

VT

PATENTES

IMPRESIÓN 3D

4



Vigilancia
Tecnológica
4º trimestre 2020

NIPO: 116-19-050-9

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



PRODUCTOS



DISPOSITIVOS



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 estos momentos, en que la pandemia del corona virus SARS-CoV-2 azota a la población mundial, la impresión 3D se ha puesto de gran actualidad. La necesidad de fabricar de forma urgente respiradores o material de protección personal ha despertado el interés por la utilización de esta tecnología, surgiendo así multitud de iniciativas públicas y privadas.

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. Por este motivo, incluimos en este boletín un nuevo apartado dedicado a los Productos, con objeto de ilustrar el resultado de esta gran transformación en la fabricación que nos ofrece la impresión 3D.

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 cuarto trimestre de 2020, 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](#).

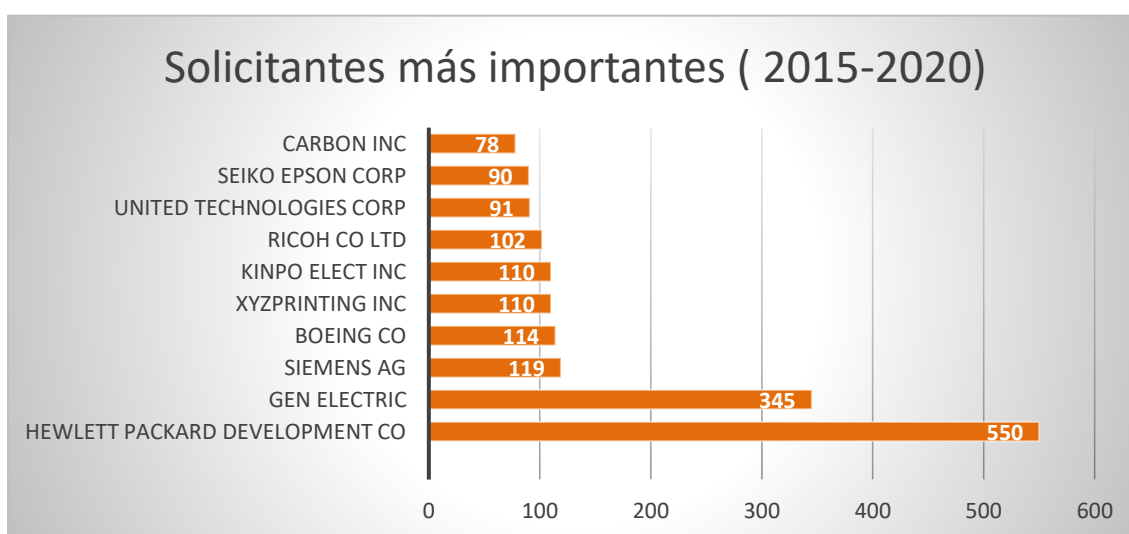
ANÁLISIS ESTADÍSTICO DE LAS SOLICITUDES DE PATENTE PUBLICADAS EN LOS ÚLTIMOS 5 AÑOS

Se ha realizado un estudio estadístico con el fin de analizar la evolución de la tecnología de Impresión 3D, utilizando las patentes como indicador. Se han considerado las solicitudes de patentes publicadas en el periodo 2015-2020, para mostrar su evolución temporal, los solicitantes de patentes más activos, así como aquellos países donde se protege la tecnología en origen. La herramienta empleada ha sido Global Patent Index (GPI) de la Oficina Europea de Patentes. Se han recuperado un total de 36559 familias de patentes, que corresponden a 85.336 documentos de patentes.

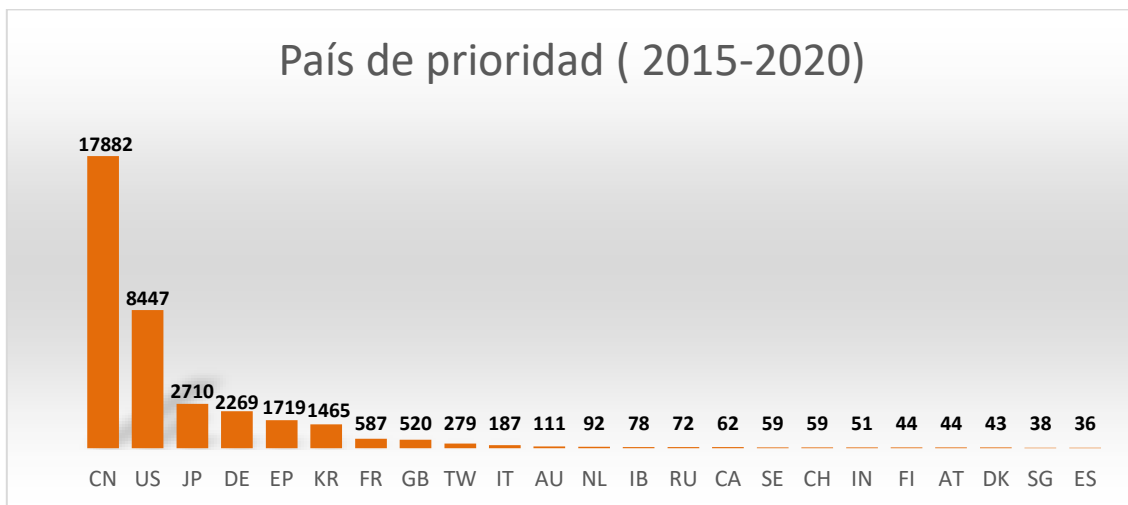
En la siguiente gráfica, se muestra la evolución del número de solicitudes del sector en los últimos 5 años. Se observa que la tendencia sigue en aumento con 9.110 solicitudes de patentes en 2020.



En la siguiente gráfica, se recogen los 10 solicitantes con mayor número de patentes protegidas en la tecnología de impresión 3D. Destaca la empresa americana HEWLETT PACKARD como líder indiscutible en el sector.



En la tercera gráfica se observan los países origen de la tecnología, donde se protegen las solicitudes prioritarias. China aparece en primer lugar, seguida de Estados Unidos. España se encuentra en el puesto número 23, con 36 patentes publicadas.



La última gráfica ilustra la evolución temporal entre 2015 y 2020 de solicitudes de patentes publicadas sobre la tecnología de Impresión 3D por parte de los solicitantes más destacados. En líneas generales se observa una progresión ascendente en todos ellos.





Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
US2020353685	INTREPID AUTOMATION [US]	Multiple image projection system for additive manufacturing
CN111688180	KOCEL INTELLIGENT FOUNDRY IND INNOVATION CT CO LTD [CN]	3D printing method, printer, system, and storage medium
CN111633977A	JIANGSU DAQI CHANGXIANG INFORMATION TECH CO LTD [CN]	Method for realizing color structures through monochrome 3D printing
CN111761814A	CHINA ELECTRONIC SCI & TECH GROUP 54 INS; DONGGUAN MAYI 3D TECHNOLOGY CO LTD [CN]	Method for manufacturing electromagnetic wave device by 3D printing and 3D printer
WO2020210433	UNIV BRIGHAM YOUNG [US]	Systems and methods for printing a three-dimensional object
US2020324468	CONTINUOUS COMPOSITES INC [US]	Method and apparatus for continuous composite three-dimensional printing
US2020316865	HOLO INC [US]	Methods and systems for stereolithography three-dimensional printing
CN111660558	YANTAI MAGIE NANO TECH CO LTD	Method for preparing nanometer microneedle template by laser direct writing
WO2020212564	MATHEA HANS [DE]	Method for producing at least one solid body layer on a substrate which is rotatable about an axis of rotation
CN111761817	UNIV SOOCHOW [CN]	Large-format 3D printing method and device based on DLP
CN111745959	BEIJING JINDALEI TECHNOLOGY CO LTD [CN]	3D printing method and 3D printing equipment
WO2020206283	OHIO STATE INNOVATION FOUNDATION [US]	Additive manufacturing methods utilizing a robotic arm
DE102019107664	APS AUTOMATISIERTE PRODUKTIONS SYSTEME GES M B H [AT]	Process and device for the additive manufacturing of high-strength components
DE102019204583	BOSCH GMBH ROBERT [DE]	Method and device for the additive manufacturing of a three-dimensional workpiece from a melt
WO2020188648	NIKON CORP [JP]	Modeling method, modeling system, and modeling base
US2020290273	L LIVERMORE NAT SECURITY LLC [US]	Optically enhanced patternable photosensitivity via oxygen excitation
WO2020225499	SAFRAN [FR]	Method for manufacturing a power electronic module

Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
AU2020102205	ARAFAT I SHEIK DR [IN] AWASTHI SHUBHAM MR [IN] BOLLU MANAS SAI MR [IN] DEKATE HIREN MADHUKAR DR [IN] KHASIM SYED DR [IN] MAMIDALA KISHORE KUMAR MR [IN] R KAVIN MR [IN] S DINESH KUMAR DR [IN] S VELMURUGAN DR [IN] V SRINIVAS VISWANATH DR [IN]	3D printing and additive manufacturing process for rapid manufacturing of customized bio implants
WO2020217822	MICRO AMS INC [JP]	Resin molding method
EP3722027	SLM SOLUTIONS GROUP AG [DE]	Method and apparatus for generating a work piece containing an information code
US2020316856	ALIGN TECHNOLOGY INC [US]	3D printed objects with selective overcure regions
EP3714836	BIOMET 3I LLC [US]	Optimized library solution for dental implants
US2020330233	HD LIFESCIENCES LLC [US]	Methods of designing three-dimensional lattice structures for implants

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Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
ES2786098	UNIVERSIDAD DE CÁDIZ [ES]	Material termoplástico de base ABS para impresión 3D mediante extrusión de filamentos y grana fundida
ES1256211	ENRIQUE OÑATE MOLINA; PEDRO MARIA ALONSO PÉREZ [ES]	Filamento con capacidad virucida y antibacteriana para impresoras tridimensionales
ES2797001	UNIVERSITAT D'ALACANT [ES]	Catalizador heterogéneo con soporte polimérico
CN111823569	UNIV FUDAN HUASHAN HOSPITAL [CN]	Biological scaffold based on silk fibroin 3D printing and preparation method and application thereof
WO2020198490	L LIVERMORE NAT SECURITY LLC [US] LENHARDT JEREMY [US]	Three-dimensional porous siloxanes using leachable porogen particles
JP2020180171	NIPPON ELECTRIC GLASS CO [JP]	Method for manufacturing resin composition, cured resin, and three-dimensional model
WO2020217929	TORAY INDUSTRIES [JP]	Fiber-reinforced thermoplastic resin filament for 3D printer, and molded article thereof
CN111775443	HUARONG PRINTING BEIJING TECHNOLOGY CO [CN]	High-density ABS material FDM molding process
JP2020175510	ISHIKAWA KEN; MARUKOSHI KOGYO KK; NIPPON DAIYAKOMU KOGYO KK	Modeling materials containing diatomaceous earth and diatomaceous earth products
WO2020213606	CANON KK [JP]	Stereolithographic resin composition, and 3D-printed article
WO2020205212	CARBON INC [US]	Dual cure resin for the production of moisture-resistant articles by additive manufacturing
WO2020209105	CANON KK [JP]	Photocurable resin composition for three-dimensional modeling and method for producing article
US2020315975	L LIVERMORE NAT SECURITY LLC [US]	Three-dimensional printed structural siloxanes having controlled drug release
EP3719158	DEUTSCHE EDELSTAHLWERKE SPECIALTY STEEL GMBH & CO KG [DE]	Use of a steel powder, method for producing a steel component and component produced by means of additive production
EP3718743	UPM KYMMENE CORP [FI]	A method for manufacturing composite material having self-supporting capability in a melt state that is suitable for fused granulate fabrication and a product thereof

Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
WO2020196753	DENKA COMPANY LTD [JP]	Photocurable composition for three-dimensional molding, three-dimensional molded product, and method for producing three-dimensional molded product
WO2020196839	MITSUBISHI CHEM CORP [JP]	Filament for 3d modeling, roll, and cartridge for 3D printer
WO2020196578	FURUYA METAL CO LTD [JP]	Method of producing solid spherical powder, and method of producing shaped product
AU2020101724	A G GANESH KUMAR DR [IN] A SAMPATHKUMAR DR [IN] G BALAMURUGA MOHAN RAJ DR [IN] J JOSHUA GNANA SEKARAN DR [IN] K G THIRUGNANASAMBANTHAM DR [IN] K SUTHERSHAN MR [IN] KESAVA REDDY MEDAGAM MR [IN] KOTI HALESH DR [IN] PREMKUMAR BOTIKA MR [IN] R KEERTHI VAASAN MR [IN] R MAHESWAR DR [IN] T SANKARAMOORTHY MR [IN]	A reinforced abs composite material of spider silk and aramid fiber along with graphene for fabrication of unmanned aerial vehicles
DE102019111236	VOESTALPINE BOEHLER EDELSTAHL GMBH & CO KG [AT]	Steel material in powder form and process for producing said steel material
WO2020215047	UNIV JOHNS HOPKINS [US]	Fluoropolymer shear-thinning inks and methods of making and using same

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Dispositivos



Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
WO2020219075	HEWLETT PACKARD DEVELOPMENT CO [US]	3D printing with focused microwave energy field
CN111761812	UNIV XIAN JIAOTONG [CN]	3D printing system for multi-dimensional cavity absorbing structure with controllable electromagnetic performance
EP3726293	UNIV AMSTERDAM [NL]	Stereo lithographic 3D printing assembly and stereo lithographic 3D printing method
EP3711921	MAGNUM VENUS PRODUCTS [US]	Pumping system and method for 3D printing
EP3733378	RICOH CO LTD [JP]	Three-dimensional object producing apparatus and three-dimensional object producing method
WO2020185690	UNIV PITTSBURGH COMMONWEALTH SYS HIGHER EDUCATION [US]	Systems and methods (-or photopolymerization based additive manufacturing enabled by multiple-wavelength irradiations
EP3736633	XEIKON PREPRESS N V [BE]	Apparatus and method for generating a 3D structure
CN11173086	WINTech DIGITAL SYSTEMS TECH CORP	3D printing laser processing module based on digital light processing
DE102019206367	AUDI AG [DE]	3D printing device for the photopolymerization of a photosensitive synthetic resin through an exposure pattern
US2020346409	COMMON SENSE ENG AND CONSULT B V B A [BE]	Method and device for creating a gas stream during the additive manufacturing of a product in a powder bed
US2020338810	FORMLABS INC [US]	Techniques for surface preparation during additive fabrication and related systems and methods
EP3730278	SEIKO EPSON CORP [JP]	Three-dimensional shaping device and manufacturing method for three-dimensional shaped article
CN111745966	HARBIN KUNCHENG TECHNOLOGY CO LTD [CN]	An anti-blocking carbon fiber 3D printing device
EP3726315	BOEING CO [US]	Manufacturing systems with coolant supply systems and related methods
NL1043174	ING ADRIANUS FRANCISCUS VAN DER GEEST [NL]	System for automatic removal of end product from three dimensional printer
JP2020157772	TANIGUCHI H [JP]	Modeling material discharge head
WO2020198050	DESKTOP METAL INC [US]	Controlled environment for additive manufacturing

Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
CN111688185	UNIV CHANGSHA SCIENCE & TECH	Surface microstructure array with anti-icing performance and forming method thereof
WO2020184525	RICOH CO LTD [JP] FUJITA TAKASHI [JP] SUHARA HIROYUKI [JP] SAKAI KOHJI [JP] KOBASHIGAWA SHOHTA [JP] TAKEUCHI ATSUSHI [JP] TAMURA ASATO [JP] MAEDA ICHIRO [JP] NISHIO TAKUEI [JP]	Apparatus configured to model three-dimensional modeled object, apparatus configured to fly particles, and method of modeling three-dimensional modeled object
EP3741543	LAYERWISE N V [BE]	Three-dimensional printing system with self-maintaining powder distribution subsystem
WO2020219027	HEWLETT PACKARD DEVELOPMENT CO [US]	Sacrificial barriers
US2020307071	30 SYSTEMS INC [US]	High productivity system for printing precision articles
US2020391436	POSTPROCESS TECH INC [US]	Apparatus and method for support removal
EP3744507	HEWLETT PACKARD DEVELOPMENT CO [US]	Hybrid part-accessory connections
EP3733933	HAMILTON SUNDSTRAND CORP [US]	Extruded article containing conductive fibers and having a metallic coating thereon
WO2020222750	HEWLETT PACKARD DEVELOPMENT CO [US]	Cooling unit with a self-locking latch mechanism
WO2020222822	HEWLETT PACKARD DEVELOPMENT CO [US]	Material removal system
WO2020222769	HEWLETT PACKARD DEVELOPMENT CO [US]	Translating contents of a print chamber to a secondary chamber
EP3750686	UNIV STUTT GART [DE]	Water soluble support structures for fused deposition modeling
WO2020219047	HEWLETT PACKARD DEVELOPMENT CO [US]	Seal assemblies having a sensor
WO2020219037	HEWLETT PACKARD DEVELOPMENT CO [US]	Detection of accessory in additive manufacturing system
WO2018145114	OPTIMEDICA CORP [US]	Additive manufacturing inside the human eye
EP3715020	HAMILTON SUNDSTRAND CORP [US]	Inserts in a build plate utilized in additive manufacturing
WO2020219025	HEWLETT PACKARD DEVELOPMENT CO [US]	Built material supply units

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Productos



Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
JP2020172076	BRIDGESTONE COR	Seat pad, seat pad manufacturing method, and 3D modeling data
WO2020224894	DAIMLER AG [DE]	Component, in particular for a vehicle, and method for producing such a component
CN111821507	UNIV SICHUAN [CN]	3D printed bone tissue engineering scaffold with slow-release and osteogenesis functions
CN211834883	UNIV FUJIAN MEDICAL UNION HOSPITAL; UNIV FUZHOU [CN]	Three-dimensional printing pancreatic duct stent tube stapler configuration
US2020376167	UNIV KOREA RES & BUS FOUND [KR] KOREA INST SCI & TECH [KR]	Method for preparing of nerve conduit using bio-printing technology and the nerve conduit prepared by the same
CN111793597	UNIV WESTLAKE	Biomimetic vascular smooth muscle layer biological manufacturing method
US2020337830	PEYMAN GHOLAM A [US]	Molding or 3D Printing of a Synthetic Refractive Corneal Lenslet
CN111772906	NANJING CHILDRENS HOSPITAL [CN]	3D printed postoperative rehabilitation aid for children with hip dislocation
US2020324463	AREVO INC [US]	Single-Piece Objects and Methods for Forming the Same
CN111701075	GENYUAN TIANJIN BIOMEDICAL TECH CO LTD	Cartilage repair material, and cartilage reconstruction biological scaffold and preparation method thereof
CN111714264	QINGDAO XINGKANG 3D TECH CO LTD	Diabetes foot shoes containing medical dressing for promoting ulcer healing
CN211631632	CHANGXING SHIYIN TECHNOLOGY CO LTD; SHENYANG WENSHENSANDI FOOD TECHNOLOGY CO LTD [CN]	Ice cream 3D printed product
WO2020188212	SAFRAN AIRCRAFT ENGINES [FR] SAFRAN HELICOPTER ENGINES [FR]	Impact-cooling tubular insert for a turbomachine distributor
CN111671203	ZHENGZHOU JIANBU INFORMATION TECH CO LTD	Customized insole, method for obtaining customized insole and customized shoe

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Procesamiento de Datos



Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
WO2018051277	IO TECH GROUP LTD [GB]	Method and system for additive-ablative fabrication
WO2020190645	FORMLABS INC [US]	Techniques for mixing in additive fabrication and related systems and methods
WO2020033418	3DFORTIFY [US]	Systems and methods for alignment of anisotropic inclusions in additive manufacturing processes
WO2020202147	STRATASYS LTD [IL]	Method and system for leveling a layer in freeform fabrication
GB2584176	ADOBE INC [US]	3d object reconstruction using photometric mesh representation
EP3738750	MARKFORGED INC [US]	3d printing apparatus and method
WO2020229137	VISITECH AS [NO]	System and method for exposing a material with images
WO2020226608	HEWLETT PACKARD DEVELOPMENT CO [US]	Agent composition determination based on thermal values
EP3736110	LAYERWISE NV [BE]	System for aligning laser system to a carrier plate
EP3722083	BOEING CO [US]	Fabrication optimization for composite parts
WO202019065	HEWLETT PACKARD DEV COMPANY L P [US]	Curated notifications for three-dimensional printing
WO202013211	MITSUBISHI HEAVY IND MACHINE TOOL CO LTD [JP]; TECH RES ASSOCIATION FUTURE ADDITIVE MANUFACTURING [JP]	Management system and management method
WO202014965	ORIGIN LABORATORIES INC [US]	Method for regulating temperature at a resin interface in an additive manufacturing process
WO2020209851	HEWLETT PACKARD DEVELOPMENT CO [US]	Adaptive thermal diffusivity
WO2020208708	NIKON CORP [JP]	Molding unit
WO2020203992	IHI CORP [JP]	Three-dimensional manufacturing apparatus
WO2020197553	HEWLETT PACKARD DEVELOPMENT CO [US]	Arranging three-dimensional models
WO2020190779	FORMLABS INC [US]	Method and system for calibration of optics modules for additive fabrication devices
WO2020194916	HITACHI LTD [JP]	Molding recipe provision system, molding recipe provision method, molding business operator selection assist system, and molding business operator selection assist method

Nº PUBLICACIÓN	SOLICITANTE Y PAIS DE ORIGEN	CONTENIDO TÉCNICO
WO2020190262	HEWLETT PACKARD DEVELOPMENT CO [US]	Coloured object generation
WO2020187435	KRAUSS MAFFEI TECH GMBH [DE]	Lamella block for a calibration device
WO2020212519	MATHEA HANS [DE]	Method for producing at least one solid layer in accordance with specified geometry data

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