [IT]	Method for the treatment of cake resulting from additive manufacturing processes
WO2022018197	ABB SWITZERLAND LTD [CH]	Method for removal of support structures of additive manufactured components by pressurized jet
DE102020117457	BAYERISCHE MOTOREN WERKE AG [DE]	Device for depowdering additively manufactured component

VOLVER A  
CONTENIDO



# Productos



Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
US2022018071	HEWLETT PACKARD DEVELOPMENT CO [US]	3D printed articles for use in pulp molding die
CN113576053	SHENZHEN CHANGNENG HUIKE TECH CO LTD	Molding method of atomizing core with multifunctional areas
CN113519979	UNIV JIANGNAN; SUZHOU BUTAI TECH CO LTD	3D printing functional insole for monitoring epilepsy and preparation method thereof
US2021379884	HOWMEDICA OSTEONICS CORP [US]	Laser-produced porous surface
CN113796592	UNIV TIANJIN POLYTECHNIC	Fully-molded breathable bra liner and preparation method thereof
EP3971347	HEWLETT PACKARD DEVELOPMENT CO [US]	Addition of features to screens for forming wet parts with details
WO2022047263	GOOD MEAT INC [US]	Extrudate food compositions comprising cultivated animal cells and methods of production thereof
WO2022044930	NORITAKE CO LTD [JP]	Laminate molding fired body and method for manufacturing said laminate molding fired body
CN215703301	QUANZHOU FUNGYANG PRECISION MOULD CO LTD	A metal shoe mold with adjustable sole thickness based on 3D printing
CN215864967	CHINA FAW CO LTD	A vehicle door sealing strip inspection tool
US2022055111	APPLE INC [US]	Additive manufacturing methods for components
CN113635640	UNIV SICHUAN AGRICULTURAL	Anticorrosion label based on 4d printing
CN113714513	SHANGHAI AEROSPACE EQUIPMENTS MFT CO LTD	Spacecraft spherical storage box manufacturing method based on laser near-net forming technology
CN113857480	UNIV KUNMING SCIENCE & TECH	Functionally graded material gear
CN113931518	SHENZHEN HUIQING TECHNOLOGY CO LTD	A 3D printing construction enclosure and its manufacturing method
DE102020121547	INNOSPIRE TECH GMBH [DE]	Additive manufacturing component with monolithic filter module
WO2022001000	GUANGZHOU HEYGEARS IMC INC [CN]	Dental instrument production method, system, and apparatus, and medium
US2021316528	HELICOID IND INC [US]	Shock and impact resistant structures

VOLVER A  
CONTENIDO

# Procesamiento de Datos



Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
EP3970886	GEN ELECTRIC [US]; CONCEPT LASER GMBH [DE]	Controlling irradiation parameters of an additive manufacturing machine
KR20220029801	3D KOREA CO LTD [KR]	3D printing method of a dummy for simulation with skeletons similar to the skeleton human body
WO2022025932	HEWLETT PACKARD DEVELOPMENT CO [US]	Part enhancement sections for 3D parts
US2022024138	SEIKO EPSON CORP [JP]	Three-dimensional shaping device
WO2022045170	MUTOH IND LTD [JP]	Raster image conversion device, program and printing system
DE102020210054	VOLKSWAGEN AG [DE]	Method and apparatus for an additive manufacture process
WO2022048636	IBM [US]; IBM CHINA CO LTD [CN]	Movement sequence analysis utilizing printed circuits
EP3961557	SIEMENS AG [DE]	Quality inspection method and assembly for quality inspection
US11072125	INKBIT LLC [US]	Reflective coating for material calibration
WO2022046073	HEWLETT PACKARD DEVELOPMENT CO [US]	Real-time anomaly detection in three dimensional printers
KR102353500	KOREA ELECTRONICS TECHNOLOGY [KR]	3D print slicing method for resolving tolerance error
US11226195	US GOV AIR FORCE [US]; UNITED STATES OF AMERICA REPRESENTED BY THE SECRETARY OF THE AIR FORCE [US]	Method and system for measuring strain in a 3D printed part
DE102020121471	FRAUNHOFER GES FORSCHUNG [DE]	Method and system for additive manufacturing and object characterization
KR102357983	SCOOP CO LTD [KR]	3D apparatus and methos of preprocessing data for format transforming 3D design mesh data
US2020070414	INTERFACE INC [US]	Digital printing for flooring and decorative structures
WO2022025886	HEWLETT PACKARD DEVELOPMENT CO [US]	Thermal image determination
WO2022018382	ADDUP [FR]	Method for detecting defectas in an additive manufacturing powder layer deposited on a working area
WO2022015657	L LIVERMORE NAT SECURITY LLC [US]; TAYLOR HAYDEN [US]; LI CHI CHUNG [US]; RONGEY TREVOR JR [US]; LUK SUI MAN [US]; FU HETING [US]; FEILI SAMIRA [US]; TOOMBS JOSEPH [US]; HEIDARI HOSSEIN [US]	Computed axial lithography optimization systema
US2021354378	CARBON INC [US]	Apparatus and methods for controlled validation of additive manufacturing systems

Nº PUBLICACIÓN	SOLICITANTE Y PAÍS DE ORIGEN	CONTENIDO TÉCNICO
<a href="#">KR102343272</a>	HYUNDAI ENG & CONSTRUCT CO LTD [KR]; 3D FACTORY CO LTD [KR]	3D manufacturing method of free form landscape architecture structure using 3D printing and free form bench manufactured thereby
<a href="#">US2018297113</a>	DESKTOP METAL INC [US]	Calibration of 3D printer via computer vision
<a href="#">JP2021186999</a>	SEIKO EPSON CORP [JP]	Method for 3D generation product involving generating layer data by logical sum of first data and second data
<a href="#">KR102350267</a>	KUMOH NAT INST TECHNOLOGY IND ACAD COOP FOUND [KR]	3D Mannequin split 3D printing method
<a href="#">US2021402707</a>	KPN INNOVATIONS LLC [US]	Mehods and systems for additive manufacturing of nutritional supplement servings
<a href="#">US2022009173</a>	IBM [US]	Additive manufacturing by light-emitting micro devices in phosensiive material
<a href="#">KR20210129381</a>	SCOOP CO LTD [KR]	3D System for providing 3D model design data platform service and method thereof

VOLVER A  
CONTENIDO

