FDM-Clean 3D

Get yourself a time and competitive advantage:

Extremely effective Removal of FDM 3D print Support Materials

Automatic | Fast | Clean | Safe | Economical

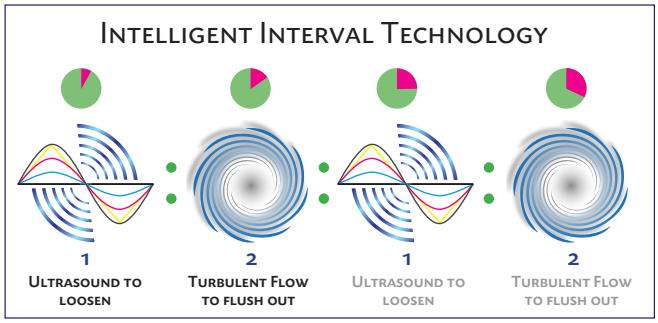
Rapid Prototyping – the fast availability of 3D prototypes is a highly topical subject. The fast production of 3D prints is in fact impressive – the availability of the final print version instead is often delayed due to the time consuming and often manual removal of the support material.

The far better alternative is a fast, efficient and economical support structure removal using our ***FDM-Clean system*** *which we developed especially for FDM and other materials requiring heated cleaning liquids.*

After extensive tests with different support materials regarding the ideal calibration and matching of frequency, amplitude, cleaning liquid, interval and temperature we can now offer a solution, helping you to remove the support structure of your FDM 3D prints in a cost- and time efficient way.

Schmitt GmbH
Ultraschalltechnik

The Removal Process



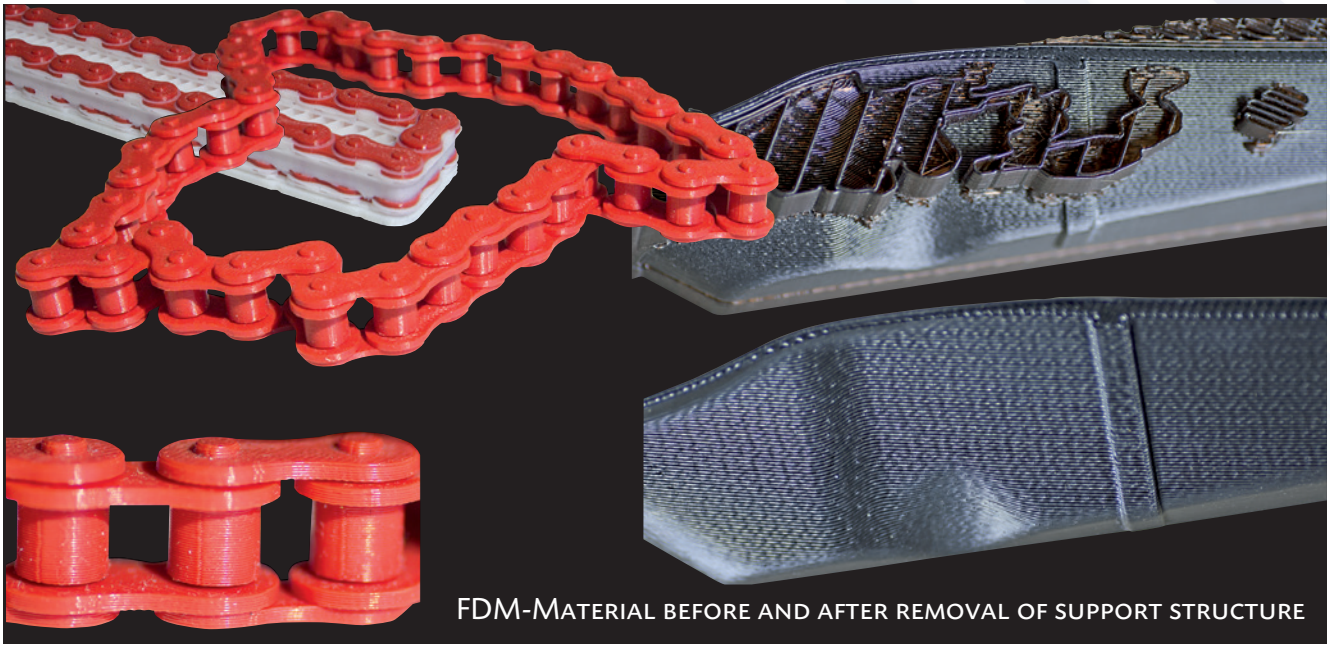
Our **FDM-Clean 3D** systems are designed to clean multiple objects simultaneously. The objects are placed into a metal basket which is hooked into the system. The combined *Ultrasonic/ Turbulent Flow* system is controlled by an electronic interval program: the ultrasonic sequence loosens the particles of the support structure; the *Turbulent Flow sequence* dissolves the particles and washes them off. The temperature is adjustable – in our systems a setting to 60°C is absolutely effectual and even minimises the grade of evaporation. After the removal the objects solely need to be shortly rinsed with clean water. *Depending on the kind of support material, its thickness and complexity, the removal will be faster than before.* ***The support removal can be done in an unattended overnight process.***

Pump and material saving chemistry

Our dedicated developed chemistry does ***not crystallize*** *and therefore does not damage any pumps or piping – a very important cost saving factor in the 3D printing process.*

Solo-, Duo- and Trio-Systems

Our solutions are available as ***Solo-systems*** *(support removal)*, ***Duo-systems*** *(support removal and rinsing)* and ***Trio-systems*** *(support removal, rinsing, drying)*. The rollable Caddies *(Drip Trays)* for our cleaning systems are completely made of 2mm special stainless steel. They are amply dimensioned to *(in case of an unlikely leakage)* hold the complete content of a cleaning basin.



FDM-Material before and after removal of support structure

Basic Principle of Ultrasonic Cleaning

Ultrasonic stands for oscillations with frequencies above 16 kHz. A highly energetic ultrasonic checking stimulates liquids to oscillate. The continuous compression and decompression results in intense pressure variation *(up to 1.000 bar)*, which leads to strong currents in the micro level and therefore to a brush-effect, which removes particles from the top of the support structure.

Our ultrasonic based systems for removing 3D print support structures utilise frequencies and amplitude modulations which we specially developed for the support structure removal. Once these frequencies are applied to a cleaning liquid they produce millions of small continuously imploding bubbles. This process is known as cavitation. The cavitation *(electronic brushing)* allows to dissolve support structure parts even in areas, which are difficult to access without damaging the construction material.

Our ***Turbulent Flow*** and ***Ultrasonic based*** systems outperform conventional removal methods regarding effectivity and speed and can even be used without a manual mechanical pre-removal of supporting parts.

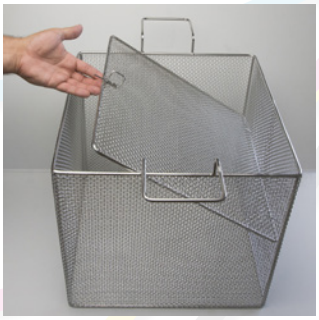
Strictly solid components

All metal parts of our systems are manufactured from high quality special stainless steel – this applies to the basins as well as to the pipes, cover plates and frames.

Efficient pumps produce an effective turbulent flow as part of the electronically controlled interval with the ultrasonic sound.

In-House production

The production of the systems including the ultrasonic devices and controllers takes place in our own facilities. Therefore Schmitt Ultraschalltechnik has full control on the quality of all installed components.



Variable Zoning Grids

The variable clampable zoning grids allow to hold down parts in the liquid as well as a vertical zoning of the basket for a targeted positioning of parts in front of *(or apart from)* the flushing openings *(e.g. to protect fragile parts)*.

FAQs

1. How long does the cleaning liquid last ?

   For FDM material (depending on complexity and workload) up to 8 weeks.

2. Which liquid should be used and what are the costs ?

   *The cleaning liquid is named **SUT-Clean 1**, approx. 9,– Euro per liter, mixing ratio 1:10 (10 %) – we recommend to use distilled water.*

3. Should 3D prints be manually pre-cleaned or can they be placed untreated directly in the liquid?

   No pre-cleaning may work but will result in a faster saturation of the liquid and a much longer cleaning time. A rough manual pre-separation reduces the removal time and extends the lifetime of the cleaning liquid significantly.

4. How much time does the cleaning take ?

   This also depends on the material and the accessibility of the support material. The average expenditure of time is approx. 6-8 hours @ 60° C

5. Which type do I need – **Turbulent Flow** or a combination of **Turbulent Flow and Ultrasonic sound** ?

   This depends on the kind of support material and should in case of doubt be evaluated in a practical test. The removal of FDM support sructures also works without ultrasonic sound – but it is significantly faster using both technologies. The temperature is adjustable and set to 60°C as the default value - which also minimises the evaporation of the cleaning liquid.

Technical Data FDM-Systems *(systems with higher volumes on request)*

Product key: **SUT ### US FL H**

- SUT – Schmitt Ultraschall Technik
- ### – Liter
- US – Ultra-Sound
- FL – Flow
- H – Heating

	SUT20 FLH	SUT20 USFLH	SUT70 FLH	SUT70 USFLH	SUT90 FLH	SUT90 USFLH	SUT140 FLH	SUT140 USFLH
Technology	Flow + Heating	Ultrasound + Flow + Heating	Flow + Heating	Ultrasound + Flow + Heating	Flow + Heating	Ultrasound + Flow + Heating	Flow + Heating	Ultrasound + Flow + Heating
Support structure	The Schmitt Cleaning Systems have proven for being ideally suited to remove FDM support structures							
Cleaning solution	**SUT-Clean 1 (Standard):** Pump-protecting alkaline liquid concentrate to be mixed with water in a 1:10 | 10% ratio *(see separate spec sheet/security information)*.							
Cleaning Basin	Welded, heat insulated Cleaning Basin consisting of 2mm stainless steel with included pump. (adjustable from 30°C - 85°C).							
Basin Lid	Standard with all systems – with hinge							
Handles / Rolls	Side Handles		Rolls Standard		Rolls Standard		Rolls Standard	
Dimensions W x D x H	approx. 420 x 370 x 620 mm		approx. 580 x 605 x 800 mm		approx. 640 x 590 x 1.020 mm		approx. 880 x 750 x 850 mm	
Basin W x D x H	approx. 320 x 270 x 300 mm		approx. 430 x 430 x 430 mm		approx. 500 x 450 x 500 mm		approx. 650 x 550 x 450 mm	
Basket W x D x H	approx. **300 x 250 x 250 mm**		approx. **410 x 410 x 370 mm**		approx. **480 x 430 x 450 mm**		approx. **630 x 530 x 370 mm**	
Cubic Capacity	**20 Liter**		**70 Liter**		**90 Liter**		**140 Liter**	
Flushing Openings	2 x 14 (120 + 220mm)		2 x 14 (130 mm + 280 mm)		2 x 21 (200 mm + 300 mm)		2 x 24 (130 mm + 280 mm)	
Ultrasonic Devices	–	6 pieces	–	12 pieces	–	12 pieces	–	18 pieces
Niveau-Control	Optional	Optional	Standard	Standard	Standard	Standard	Standard	Standard
Drain Connection	1 Zoll		1 Zoll		1 Zoll		1 Zoll	
Heating	1 x 900 W (30°C - 85°C)		2 x 900 W (30°C - 85°C)		2 x 900 W (30°C - 85°C)		4 x 900 W (30°C - 85°C)	
Electrical Supply	230 V | 50/60 Hz approx. 1,2 kW	230 V | 50/60 Hz approx. 1,4 kW	230 V | 50/60 Hz approx. 2,2 kW	230 V | 50/60 Hz approx. 2,5 kW	230 V | 50/60 Hz approx. 2,2 kW	230 V | 50/60 Hz approx. 2,5 kW	380 V | 50/60 Hz approx. 3,8 kW	380 V | 50/60 Hz approx. 4,5 kW
Weight	approx. 33 kg	approx. 37 kg	approx. 74 kg	approx. 83,5 kg	approx. 91,5 kg	approx. 104 kg	approx. 115 kg	approx. 125 kg
Optional Supplies	**Clamp Grid** for hold down parts, vertical basket zoning and positioning of parts in front of (or apart from) flushing openings **Caddy** (rollable stand with collecting tray and additional drip pan area for baskets)							
Caddy Dimensions / Weight	approx. 86 x 38 x 27 cm / approx. 14 kg		approx. 120 x 65 x 27 cm / approx. 24 kg		approx. 140 x 70 x 20 cm / approx. 29,5 kg		approx. 160 x 80 x 20 cm / approx. 36 kg	

May 2019 E&OE. – Specifications and details subject to change without notice

Further Systems for support structure removal:

Poly-Clean 3D for support removal of 3D-Prints based on Polyjet material
Wax-Clean 3D for removal of wax based support material
SLA-Clean 3D for cleaning of Stereolithographic 3D prints *(Removal of remaining resin material)*

About the manufacturer

Schmitt Ultraschalltechnik GmbH serves several industry markets with special solutions for ultrasonic cleaning of miscellaneous materials and products. Besides the industrial cleaning solutions Schmitt also offers solutions for the leisure and sports markets *(specialised on cleaning plastic products – see web site for further information).*

Customised manufacturing

We offer to manufacture our systems to your specific needs. Tell us the required size and performance and we will send you a corresponding quotation. We can also help you to dimension the required system.

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Schmitt Ultraschalltechnik GmbH
Albert-Schweitzer-Strasse 6
D-63165 Muehlheim-Laemmerspiel | Germany
Tel: +49 (0) 61 08.79 34 41 | Fax: +49 (0) 61 08.79 34 42
info@schmitt-ultraschall.de | www.schmitt-ultraschall.de