

AMT



**EQUIPMENT FOR
THE 3D CONSTRUCTION
PRINTING
BY THE MARKET LEADER**

«Additive Manufacturing Technologies»

WWW.SPECAVIA.PRO

ABOUT COMPANY

The production of the largest construction printers in the world was recently launched in Russia.

The group of companies AMT-SPETSAVIA (Yaroslavl, Russia) has updated the range of construction printers (COP-printers, Construction Objects Printing): two new models of large format printers have been launched.

Construction printer S-300 with a working field of 11.5 x 11.0 x 5.4 m allows to build directly on the foundation of one or two story buildings up to 120 sq.m.

Construction printer S-500 has a working surface of 11.5 x 11.0 x 15.0 m, which makes it possible to print buildings up to 5-6 floors inclusive. At the same time, there is an optional possibility to increase the S-500 working field to: 40.0 x 11.0 x 80.0 m. (!) That makes the AMT-S-500 printer the largest 3D construction printer in the world.

It's important to note, that additionally both models have significant features. Thus, the printers "AMT" S-300 and "AMT" S-500 for the first time equipped with a direct flow printing head for fast printing. Thanks to this, the productivity of the equipment has considerably increased - up to 2.5 cubic meters per hour. For comparison, the first-generation printers were printing up to 0.6 cubic meters per hour, i.e. there was a 4 times increase in printing speed.

Especially for new printer models the new feed station, which prepares the concrete mixture, has been developed. It is matched with the print head for productivity and extrusion speed. The feed station to prepare the mixture is included in the basic equipment, along with a high pressure washer to service the equipment. Basic equipment as usual includes the control center (the computer with pre-installed licensed software and specific controllers). All without exception, printers undergo a test assembly and testing before shipping to the buyer.

"New models of the S series are essentially the next generation of building printers," - said Alexander Maslov, General Director of "AMT-SPETSAVIA". – "We've always been asked for a solution for multi-storey construction. Now we declare with confidence that such a solution exists! The AMT S300 and S500 printers are high-performance equipment with unprecedented capabilities and competitive price.

During the development we've taken into account the wishes of the developing companies, at the same time maintaining the inherent reliability of our equipment, ease of management and maintenance."

The first largest printer in the world is planned for shipment to the customer this fall. Upon its arrival, a team of Russian engineers will fly to the construction site to start up the equipment and train the staff for independent work.

BRIEF: Group of companies "AMT-Spetsavia" (Yaroslavl, Russia) is a leading manufacturer and developer of professional 3D equipment for construction and industry. "AMT-Spetsavia" is Europe's first large-scale manufacturer of building 3D printers (COP-printers, Construction Objects Printing). Since 2015, the company produces a line of portal construction 3D printers: from small format (for printing small architectural forms) to large (for printing buildings up to 80 meters high). At present, the equipment under the brand name "AMT" is exported and operates in the EU, Central Asia and the Middle East. Official website: www.specavia.pro

OUR ACHIEVEMENTS

- First company in the world to launch the serial production of construction 3D-printers (COP-printers, Construction Objects Printing)
- First residential house 298,5 кв.м., biggest 3D-printed building in Europe and CIS
- The biggest 3D-printer developed, capable to print multi-storey buildings.
- Production for the mixtures for 3D printing
- Equipment working in 8 countries (including EU)

ADVANTAGES OF OUR EQUIPMENT

Our main goal is to produce efficient and convenient equipment:

- ✓ Printing with sand concrete M 300-500
- ✓ Laying capacity up to 2.5 m³ / h
- ✓ Installation does not require much time
- ✓ Simple routine maintenance, operation
- ✓ Operated by 2 persons
- ✓ Operational life: up to 60 000 working hours
- ✓ High-quality components
- ✓ Training, technical support

TECHNOLOGY

Three-dimensional construction printing (COP, Construction objects Printing) includes the following sequence of stages: creation of 3D model of the object, division of the model into horizontal layers, layer extrusion of the construction mixture in accordance with the model, solidification of the material until the formation of the object (product).

Building printers are printing with solutions based on cement (Portland cement), sand (silicon dioxide, olivine, zircon, alumina, mullite, quartz glass, chamotte), gypsum.

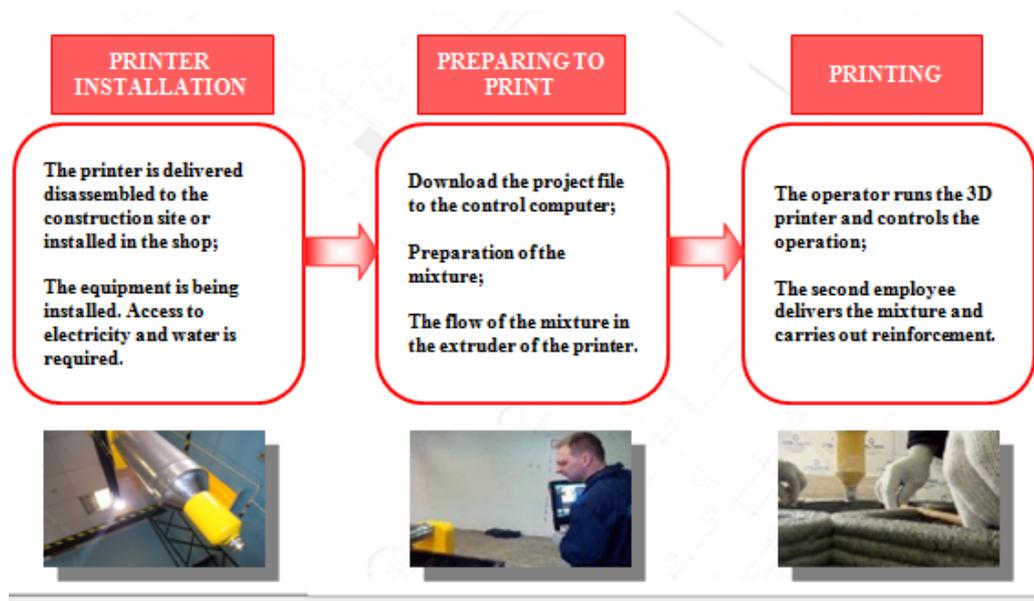
To obtain the necessary properties of the mixture various mineral additives, fiber, plasticizers, accelerators (retarders) of solidification and anti-frost additives can be used.

The choice of components for the building mixture is determined by the operating conditions of building structures and the given physical and mechanical properties of the future product: density, strength, heat resistance, thermal conductivity, resistance to mechanical stress in a significant temperature gradient, etc.

Dry mixture is being prepared with these components, and adding water, knead until a homogeneous mass. There is an option to prepare the printing mixture using fast-curing compositions.

Technical result: creation by 3D printing of building structures of complex or unique geometric shape with specified physical and mechanical properties.

Construction printing allows you to provide the design of the cavity for reinforcement, filling with heat-intensive compounds and a lining of communications.



S-6044 Model

Printer S-6044 — small-format portal COP-printer for shop production, allowing to print small concrete forms up to 12 cubic meters, i.e. various elements for buildings, gazebos, all kinds of landscape buildings, ponds and swimming pools, flower beds, barriers and fences, children's towns. It is also suitable for printing stoves, fireplaces, barbecues, barbecues and other fire-resistant products with coalition mixtures.

Characteristics: The S-6044 printer is the most compact 3D-construction printer. Refers to the category of professional workshop equipment, working life of 60,000 hours.

The basic equipment is complete: the printer includes a control computer with preinstalled licensed software. Configuration of the printers is custom-tailored, for example, printer can be wall-mount, pillar-mount or combined. The printer prints with basic composition mixes series 300 - 500 cement based, it is also possible to use mixes with mineral additives.



Producer

AMT. Russia. The equipment is certified in the territory of the Customs Union. The registration number of the Declaration of Conformity of the Customs Union is TC N RU Д- RU.A/192.B.17528
Custom tariff number TC 8479100000, Serial production. Manufactured in accordance with TR 4833-001-21740072-2016

Motor type	Parallel-shaft reduction gear stepper motor
Printing speed, cubic meters/hour	0,6
Operating field, mm	3500x7500x1200 (Long) / 7400x7500x2700 (Long 2)
Speed/positioning precision	12m/min / 2mm
Working power, kW	1,6
Printing layer, mm	10x30 (height/width)
Concrete expenditure for 1 m ² of the wall at 4-layers printing	0,12 m ³ .
Period of the guarantee	12 months

S-1160 Model

The S-1160 printer is a large-format portal printer. It allows you to print various construction parts of buildings in the workshop for the subsequent assembly on the foundations or printing of buildings with an area up to 140 sq.m. (for the core model) directly on site.

Characteristics: The portal concrete printer of a large format (working field can be increased up to 200 sq.m. and more).The advantages of this equipment are the following: easy construct, simple maintenance and operation, an understandable layout. The large printer resource - 60 000 hours - classifies it as professional equipment.



The printer is expanded to include a high pressure washer and a concrete mixes' supplier station. The basic configuration is complete: the printer includes a control computer with preinstalled licensed software. The printer S-1160 prints basic construction mixes on the cement series 400-500, it is also possible to use mixes with mineral additives.

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Motor type	Parallel-shaft reduction gear stepper motor
Printing speed, cubic meters/hour	0,6
Operating field, mm	11500x11600x2700
Speed/positioning precision	12m/min / 2 mm
Working power, kW	7,5
Printing layer, mm	5-10x20-50 (height/width)
Concrete expenditure for 1 m ² of the wall at 2-layers printing	0,12 m ³
Period of the guarantee	12 months

S-300 Model

The S-300 printer is a large-format portal COP-printer with enhanced performance for printing elements of buildings, structures on foundations with an area of 120 sq m and a height up to 5.4 m.

Characteristics: Printer S-300 in the base assembly is equipped with electric lifts 6 meters high, which allows you to build a 2-storey building and is equipped with an arm with a propulsive print head for faster printing (up to 25 sq.m./hour).

The printer is expanded to include a high pressure washer and a **synchronized** concrete mixes' supplier station (specially designed for S-300 / S-500 printers). The basic configuration is complete: the printer includes a control computer with preinstalled licensed software. The printer S-300 prints basic construction mixes on the cement series 400-500, it is also possible to use mixes with mineral additives.



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Motor type	Stepper motors with planetary gearboxes
Printing speed, cubic meters/hour	2,5 (25 sq.m./hour)
Operating field, mm	11500x11000x5400
Speed/positioning precision	12m/min / 2 mm
Working power, kW	12
Printing layer, mm	10-30x40-80 (height/width)
Concrete expenditure for 1 m2 of the wall at 2-layers printing	0,12 - 0,25 m3
Period of the guarantee	12 months

S-500 Model

The S-500 printer is a large-format portal COP-printer with enhanced performance for printing buildings up to 80 meters high with an area up to 340 sq.m. (special equipment). This is the biggest construction printer in the world so far.

Characteristics: Printer S-500 in the base assembly is equipped with electric lifts 16 meters high, which allows you to build a 5-storey building and is equipped with an arm with a propulsive print head for faster printing (up to 25 sq.m./hour).

The printer is expanded to include a high pressure washer and a **synchronized** concrete mixes' supplier station (specially designed for S-300 / S-500 printers). The basic configuration is complete: the printer includes a control computer with preinstalled licensed software. The printer S-300 prints basic construction mixes on the cement series 400-500, it is also possible to use mixes with mineral additives.



Producer

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 Custom tariff number TC 8479100000, Serial production. Manufactured in accordance with TR 4833-001-21740072-2016

Motor type	Stepper motors with planetary gearboxes
Printing speed, cubic meters/hour	2,5 (25 sq.m./hour)
Operating field, mm	11500x11000x15000
Speed/positioning precision	12m/min / 2 mm
Working power, kW	12
Printing layer, mm	10-30x40-80 (height/width)
Concrete expenditure for 1 m2 of the wall at 2-layers printing	0,12 – 0,25 m3
Period of the guarantee	12 months

MAJOR COMPETITORS

	 (Russia)	 (USA)	 (China)	 (USA)	 (Russia)
Printers serial production and sale	Yes, since May, 201	Planning to present a production sample in 2018	No, company provides 3D printing service	Planned	No, company provides 3D printing service
Industrial use	Yes	Yes	Yes	No	Yes
Pre-fab/on site printing	Yes/Yes	n.a/Yes	Yes/No	Yes/Yes	Yes/Yes
Equipment installation	Easy, takes 3 hours	Labor-intensive	Labor-intensive	Labor-intensive	Easy
Equipment's preparation time	2% of working time	n/a	n/a, presumable, 7% of working time	n/a, presumable, 5% of working time	n/a, presumable, 5% of working time

	 (Russia)	 (USA)	 (China)	 (USA)	 (Russia)
Construction mixes range	Wide, inc., industrial production	n/a	Limited by in-house production	Not wide	Geopolymer concrete only
Construction mixes price	Starting from \$28/ton	n/a	n/a, presumable starting from \$60/ton	n/a, presumable from \$150/ton	Starting from
Declared lifetime, hours	60 000	n/a	n/a, high	Low	10 000
Operating field, LxWxH, m	Minimum 2,5x1,6x0,8 Maximum 31x11x80	n/a, big	Presumable, 12x20	Presumable, 8x10	Ring with inside diameter of 4 m and outside full diameter of 8,5 m

Research questions to student teams

1. Find out potential market size for 3D building printers within 1 or 2 countries in the EU (provide explanation why you choose these countries).
2. Find out about the interest of construction companies in these countries to adopt and/or expand their business operations towards working with 3d building printers.
3. What kind of market entry model into the selected EU countries under number 1, would you suggest for AMT company?