HAGE3D

LIFETIME PARTNER

for additive material extrusion

HAGE3D

INDUSTRIAL SOLUTIONS – MADE IN AUSTRIA

For over 7 years, we have been developing and producing industrial 3D printers in Austria and we have been supporting industrial customers around the globe, helping them to start and continue using 3d technology. Our basic technology is additive material extrusion, an extrusion-based sub-discipline of additive production. Our team combines a range of different skills: machine engineering, control and plastics engineering. These combined skills allow us to produce accurate, industrial 3D printers for large components at production speed with an unbeatable price-to-performance ratio. We have a steadfast commitment to the use of open materials.

Several years ago, HAGE3D GmbH was spin off from the business unit of HAGE Sondermaschinenbau GmbH – a specialist in customised 5-axis portal machining centres – within the family-run holding company.

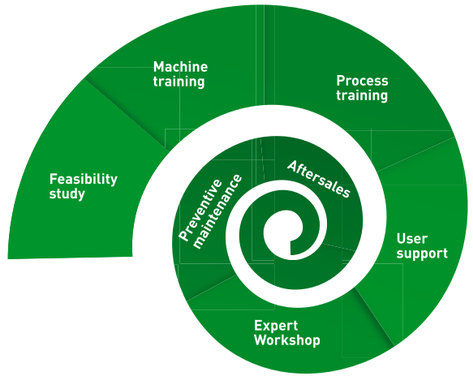
BENEFITS FOR YOU:

- The best price-to-performance ratio for the machinery
- All from a single source
- An open, transparent business model
- Open material system
- Low running costs
- No inflated maintenance contracts

SERVICES

'LIFETIME PARTER' FOR INDUSTRIAL LARGE-FORMAT PRINTING

We work with you to develop successful integration of additive material extrusion into your operations. In addition to feasibility studies for technology assessment and ongoing process support in use, we also offer a range of training programmes and support services.



1 FEASIBILITY STUDY

- Which material is most suitable?
- What are the unit costs?
- Which design/optimisations can save material and also reduce printing time?

Our feasibility studies also include joint development of the business case for your intended applications. This helps to ensure that the technology is properly located and used in the correct application.

2 MACHINE TRAINING

We train you and your team on our machines on site – at your premises. Our HAGE3D machines operate according to the Easy2Use operating principle and enable straightforward maintenance, so that you can start and continue using your machine after just a few hours' preparation.

3 PROCESS TRAINING

We will provide you with training to help you find your feet in the world of additive material extrusion, from materials and process settings in the slicing software, to design tips.

4 USER SUPPORT

Want to go from 0 to 60 in the shortest possible time? Our user support will help to improve users' learning curve and turn you and your team into pros. Another benefit is that we will also extend the warranty on your machine by six months.

5 EXPERT WORKSHOP

Looking to print special parts? Speak to our expert team. Online or on site

6 PREVENTIVE MAINTENANCE

Want to outsource maintenance? Not a problem, we carry out preventive maintenance once a year and double check your system from top to bottom.

7 AFTERSALES

You can, of course, obtain filaments and granulate from our certified suppliers, with preferential settings. In addition, the use of industrial components will also help to ensure maximum availability of spare and wear parts.

MEX LINE

The MEX line offers the best price-to-performance ratio and maximum usability, whilst also ensuring a high level of material flexibility.

The water-cooled DSD print head in the MEX line ensures thermal decoupling from the heated build chamber, enabling optimal process reliability in multi-material printing and production speed for large components.

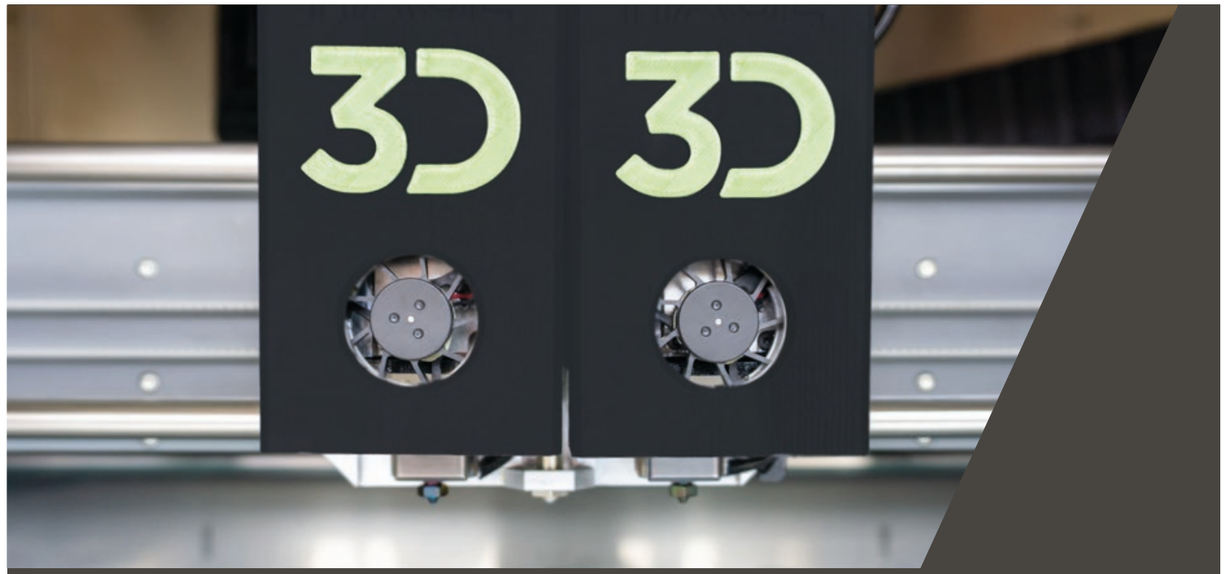
The MEX ONE is an all-round 3D printer for technical thermoplastics. The MEX TWO gives you large-format printing in device and equipment production.

PRECISE LINE

The Precise line is our high-speed, high-precision solution with drive system technology derived from CNC technology.

The machine platform concept provides cooled servo motors and ball screw drives for high process temperatures and smooth running at high speeds. The high-performance print heads offer printing speeds of up to 350 mm/s for technical and high-performance thermoplastics. The Precise line also enables multi-printing with up to four extrusion units or, as an alternative, the use of a granulate print head.

The PRECISE ONE is the 3D printer for high-performance materials. Unusual requirements require unusual dimensions – something that the PRECISE TWO can handle.



PRINT HEAD TECHNOLOGY

DUAL-DSD

The compact and ultra-lightweight DSD (Direct Synchronised Drive) filament print head can be integrated into all HAGE3D printers as a standard print head. The print head processes all current filaments in the market with accuracy and reliability. The DSD print head is modular in construction and can be operated with a two cooling concepts, special filament drives for filament feeding, hot end and nozzle concepts.

MULTI-DSD

The Multi-DSD has up to four extruders and hence allows up to four different materials to be processed in a single print. A printed component as s a combination of hard/soft components, distinguishable colour identification and solubility support are just first examples of multi-material technology.

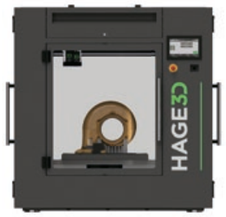
PEX

The PEX granulate extruder head (pellet extrusion) combines the benefits of high melt output with a significant reduction in material costs, achieved thanks to the use of cost-efficient plastic granulate. This facilitates rapid, cost-efficient printing of large components.

DSD TECHNICAL DATA:

- Two counter rotating knurled wheel drives
- Component cooling
- Nozzle diameter: 0.1 mm - 1 mm
- Nozzle temperature: 450°C
- Integrated automatic, topographic-based bed calibration
- Tilting extrusion units
- Cooling concept: water-cooled
- Build-up rate: 300 g/h
- Filament diameter: 1.75 mm
- Filament feed: Form fit or friction fit
- Extrusion units/print head: up to 4 extruders with direct free lift

MODEL OVERVIEW



	MEX ONE	MEX TWO	PRECISE ONE	PRECISE TWO
Build chamber (XYZ) in mm:	400 x 600 x 440	900 x 600 x 440	500 x 700 x 800	1,200 x 700 x 800
Drive technology XYZ:	Stepper motors with encoder	Stepper motors with encoder	Servo motors	Servo motors
Axis system:	XY: fibre-reinforced industrial belts Z: trapezoidal thread spindle	XY: fibre-reinforced industrial belts Z: trapezoidal thread spindle	XYZ: ball screw drives	XYZ: ball screw drives
Printing speed:	up to 200 mm/s *(depending on geometry and material)*	up to 200 mm/s *(depending on geometry and material)*	up to 350 mm/s *(depending on geometry and material)*	up to 350 mm/s *(depending on geometry and material)*
Layer thickness:	0.05 mm	0.05 mm	0.05 mm	0.05 mm
Heatable build chamber:	100°C	100°C	150°C	150°C
Heatable print bed:	180°C	180°C	180°C	180°C
Print bed system:	Quick-change special glass	Quick-change special glass	Vacuum bed with film or special glass	Vacuum bed with film or special glass
Print temperature:	450°C	450°C	450°C	450°C
Print head:	Dual-DSD	Dual-DSD, Multi-DSD (3-way)	Dual-DSD, Multi-DSD (3/4-way), PEX	Dual-DSD, Multi-DSD (3/4-way), PEX
Nozzle diameter:	0.1 - 1.0 etc.	0.1 - 1.0 etc.	0.1 - 1.0 etc.	0.1 - 1.0 etc.
Build-up rate, filament:	150 g/h	150 g/h	300 g/h	300 g/h
Build-up rate, pellets:	-	-	3.000 g/h	3.000 g/h
Open materials system:	Yes	Yes	Yes	Yes
Flexible materials up to 65A:	Yes	Yes	Yes	Yes
Technical thermoplastics:	Yes	Yes	Yes	Yes
3D-optimised high-performance materials:	Yes	Yes	Yes	Yes
High-performance materials:	-	-	Yes	Yes
Calibration:	Automatic	Automatic	Automatic	Automatic
Air cleaning unit:	Filtration system with active carbon filter and HEPA filter	Filtration system with active carbon filter and HEPA filter	Filtration system with active carbon filter and HEPA filter	Filtration system with active carbon filter and HEPA filter
Slicing software, open (Simplify3D, Cura)	Yes	Yes	Yes	Yes
Camera	Optional	Optional	Standard	Standard

MEX ONE

TECHNICAL DATA

MECHANICAL ENGINEERING	
Build chamber (XYZ):	400 x 600 x 440 mm
Heatable build chamber:	to 100°C
Heatable print bed:	to 180°C
Positioning accuracy (XY):	<0.1 mm
Layer thickness:	from 0.05 mm
Movement speed:	XY~250 mm/s
Air cleaning unit:	filtration system with active carbon filter and HEPA filter
Safety circuit:	unmanned 24/7 operation

INSTALLATION INFORMATION	
Power supply:	400 V/16 A
External dimensions (XYZ):	1,270 mm x 1,120 mm x 1,730 mm
Weight:	approx. 420 kg

MATERIALS

Wide range of materials: free choice of materials – no manufacturer ties

Printable materials: PC, PC-ABS, PC-FR, PC-CF, PA6, PA6-CF, PA12, PA12-CF, PA12-GF, CoPA, ABS, ASA, ABS-FR, ABS-ESD, TPU, TPC, PETG, PLA, HT-PETG, PCTG, PP, PP-GF, PEKK, PPSU

OPERATION	
Stand-alone printing:	USB/network
Pause printing:	smart 'stop and go' function
Slicing software:	Simplify3D (delivery standard), Cura
Machine control:	HAGE3D industrial control
HMI:	LED + 7" touchscreen
Camera:	optional available
Filament stock:	run-out sensor
Override function:	in real time
User level:	multi-level

PRINT HEAD	
Print head:	water-cooled Dual-DSD
Design:	adjustable tension and fine tuneable pressure; short filament path, allows thermoplastic elastomers up to Shore 65A
Nozzle diameter:	0.1 to 1.0 mm (0.4 mm standard)
Printing speed:	up to 200 mm/s *(depending on geometry and material)*
Build-up rate:	up to 150 g/h *(depending on geometry and material)*
Print temperature:	to 450°C

HIGHLIGHTS

- Best price/performance ratio
- Engineering plastics printable at production speed
- Print bed calibration: automatically by topographic mesh
- Closed-loop technology for accurate step positioning without step losses
- Glass-fibre reinforced belts in XY direction and trapezoidal spindle in Z direction
- Component cooling: high-performance, targeted air cooling at up to 4.8 m^3/h
- Filtration system with active carbon filter and HEPA filter for efficient air cleaning of macro, micro and nano particles (VOC) and volatile solvents
- Multi-level user concept, notification via mail inclusive
- Run-out sensor for filament stock

MEX TWO

TECHNICAL DATA

MECHANICAL ENGINEERING	
Build chamber (XYZ):	900 mm x 600 mm x 440 mm
Heatable build chamber:	to 100°C
Heatable print bed:	to 180°C
Positioning accuracy (XY):	<0.1 mm
Layer thickness:	from 0.05 mm
Movement speed:	XY~250 mm/s
Air cleaning unit:	Filtration system with active carbon filter and HEPA filter
Safety circuit:	unmanned 24/7 operation

PRINT HEAD	
Print head:	Water-cooled Dual-DSD, optional Multi-DSD (3-way)
Design:	adjustable tension and fine tuneable pressure; short filament path, allows thermoplastic elastomers up to Shore 65A
Nozzle diameter:	0.1 to 1.0 mm (0.4 mm standard)
Printing speed:	up to 200 mm/s (depending on geometry and material)
Build-up rate:	up to 150 g/h (depending on geometry and material)
Print temperature:	to 450°C

OPERATION	
Stand-alone printing:	USB/network
Pause printing:	smart 'stop and go' function
Slicing software:	Simplify3D (delivery standard), Cura
Machine control:	HAGE3D industrial control
HMI:	LED + 7" touchscreen
Camera:	optional available
Filament stock:	run-out sensor
Override function:	Iin real time
User level:	multi-level

INSTALLATION INFORMATION	
Power supply:	400 V/16 A
External dimensions (XYZ):	1,870 mm x 1,120 mm x 1,730 mm
Weight:	approx. 560 kg

MATERIALS

Wide range of materials: free choice of materials – no manufacturer ties

Printable materials: PC, PC-ABS, PC-FR, PC-CF, PA6, PA6-CF, PA12, PA12-CF, PA12-GF, CoPA, ABS, ASA, ABS-FR, ABS-ESD, TPU, TPC, PETG, PLA, HT-PETG, PCTG, PP, PP-GF, PEKK, PAEK

HIGHLIGHTS

- Best price/performance ratio
- Engineering plastics printable at production speed
- XL build chamber for large components
- Print bed calibration: automatically by topographic mesh
- Closed-loop technology for accurate step positioning without step losses
- Glass-fibre reinforced belts in XY direction and trapezoidal spindle in Z direction
- Component cooling: high-performance, targeted air cooling at up to 4.8 m^3/h
- Filtration system with active carbon filter and HEPA filter for efficient air cleaning of macro, micro and nano particles (VOC) and volatile solvents
- Multi-level user concept, notification via mail inclusive
- Run-out sensor for filament stock

PRECISE ONE

TECHNICAL DATA

MECHANICAL ENGINEERING	
Build chamber (XYZ):	500 x 700 x 800 mm
Heatable build chamber:	up to 150°C
Heatable print bed:	to 180°C
Drive technology:	Servo motor in XYZ
Positioning accuracy (XY):	<0.05 mm
Layer thickness:	from 0.05 mm
Movement speed:	XY~400 mm/s
Air cleaning unit:	Filtration system with active carbon filter and HEPA filter
Safety circuit:	unmanned 24/7 operation

OPERATION	
Stand-alone printing:	USB/network
Pause printing:	smart 'stop and go' function
Slicing software:	Simplify3D (delivery standard), Cura
Machine control:	HAGE3D industrial control
HMI:	LED + 7" touchscreen
Camera:	standard
Filament stock:	run-out sensor
Override function:	in real time
User level:	multi-level

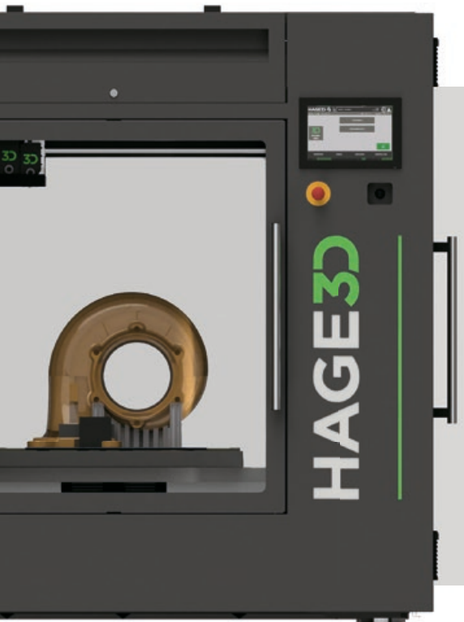
INSTALLATION INFORMATION	
Power supply:	400 V/32 A
External dimensions (XYZ):	2,550 mm x 1,950 mm x 1,920 mm
Weight:	approx. 1,980 kg

PRINT HEAD	
Print head:	water-cooled multi-DSD (up to 3/4 extruder)
Pellet extruder:	optional
Nozzle diameter:	0.1 to 1.0 mm (0.4 mm standard)
Printing speed:	up to 350 mm/s (depending on geometry and material)
Build-up rate (filament):	up to 300 g/h (depending on geometry and material)
Print temperature:	to 450°C
Build-up rate (pallets):	up to 3 kg/h (depending on geometry and material)

MATERIALS

Wide range of materials: free choice of materials – no manufacturer ties

Printable materials: PC, PC-ABS, PC-FR, PC-CF, PA6, PA6-CF, PA12, PA12-CF, PA12-GF, CoPA, ABS, ASA, ABS-FR, ABS-ESD, TPU, TPC, PETG, PLA, HT-PETG, PCTG, PP, PP-GF, PEKK, PPSU, PSU, PAEK, PEI, PPS



HIGHLIGHTS

- Servo motor and ball screw in XYZ for high speed printing
- Variable print heads: pellet extruder, dual-DSD, multi-DSD
- Heatable build chamber up to 150 °C for large components of high-temperature plastics
- Temperature management: 360 ° cooling and/or tempering of components
- Vacuum print bed
- Print bed calibration: automatically topographic mesh
- Filtration system with active carbon filter and HEPA filter for efficient air cleaning of macro, micro and nano particles (VOC) and volatile solvents
- Real time adjustment of the printing parameters with override function
- Multi-level user concept, notification via mail inclusive
- Run-out sensor for filament stock

PRECISE TWO

TECHNICAL DATA

MECHANICAL ENGINEERING	
Build chamber (XYZ):	1,200 mm x 700 mm x 800 mm
Heatable build chamber:	up to 150°C
Heatable print bed:	to 180°C
Drive technology:	Servo motors in XYZ
Positioning accuracy (XY):	<0.05 mm
Layer thickness:	from 0.05 mm
Movement speed:	XY~400 mm/s
Air cleaning unit:	Filtration system with active carbon filter and HEPA filter
Safety circuit:	unmanned 24/7 operation

OPERATION	
Stand-alone printing:	USB/network
Pause printing:	smart 'stop and go' function
Slicing software:	Simplify3D (delivery standard), Cura
Machine control:	HAGE3D industrial control
HMI:	LED + 7" touchscreen
Camera:	Standard
Filament stock:	run-out sensor
Override function:	in real time
User level:	multi-level

PRINT HEAD	
Print head:	water-cooled multi-DSD (up to 3/4 extruder)
Pellet extruder:	optional
Nozzle diameter:	0.1 to 1.0 mm (0.4 mm standard)
Printing speed:	up to 350 mm/s (depending on geometry and material)
Build-up rate (filament):	up to 300 g/h (depending on geometry and material)
Print temperature:	to 450°C
Build-up rate (pellets):	up to 3 kg/h (depending on geometry and material)

INSTALLATION INFORMATION	
Power supply:	400 V/32 A
External dimensions (XYZ):	2,550 mm x 1,950 mm x 1,920 mm
Weight:	approx. 1,980 kg

MATERIALS

Wide range of materials: free choice of materials – no manufacturer ties

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HIGHLIGHTS

- Servo motor and ball screw in XYZ for high speed printing
- Variable print heads: pellet extruder, dual-DSD, multi-DSD
- Heatable build chamber up to 150 °C for x-large components of high-temperature plastics
- Temperature management: 360 ° cooling and/or tempering of components
- Vacuum print bead
- Print bed calibration: automatically topographic meshy
- Filtration system with active carbon filter and HEPA filter for efficient air cleaning of macro, micro and nano particles (VOC) and volatile solvents
- Real time adjustment of the printing parameters with override function
- Multi-level user concept, notification via mail inclusive
- Run-out sensor for filament stock

DCU

DRYING AND ANNEALING CHAMBER

ANNEALING CHAMBER

Annealing is a process that helps to improve the strength and heat resistance of printed components. The procedure is well established in plastic and metal processing, and offers benefits to additive material extrusion processes. Components are heated up to characteristic temperatures in a controlled environment before being cooled again. When heated, the macro-molecules rearrange themselves, thus removing internal tension and improving layer adhesion through diffusion processes or an increase in entropy. The result is a durable component in terms of both its mechanics and temperature resistance. Important characteristic values, such as tensile strength and heat deflection resistance, are improved in the process.

The HAGE3D annealing chamber has been designed for industrial annealing of products produced in additive processes and can help to improve component properties with preset materials profiles.

ANNEALING CHAMBER TECHNICAL DATA	
Internal dimensions (XYZ):	418 mm x 601 mm x 401 mm
Insertion areas:	3 insertion options of sheets or grids of size 600 mm x 400 mm
Annealing temperature:	max. 200 °C
Simultaneous operation	of both chambers

DEVICE DATA	
External dimensions (XYZ):	1,600 mm x 695 mm x 580 mm
Total weight:	approx. 100 kg
Control:	Siemens logo!
Power consumption:	max. 6 kW
Connection:	Three-phase AC current 230 V with 16 A fuse per phase

DRYING CHAMBER

Important filament-base materials, such as PA and PC, which are commonly used in additive material extrusion, are hygroscopic, which means that they absorb moisture. This moisture can negatively affect the quality of the print and component. Pre-drying or continuous drying of the filament coils can take as long as 100 hours, depending on the size of the coils, and should be carried out at high temperatures and with special drying programmes independently of and ideally before the printing process. This helps to ensure thoroughly dried coils at all times, whilst having no negative impact on the process in the drying chamber.

With the HAGE3D drying chamber, developed specifically for professional drying of technical filaments and large coil volumes, drying can be carried out with energy efficiency and maximum reliability. As an option, the filament can also be conveyed directly into the printer.

DRYING CHAMBER TECHNICAL DATA	
Internal dimensions (XYZ):	630 mm x 390 mm x 260 mm
Space for the following coil versions:	3 moving small rollers (top) 2 moving large rollers (bottom)
Drying temperature:	max. 100 °C
Filament withdrawal:	conveyance directly from the chamber possible with 4 coils
Air exchange:	automated air exchange and moisture removal

CONTROL PLATFORM

The tried-and-tested CNC interpreter of Sigmatek's proprietary, object-oriented development and operating system LASAL converts the G code into control commands. HAGE3D machines have nine or twelve dynamic axes, These are driven by stepper or servo motors.

A significant benefit of the solution is the excellent scalability for customisation – such as the option of comprehensive extensions, including the theoretically unlimited number of print heads in use at the same time, integration of thermographic cameras or the option to remotely access the user interface. Process innovations, such as an extruder axis adapted to extrusion printing or thermo management, are constantly being integrated.

Key functions for your operating and maintenance convenience:

- Guided operator menus for daily-use operation
- Multi-level user administration
- E-mail notification for defined system statuses (e.g. filaments empty)
- Operating status monitoring of the inputs and outputs
- Closed-loop motor operation
- UPC-OA interface
- Override intervention into ongoing printing processes

SLICING SOFTWARE

SIMPLIFY3D AND CURA

The HAGE3D control allows different slicing software applications to be used. Simplify3D is used as standard, while Cura and SuperSlicer can also be selected.

The slicing software converts 3D models (STL, OBJ, etc.) into G-Code, i.e. the machine code used by 3D printers. The loaded model can be assessed in a preview, so that changes, including to size, orientation and reflection, can be implemented. Material and process-specific settings can be stored in the material profiles. The 3D model is then given appropriate process parameters and displayed in a layer view, so that the planned printing process can be evaluated.

TAILORMADE SOLUTION

At HAGE3D, we rely on a foundation of machine engineering experience and combine this with innovation aspirations and a passion to develop tailored additive systems. A range of different systems have been used in recent years:

In the HAGE3D FLEX line, we flexibly integrate different printing systems for the processing of continuous filaments or silicone.

The HAGE3D X line is a range of multi-axis printers, which can be equipped with a pivoting printing system.

In the HAGE3D Pro line, industrial additive production lines for series production are developed and manufactured according to customer needs so that additive material extrusion can be used in cyclical and series production.

'We were impressed with the way in which HAGE3D rose to our challenges so easily, and actively supported us in finding a solution. This meant that we could commission a functional system extremely quickly,' explains Mr Uljanov, project manager at Breco Antriebstechnik.

MATERIALS

	TECHNICAL PLASTICS						
Material	**TPC**	**TPU**	**TPU 65A**	**PA 6**	**PP**	**PC**	**PC-ABS**
Diameter:	1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm
Application example	Flexible applications	Flexible applications	Sanitary technology Sealing technology Mechanical engineering	Functional prototypes Small series Automotive Mechanical engineering	Functional prototypes Small series	Functional prototypes Small series Automotive Mechanical engineering	Functional prototypes Small series Automotive Mechanical engineering
Notch impact strength (23°C; max.):	No break	No break	-	-	-	25 kJ/m²	13 kJ/m²
Tensile strength (max.):	8 MPa	50 MPa	-	80 MPa	12 MPa	60 MPa	40 MPa
Tensile modulus (max.):	29 MPa	150 MPa	-	3400 MPa	-	2048 MPa	1832 MPa
Elongation at break (max.):	390%	450%	-	4%	>600%	12%	400%
Bending strength (max.):	-	-	-	-	-	94 MPa	66 MPa
Bending modulus (max.):	-	-	-	2370 MPa	402 MPa	2044 MPa	2081 MPa
Hardness:	34D (Shore)	98A (Shore)	-	-	50D (Shore)	-	-
Max. usage temp. (continuous):	90°C	138°C	-	90°C	100°C	117°C	135°C
Special properties:	Elastic UV resistant	Elastic Good mechanics	Very soft	Tough, very good mechanics	Very resistant to media	Very good mechanics UL 94 VO	Resistant to low temperatures
Basic settings:							
Average printing temperature:	230°C	240°C	235°C	275°C	230°C	255°C	260°C
Active build chamber heating:	No	No	No	Yes	Yes	Yes	Yes
Support system:	BVOH	BVOH	VXL70	BVOH	-	PolyDissolve S2 BVOH	PolyDissolve S2 BVOH

STANDARD PLASTICS			REINFORCED PLASTICS (SHORT-FIBRED)			HIGH-TEMPERATURE PLASTICS			
ASA	**ABS**	**PETG**	**PA/CF**	**PA/GF**	**PP/GF**	**PEKK-A**	**PPS**	**PEI**	**PSU**
1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm	1.75 mm
Presentation objects Large objects Design prototypes Functional prototypes Small series	Presentation objects Large objects Design prototypes Functional prototypes Small series	Functional prototypes Small series Mechanical engineering	Functional prototypes Small series Mechanical engineering	Functional prototypes Small series Mechanical engineering	Functional prototypes Small series Automotive Mechanical engineering	Functional prototypes Small series Automotive Mechanical engineering	Automobiles Energy Electronics	Automobiles Aircraft Mechanical engineering	Automobiles Aircraft Mechanical engineering
18 kJ/m²	58 kJ/m²	7 kJ/m²	35 kJ/m²	-	23 kJ/m²	-			
48 MPa	44 MPa	50 MPa	90 MPa	90 MPa	35 MPa	85 MPa	50 MPa	54 MPa	52 MPa
2020 MPa	2030 MPa	1940 MPa	11500 MPa	5560 MPa	3000 MPa	2850 MPa	2650 MPa	2050 MPa	2100 MPa
15%	34%	120%	1%	2%	4%	8%	18%	3%	8%
-	-	71 MPa	-	-	-	-	52 MPa	90 MPa	87 MPa
-	-	2148 MPa	4200 MPa	3080 MPa	4130 MPa	-	2540 MPa	2170 MPa	2050 MPa
-	-	105 (Rockwell)	-	-	-	-			
95°C	95°C	75°C	120°C	120°C	100°C	172°C	90°C	158°C	172°C
Good mechanics UV resistant	Good mechanics Good optics	All-round material	High strength	High strength	Lightweight High strength	HT-capable UL 94 VO	Very resistant to media	HT-capable	HT-capable
245°C	245°C	230°C	270°C	270°C	240°C (0.6 mm steel nozzle)	380°C	330°C	360°C	370°C
Depends on geometry	Depends on geometry	No	Yes	Yes	Yes	Yes			
BVOH, PLA	BVOH, PLA	BVOH	BVOH	BVOH	-	-	HTS-BA	BA	HTS-BA

OUR MATERIAL PARTNERS:

BASF We create chemistry · FORM FUTURA 3D PRINTING MATERIALS · 3D nexeo plastics · KIMYA Additive Manufacturing by ARMOR · 3DXTECH Additive Manufacturing · polymaker · Verbatim

CUSTOMER STORIES

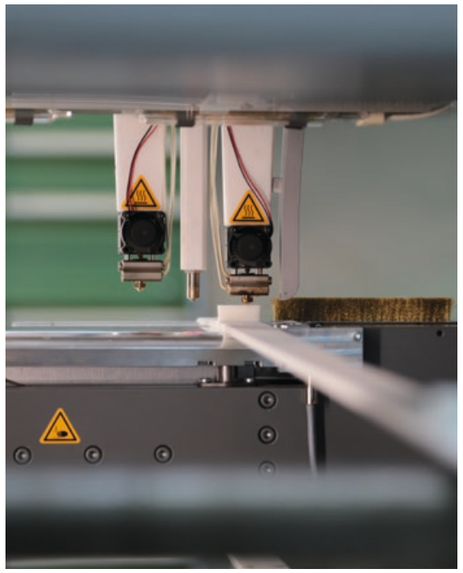
CYCLICAL AND SERIES PRODUCTION

3D PRINTING REPLACES INJECTION MOULDING

Breco Antriebstechnik Breher GmbH & Co. KG has been using 3D printing instead of injection moulding for polyurethane belts since the year 2020. The HAGE3D PROLine enables individual, application-optimised manufacture of toothed belts both economically and in smaller quantities.

Before the company started using additive material extrusion, the toothed belt profiles (with nubs, tappets or other requirements) were produced by injection moulding and then subsequently welded onto a TPU belt. There was scope to simplify the process and enhance economic efficiency with additive manufacturing in the form of the HAGE3D PROLine.

'On the one hand, the machines allow us to realise special customer requirements in a way that is economically efficient, even in small batch sizes, and on the other, to cover additional areas of use. This includes, for example, the manufacture of assembly tools and production aids. We are already eager to see what other options this will open up, and we are sure that there will be many more usage options!' – Alexander Uljanov, user at Breco.

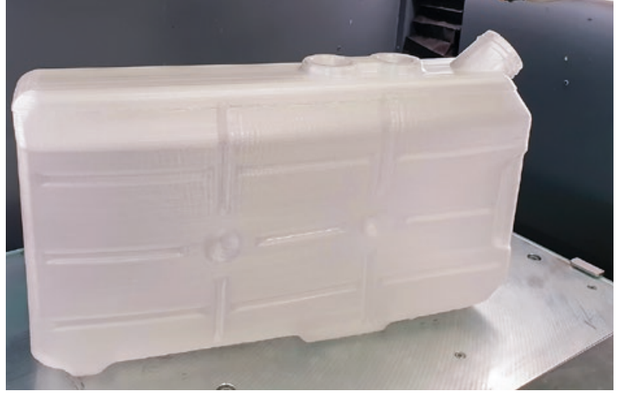


PROTOTYTPES AND EQUIPMENT PRODUCTION

FIVE YEARS OF CONTINUOUS PRINTING

Liebherr-Hausgeräte Lienz GmbH has been continuously operating a HAGE3D printer for the past five years, demonstrating that 3D printing is well established in industry. As Liebherr-Hausgeräte already had the necessary experience of using 3D printing components, the requirements that the printer needed to fulfil were clearly defined: large build chamber, open material system and short lines of communication for service and availability.

'Customers like Liebherr are a shining example of how additive production can be used economically. The original focus was actually on prototyping. The range of applications has expanded considerably over time,' explains Thomas Janics, managing director of Hage3D. Lucas Putzhuber, responsible for the Moulds & Toolshop in Industrial Engineering division at Liebherr's Lienz site adds: 'That's quite correct. We have a few highly motivated and resourceful designers in equipment and device production. They quickly discovered that 3D printing could open up a whole new world of opportunities, and they come to us with a new part that they'd like to print every single day. We sometimes have parts for our refrigerators and freezers produced at short notice as well, such as when an injection-moulded part is missing or we need a slightly modified part.'



FUNCTIONAL PROTOTYPES

LARGE-FORMAT, LEAK-PROOF CANISTERS FROM PP

As the leading global provider of vehicle washing systems, Washtec uses innovative technologies such as additive manufacturing. In the early days, the company continued to rely on 3D printing providers, but experienced problems with the long lead times for large-volume components, and data confidentiality. Added to this was the size restriction in the SLS process. In their search for a new in-house solution, they ultimately found what they needed at HAGE3D.

A customisable, solvent-resistant and liquid-tight canister made of PP (polypropylene) was jointly produced, to exacting customer requirements, as part of a feasibility study. In addition to the impermeability and chemical resistance of the plastic, the print bed adhesion, uniform temperature control of the build chamber and suitable process parameters were essential. And, despite the divergent and high demands, these were solved with the HAGE3D machine after only a few print tests. Users at Washtec were quickly able to operate the machine themselves and print the first parts as soon as the two-day commissioning, including training by a HAGE3D expert, was completed. In addition to the production of canisters, the HAGE3D 140L is also used for various other internal applications, including vacuum grippers with integrated channels, supports for joining processes, auxiliary devices, covers and cladding parts.

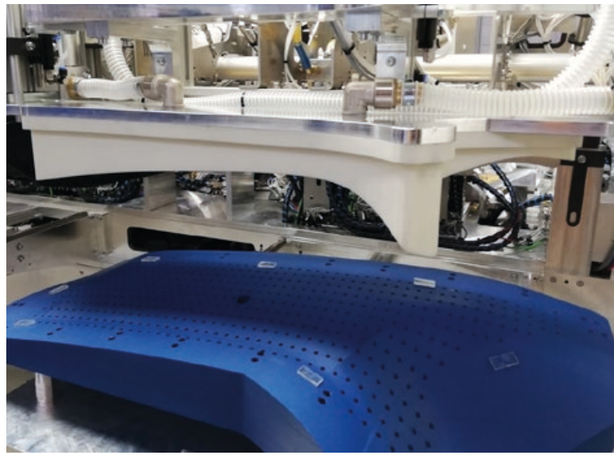
3D PRINTING IN THE VEHICLE INTERIOR

SYSTEMS MANUFACTURER 3CON RELIES ON HAGE3D

Systems manufacturer 3Con produces machinery to laminate car doors, centre consoles and other car interior surfaces. Systems produce up to 2000 parts per day, applying coatings made of plastic, leather and other materials. The company is now the market leader and counts BMW, Mercedes, Audi, Porsche and many others amongst its customers.

Four steps to the finished car interior

1. The HAGE3D printer is used at the outset of the system manufacturing process. The car manufacturer sends the CAD model of the component. A 3D model is then created using the CAD data, and printed from ABS with the HAGE3D 140L.
2. The printed prototypes are used for setting and materials testing; the material sample of the car part is pasted over the prototype in 'test systems'.
3. A series machine is then built on the basis of the test specimens and the test results. The system also processed 3D-printed components.
4. The finished system leaves 3Con and enters into operation with the respective car manufacturer. Once there, the system bonds up to 2000 parts every day, these are then processed into cars.



INDUSTRIAL 3D PRINTER

MADE IN AUSTRIA

Our company headquarters are located in Obdach, Austria, accommodating our finance, machine development, assembly, purchasing, manufacture, service and aftersales departments. In addition, Graz is home to our sales department, and a materials and application centre, which constantly tests processes, new materials and new technologies. The high degree of vertical integration ensures consistent quality and permanent further development of solutions. Growth in recent years has led to investments in a new assembly hall in Obdach.

‘We come from industry and deliver solutions for industry. Made for continuous use industry, our solutions promise high repeat accuracy at the very best price-to-performance ratio, combined with high-quality services such as our plastics application support. And we have confidence in system openness. The possibility of open material use and the modular design are a guarantee for the long-term competitiveness of our customers.**’**

- Mag. Thomas Janics MBA, Managing Director of HAGE3D GmbH

1982	2014	2015	2017	2018	2019	2020
Foundation of HAGE special purpose machine	First industrial 3D printer based on Fused Filament Fabrication (FFF) technology	Foundation of HAGE3D dedicated business unit	Expansion of production area	Opening of Graz location	Spin-off and foundation of HAGE3D GmbH	Relocation to new production hall

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HAGE3D