

PROFESSIONAL 3D PRINTING WITH THE PATENTED MULTEX4MOVE PRINT HEAD

MULTIRAP M500 AND M800 3D PRINTERS



INDUSTRIE
PREIS 2017

KATEGORIESIEGER

HAHN+KOLB
GROUP



LET'S WORK TOGETHER.



OVERVIEW OF ADVANTAGES

- Innovative Multex4Move print head for fast, accurate 3D printing
- Solid machine construction with high-quality components
- Certified machine safety
- Continuous print area monitoring with the built-in webcam
- Wide range of filaments for many applications



**PRINT HEAD
MULTEX4MOVE**

FOR EFFICIENT 3D PRINTING

ADDITIVE MANUFACTURING

Pioneering technology

3D PRINTING — PRODUCTION PROCESSES WITH A FUTURE

The term "3D printing" is used more and more as a synonym for additive manufacturing. However, additive manufacturing is better used to indicate a professional production process which differs significantly from conventional, subtractive production methods. A real image of the 3D model is built up layer by layer based on CAD data.

What are the advantages of 3D printing?

Freedom of design, resource conservation, sustainability, environmental friendliness – the list of advantages goes on. A design-driven manufacturing process, in which the design determines the production and not the other way round, offers many businesses a high level of design freedom. In the future, those product series will be implemented for which customer-specific customisation or implementation of additional features has a marketable or beneficial effect.

The product manufacturing is additive, which means that the filament flows almost completely into the product. The rapid development of filament also continually provides new options for use. Many filaments these days are manufactured using environmentally-friendly techniques from renewable raw materials such as corn and sugar beet. Supporting material built onto the model during production can either be recycled, dissolved in water or composted, depending on the material.

Is the FFF 3D printing process suitable for your product or production?

If your product involves medium-accuracy 3D components that are required for demanding applications and harsh conditions, then Fused Filament Fabrication (FFF) is the perfect 3D printing

process for you. Many companies already use this technology for rapid prototyping, rapid tooling and rapid manufacturing, for the construction of visual and functional prototypes, to manufacture tools such as mounting fixtures and tool moulds for injection and deep-drawing moulds, as well as for producing components with simple and complex geometries in individual or series production.

As exclusive sales partners for MULTEC, we at HAHN+KOLB are proud to offer the Multirap M500 and Multirap M800 3D printers. The patented quadruple print head Multex4Move enables clean colour separation and drip-free multi-material prints for the first time. Using different nozzle sizes allows a much faster print speed, which means that invisible filling structures can be printed quickly and more coarsely than visible outer surfaces, for example. Using the water-soluble support material reduces post-processing to a minimum. As a specialist and innovation driver for the Fused Filament Fabrication (FFF) 3D printing process, MULTEC is a reliable long-term partner for the future. In 2017, Multec was awarded the Deutscher Industriepreis in the "production technology and mechanical engineering" category for the patented Multex4move print head.

AREAS OF APPLICATION

FFF technology is used in tool and mould making, manufacturing, assembly and the development of new products.



Visual model

Visual models are particularly well suited to making designs "tangible". The representation of the robot gripper arm provides a visual example of a customised solution for gripping and positioning specific components. Visual models are useful for visually demonstrating functions in training sessions.



Function prototypes

Prototyping enables companies to shorten the development time for new products considerably. This makes it possible to correct errors and make improvements at an early stage.



Tool and mould making

Design elements or a particular feel adds significant value to a product. Subtractive procedures are not always suitable for achieving this or are too cost-intensive. High-strength injection, deep-drawing and blow moulds can be 3D printed with plastic filaments such as PLA-HT. This means that individual products and those with low quantities can be produced ergonomically, attractively and cost-effectively.



Assembly aids and fixtures

Design production and assembly processes more efficiently. 3D-printed assembly aids and fixtures, for example, make altering and assembling components and assemblies significantly easier.



Individual and series production

In conventional, subtractive manufacturing processes, components and models with complex shapes are often very costly to produce, or are not produced at all. This means that switching to additive manufacturing is especially beneficial for small quantities.



Spare parts

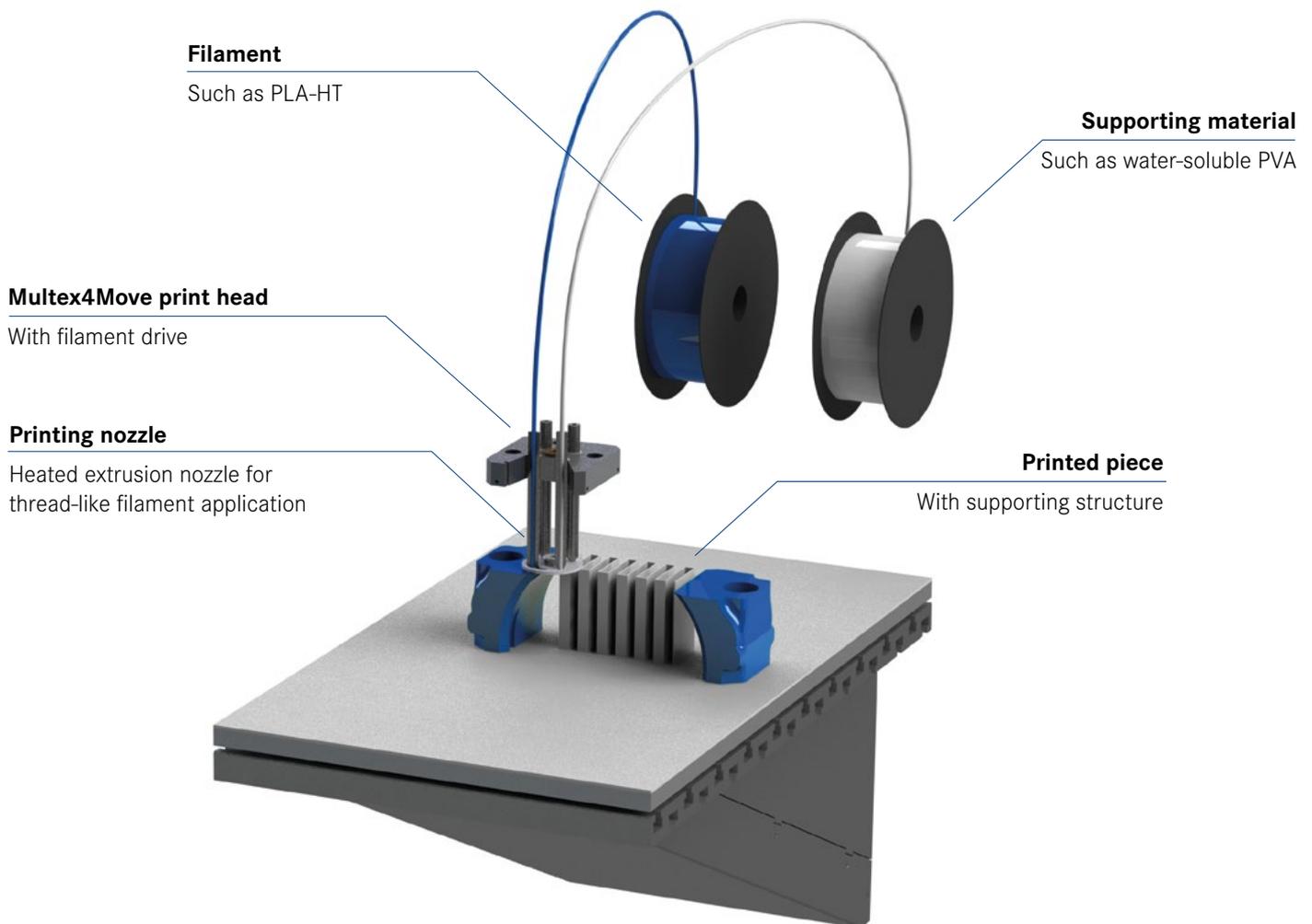
Printing spare parts is a common and cost-effective solution that provides fast availability. Improvements can also be made that would potentially improve durability or offer additional benefits.

FFF TECHNOLOGY

Layer fusing process

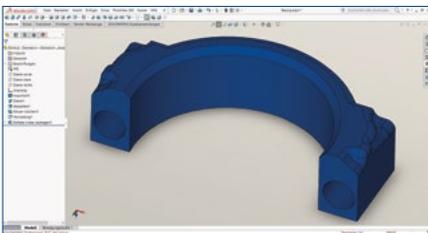
The FFF (Fused Filament Fabrication) process constructs the parts to be produced in layers. In doing so, the raw material (the filament) is heated up to an almost liquid state and pressed through a nozzle (extruder). The model constructs the thin threads that are produced in layers on a heatable printing bed. Depending on the number of nozzles, a model can therefore be made of different materials, colours and layer thicknesses.

Filling or supporting material support the printing process. The supporting material is removed once the model is completed. Depending on the filament used, the components produced can be extremely strong, form-stable and durable, for example. They are suitable as visual models, functional prototypes or as complex finished parts in individual, series or spare part production.



PROCESS DESCRIPTION

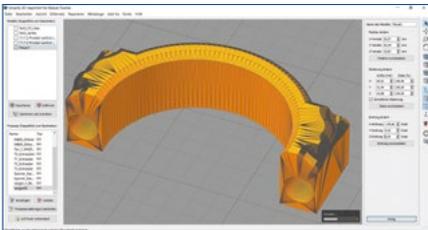
From the CAD drawing to the finished printed component



Create the CAD model

① Create the CAD model

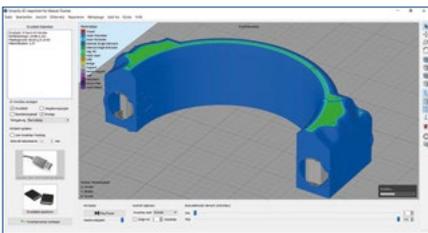
A digital design model forms the basis for the subsequent 3D printing. To do this, a model/component is created in CAD software or generated via 3D scanning. The CAD model is then converted into a printable format. The STL (Surface Tessellation Language) format has become the established standard. The surface is divided into multiple small triangles (triangulation), which represent the shape of the model.



Import the CAD model in STL format

② Prepare the model

3D printers work in layers. This means that the model is divided into individual thin layers in a procedure called "slicing". Using the 3D software, the model is positioned optimally within the print area and subsequently divided into individual layers. Supporting material is also constructed if the 3D model needs to be stabilised. Fill structures, known as infills (e.g. honeycomb structures) fill cavities as well as contributing to stability. These can be taken into account automatically by the 3D software. The result is known as G-code, which contains additional information on filament feed, heat bed and print head control, etc.



Define the supporting material and filling structure

③ Print the model

Once all settings have been applied, the 3D printing process starts. Layer by layer, the 3D model is constructed. Depending on the layer, the nozzles switch between filament and supporting material until the model is complete.



Finished, printed component

④ Post-process the model

Additional support material is removed – either dissolved in water or broken off. Subsequent surface treatment, e.g. sand blasting, sanding, painting, coating, engraving, etc. or further processing such as drilling, milling, turning, gluing, filling, etc. are additional options for finishing the model or component.



INNOVATIVE PRINT HEAD

Fast component availability through high-quality printing

- The automatic nozzle changing system enables **clean colour separation and drip-free multi-material prints** for the first time.
- Up to four individually-controllable nozzle sizes **accelerate the printing process significantly.**



MULTI-PRINTHEAD MULTEX4MOVE

Patented innovation, winner of the INDUSTRIEPREIS 2017

Fast, clean and precise – the automatic nozzle changing system enables clean colour separation and drip-free multi-material prints for the first time. The patented Multex4Move multi-print head was specially developed for industrial use, and at INDUSTRIEPREIS 2017 it came out on top in the "production technology & mechanical engineering" category, awarded by Huber Verlag für Neue Medien Karlsruhe. Up to four individually-controllable nozzle sizes accelerate the printing process significantly. This makes the multi-print head Multex4Move one of the most efficient print heads on the market, whilst simultaneously offering impressive print quality. The MultexMove multi-print heads are available in two different versions – Multex2Move and Multex4Move with two or four nozzles.

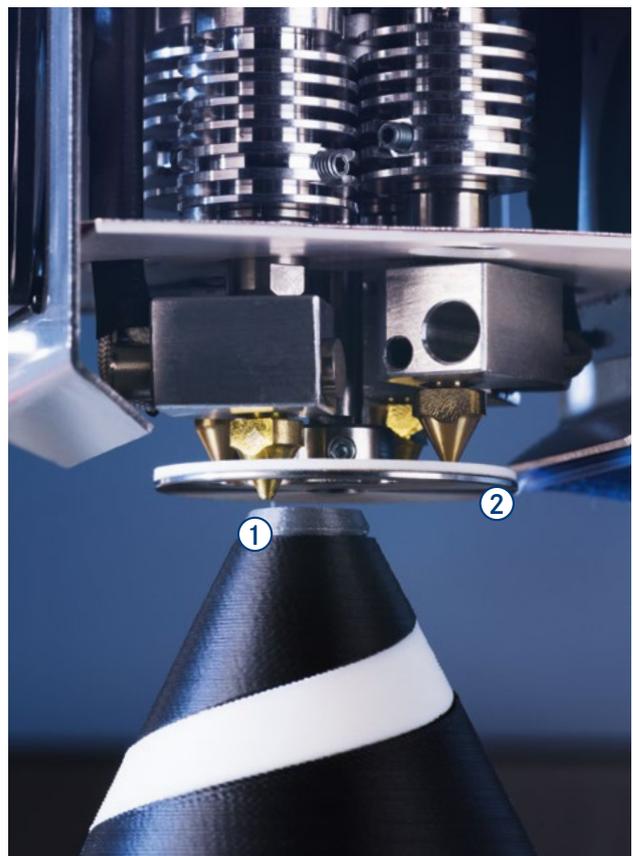
Function:

During the printing process, one nozzle is always active and in the print position. All other nozzles are parked on the rotating disk, prevented from dripping and inactive on a silicone bed. When changing the filament, the active nozzle retracts. The disc opening is re-positioned. The active nozzle moves to the park position and is disabled. At the same time, the next nozzle moves to the print position and continues the printing process. Different nozzle sizes enable rapid, multi-coloured model construction.

- Large nozzle opening for filling/supporting material or for quick creation of models with a coarse surface structure
- Small nozzle opening for fine surface structures with a layer thickness from 0.02 mm

Overview of advantages:

- Efficient printing through the use of up to four nozzles with different nozzle openings
- Clear separation of colours and materials for impressive printing results
- No dripping or smearing on the rotating disc with silicone bed when in the park position



① Printing nozzle ② Rotating disc with silicone bed



SOLID ENGINEERING

Ensures lasting precision

- To ensure lasting precision and solid construction, only **professional mechanical engineering components** are used.
- The **safety devices** are CE-compliant and correspond to the Machinery Directive as well as the German Product Safety Act (Produktsicherheitsgesetz).

HIGH-QUALITY COMPONENTS

For industrial use



Device housing

High-quality aluminium profiles form the basis for the housing construction. The safety devices are CE-compliant and in accordance with the Machinery Directive as well as the German Product Safety Act (Produktsicherheitsgesetz).



Linear guide

High-quality linear guides and ball screws ensure optimal positioning of the print head and allow clearance-free lowering of the printing bed.



Printing bed levelling

Fully automated MultiSense printing bed levelling measures and levels the printing bed. This ensures the distance from nozzle to print bed is consistent across the whole X/Y plane. An important prerequisite for a clean print result.



Filament magazine with integrated filament monitoring

The large filament magazine with capacity for up to 10 coils (M800) provides a high filament reserve. Optionally heatable for even better printing properties. In addition, filament monitoring ensures trouble-free printing.



Print monitoring

The integrated webcam allows for continual print monitoring. The user is also informed if filament runs out. Access to the webcam and filament monitoring occurs via an app which can be installed on a smartphone or tablet running the Android operating system.



FULLY AUTOMATIC PRINTING BED LEVELLING

Precise 3D prints start with parallelism between the nozzle and the printing bed

- The printing bed is **measured and levelled fully automatically** through **MultiSense** printing bed levelling.
- This ensures a precise, parallel layer structure and contributes significantly to the print quality.



INTEGRATED PROCESS MONITORING

Continuous print monitoring with the built-in webcam

- So you can keep a constant eye **on your printing process**.
- In combination with **filament monitoring**, the user is informed if a problem has occurred during the printing process or if the filament has run out.

MULTIRAP M500



**PROFESSIONAL
3D PRINTING BEGINS
WITH THE M500**

Printing area

- Enclosed printing area
- dimensions: 480 x 380 x 350 mm

Safety equipment

- Conforms to CE, Machinery Directive
- Conforms to the German Product Safety Act

Filament monitoring

- Optional

Print head

- Patented Multex2move multi-print head for clean 3D prints with excellent surface quality
- Can be expanded to the Multex4Move with four print nozzles

15" industrial touchscreen PC

- Microsoft Windows operating system

Filament magazine

- Open
- For up to four filament coils in total
- Filament reserve: up to 8 kg or 6400 ccm

Software

- Simplify3D for easy and convenient operation

Placement

- On a base (available separately) or a suitable workbench

Print area monitoring

- Optional

MULTIRAP M800



THE LARGE-AREA PRINTER
FOR INDUSTRIAL USE

Printing area

- Large, enclosed printing area
- dimensions: 650 x 500 x 800 mm

Safety equipment

- Conforms to CE, Machinery Directive
- Conforms to the German Product Safety Act

Filament monitoring

- Continuously monitors the filament feed
- In the event of a fault, the printing process is stopped and the user is informed through the app

Print head

- Patented Multex2move multi-print head for clean 3D prints with excellent surface quality
- Can be expanded to the Multex4Move with four print nozzles

19" industrial touchscreen PC

- Microsoft Windows operating system

Filament magazine

- Integrated, optionally heatable
- For up to 10 filament coils in total
- Filament reserve: up to 20 kg or 16,000 ccm

Software

- Simplify3D for easy and convenient operation

Print area monitoring

- Live print area monitoring with the webcam
- incl. Access via an app on devices with Android operating system



BE CREATIVE

Set yourself apart through customisation

- Beautifully designed, lightweight and strong — **customise your products.**
- Add **additional features** for effects that benefit use.

ADVANTAGES AND BENEFITS

overview



Tool-free production

Design and manufacture components with no need for tools

Advantage: Significant savings on tool costs



Product development

Create prototypes and eliminate errors in the creation process

Advantage: Avoid high follow-up costs

Create a cost-effective initial sample or functional model

Advantage: Accelerate design approval



Create and enhance products

Create shapes which would be extremely difficult or impossible using subtractive methods

Advantage: Customise your products or create additional benefits

Refine printed parts through processes such as sand blasting, sanding, painting, coating or engraving, or process by drilling, milling, turning, gluing, filling, etc.

Advantage: Make cost-effective visible and commercial parts

Tip: Strong, lightweight components with an internal honeycomb structure are additional strengths of the 3D printing process



Optimise manufacturing processes

Optimise production and assembly processes by creating additional tools

Advantage: Increase productivity and efficiency in manufacturing

Create mould inserts for sand casting, vacuum thermoforming and blow moulding

Advantage: Produce components and samples with complex geometries cost-effectively

Tip: Use 3D-printed clamping devices for your 3D coordinate measuring machine, for example



Make training "tangible"

Create visual models and functional models for your training to make your products and designs even more "tangible"

Advantage: This means that ideas can be touched – not just looked at



MORE FLEXIBILITY

Ready for new filament developments

- New filaments **expand or improve options for use**
- MULTEC filaments are high-quality products
"Made in EU"
- All MULTEC 3D printers are **open systems**, so you can also use filaments from other manufacturers

CONSUMABLES

for your 3D printer

FILAMENTS

The fundamental difference between filaments is their material composition. Options for use are constantly being expanded and existing properties improved thanks to new and innovative filaments. Some of these filaments are also an excellent choice for subsequent surface treatment, such as sanding and painting. Printed parts can also be processed further through machining, e.g. through turning, milling and drilling.

MULTEC filaments are produced in Europe to the highest quality and they ensure the best print quality and printed part strength. All filaments are available in the online shop at www.hahn-kolb.de.



SUPPORTING MATERIAL

Supporting material is primarily intended to support and stabilise the manufactured models and components. It can be applied at the same speed as conventional filaments. For example, MULTEC PVA is the ideal water-soluble supporting material for reducing post-processing to a minimum. For the first time, this support material can be applied extremely well with the new Multex4Move drip-free print head. example: Speaker body.





TOOL-FREE 3D PRINTING

Manufacture components with complex geometries with no need for tools

- One of the strengths of FFF technology.
- Get your professional 3D printer from us.

MULTIRAP M8

FILAMENTS

Selection and options for use

THE TOP 3 MULTEC FILAMENTS



fig. Deep-drawing tool



fig. Robotic gripping arm



fig. Car license plate lamp cover

MULTEC PLA-HT

- High-quality, impact-resistant special filament with high temperature resistance and good printing properties such as low warping
- Food-safe thermoplastic offers a particularly uniform look and feel
- PLA-HT is also not harmful to health during processing.
- Easy handling and good post-processing options
- Very high accuracy of dimensions and roundness

Heavy-duty and resilient, PLA-HT a material that is extremely well-suited to producing deep-drawing tools, dynamic elements and functional components.

MULTEC PLA

- High-quality standard filament with good printing properties such as low warping
- Food-grade thermoplastic offers high wear resistance
- PLA is also not harmful to health during processing.
- Easy handling and good post-processing options
- Very high accuracy of dimensions and roundness

PLA is a hard, easily-printable standard plastic for components that require a high level of abrasion resistance. example: Dynamic elements and functional components.

MULTEC PETG

- High-quality special filament with good printing properties such as low warping
- Food-grade thermoplastic offers high impact toughness and excellent temperature resistance
- PETG is also not harmful to health during processing
- High light transmission and low flammability

With its good material properties and high light transmission, PETG is very well suited to components with optical properties that are subject to stress. example: Car license plate lamp cover.



OTHER FILAMENTS AT
WWW.HAHN-KOLB.DE

TECHNICAL DATA

MULTIRAP M500 and M800 at a glance

"MADE IN GERMANY"



		M500	M800
Printing area (X x Y x Z)	mm	480 x 380 x 350	650 x 500 x 800
Processing speed (X x Y x Z)	mm/s	330/300/150	330/300/150
Layer height accuracy	mm	0.02	0.02
Number of printing nozzles	Quantity	2/4*	2/4*
Number of filament coils	Quantity	4	10
Filament reserve	kg/ccm	8/6400	20/16,000
Filament monitoring		optional	yes
Filament storage		Open	Closed
MultiSense printing bed levelling		yes	yes
Bed heating	°C	>100	>100
Integrated pressure monitoring via webcam		optional	yes
Industrial touchscreen PC	inch	15	19
Network connection via Wi-Fi and LAN		LAN/WiFi	LAN/WiFi
Device housing dimensions incl. Controller (W x D x H)	mm	1100 x 920 x 1200	1400 x 920 x 2030
Weight	kg	150	320
39910	Ref. no.	010**	020**
Price		On request	
Expansions		Multex4Move print head for M500 and M800	Webcam print monitoring for M500
39910	Ref. no.	100	110
Price		On request	
			Filament monitoring for M500
			120

* Print head unit: Depending on the version, Multex2Move or Multex4Move

** Excluding freight, installation, commissioning and system training

INDUSTRIES

FFF 3D printing technology

INFINITE USES FOR 3D PRINTING

3D PRINTING TECHNOLOGY CAN BE USED IN ALMOST ALL INDUSTRY SECTORS. WE CAN PROVIDE GUIDANCE IF REQUIRED.

AUTOMOTIVE
INDUSTRY

MECHANICAL
ENGINEERING

TOOL AND
MOULD MAKING

RESEARCH AND
DEVELOPMENT

AEROSPACE

MEDICAL
TECHNOLOGY

EDUCATIONAL
FACILITIES



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