TINIJET

TiniJet, a disruptive Waterjet cutter developed by a French company, offers an unparalleled industrial level of performance and all of the Waterjet Cutting Technology unique capabilities in an affordable, compact and stylish design.

Specifically engineered to be at home in any workshop worldwide, TiniJet is the must have machining equipment for fablabs, design and prototyping centers, technical schools and universities, short run workshops and many more...

Working area:	**300*300 mm / 11.81*11.81 in**
Working pressure:	**1.200 Bars / 17 000 Psi / Direct drive pump°**
Capability:	**« All materials »**
Budget:	**17.000 € (from/kit version)**

TiniJet ® is a product of DeuroS Sarl 69 Place Jules Vallès 34000 Montpellier France

You can join our team at contact@tinijet.com

Just send us a mail at contact@tinijet.com and we can organize an interview through Skype to answer your questions "face to face"

Jérome Sauret - TiniJet Research

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Click here to launch TiniJet Video, and here for Information and documentation

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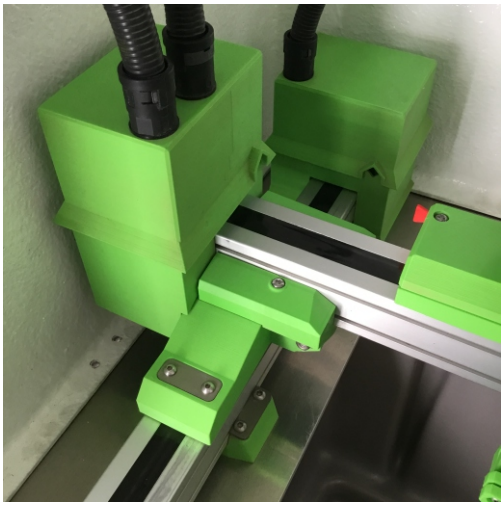
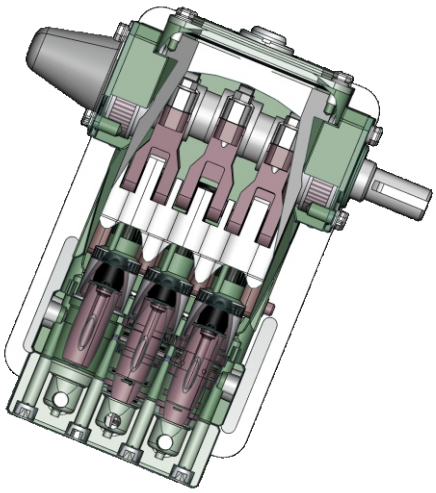
EXCLUSIVE DOSING SYSTEM
FOR ABRASIVE

DIAMOND CUTTING
HEAD



AXES SYSTEM UNDER AIR PRESSURE
FOR PROTECTION



COMPLAIN WITH CE REGULATIONS
(UTE / EN / IEC)

ROTOMOLDED TANK

FIBER GLASS TOP
WATERTIGHT

0,5 LITER - - 0.13
GALLON PER MINUTE

EXCLUSIVE
ABRASIVE DOSING
SYSTEM

RJ 45
COMMUNICATION PORT
CONNECT TO
YOUR COMPUTER

THERMO FORMED
COVERS

4 DESIGN CASTERS
TO MOVE MACHINE EASILY

X
750 mm // 30 inch

Y
790 mm // 31 inch

Z
1.690 mm // 67 inch

KG
85 Kg // 190 lb

One phase domestic current100/110/115/120/127/220/230/240 Volts - - 50/60 Hz - - **1,5 kw**

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TINIJET

THE “MISSING TOOL”

Waterjet Cutting is an almost universal tool that cuts most materials without any heat and as such is a dream for anybody who is into crafts and making. However, this technology typically relies on large (i.e.: 2 by 6 m), powerful (> 4000 bar, 3 l/min) and expensive (> 100 K$) equipment, which tends to discourage most people.

My Dad, who has been in the waterjet industry for over 20 years, always dreamed of getting Waterjet Cutting to be more known and readily available. When I joined him last year after a PhD in Applied Neuromechanics at UNC Greensboro, we decided that, even though Dad was getting close to retirement, the time was right to make “the dream” happen.

For most digital fabrication and research centers, typical Waterjet Cutting equipment is too expensive and cumbersome. Therefore, we focused on the idea of a compact machine capable of cutting relatively small pieces of various materials with no real constraints around cutting time but with professional results.

After over 2 years of development we came up with TiniJet, a machine that can cut almost any material up to 25 mm thickness in a working area 300 by 300 mm (11.81*11.81 in) using a well-focused abrasive jet at 1200 bar (17 KPsi +).

Don't get it wrong though; TiniJet has nothing of a low cost machine. It is an industrial level waterjet cutter putting together a solid aluminum frame, a very reputable high pressure direct drive (triplex) pump and a specifically designed and patented cutting head produced by the leader on the market. To run it, we partnered up with one of the best and very few specialized waterjet control systems who adapted the complete command system to account for the specificities of such a special/disruptive machine.

Our research partner for waterjet is one of the very few labs in the world specialized in waterjet and is the only one capable of simulating/optimizing the abrasive and waterjet flow in the cutting head.

With a budget below 20 000 US $, TiniJet is really the missing tool and it is available for pre-order now. It all comes in a box and is really easy for an individual to set up in a day.

Since we are part of the third industrial revolution, a concentrated structure collaborating digitally with a great network of waterjet specialists around the world to develop breakthrough products marketed worldwide, we were also motivated by the development of concepts such as the Autonomous Part Production (APP). APP, autonomous means that digital files of parts are made available for people to reproduce using local means but it also implies that for most of the electrical parts used in TiniJet we supply all detailed documentation etc. Since we tried to only include brands represented worldwide, it means that if anything breaks down, like things do, you will be able to get it replaced locally. So APP applies to

Replacing used/damaged parts

Replacing consumables

Creating relevant systems

Improving on supplied systems

We will not stop here! Our teams worldwide are working on some brilliant ideas for “traditional” waterjet cutting machines and how they can be formulated to adapt to specific environments.

Jérôme Sauret PhD
Head of TiniJet R&D

Here is a list of questions that we typically get asked, if you have any other questions feel free to get in touch, we always love talking about our passion: Waterjet Cutting!

General

Who are you?

We are based in the south of France. The quasi-majority of our suppliers produce in Europe. We have a network of partners throughout the world working with extensive experience in Waterjet and machining, research labs, fablabs, industrials etc. Overall our team has over 200 man/year of experience in the field of waterjet industry.

What is your working pressure?

1 200 bar (over 17 000 PSI), we are using a well-known European triplex pump manufacturer with a great track record of producing pumps for various industries over the last 20 years. We are working on being able to modulate (from 400 to 1 200 bars) that pressure during the cut for example to pierce materials that tend to delaminate.

What is the power of TiniJet?

Electrical 1.5 kw

Are all 1.5 kw waterjets the same?

At first sight; yes, 1.5 kw is the expression of the mechanical power developed by the machine, it is the result of the combination of flow and pressure. So you can get the same mechanical power with 1 200 bar and 0.5 l/min or with 600 bar and 1 l/min.

So is it better to have lower pressure and higher flow?

Not really, because when you get to the cutting head a higher flow means two things:

- You have to let that water through so bigger orifice 0.3 – 0.35 mm and bigger focusing tube 1mm = Bigger kerf 1 mm +.
- You need more abrasive to keep proportion of abrasive in water constant

This results in a larger “tool” (kerf) which means you are removing more material than you really should (losing time and most importantly abrasive money)

Whereas with a higher pressure and lesser flow you get

- Smaller orifice 0.18mm, smaller focusing tube 0.5 mm and narrower kerf 0.7 mm
- Better acceleration of the abrasive resulting in more erosion

Finally, because the velocity of abrasive in the jet is higher, you get a straighter, faster cut.

How much water does TiniJet consume?

TiniJet uses 0.5 l (0,13 gal) of water per minute of cutting.

Can I re-use the water?

No you cannot, if you are being realistic, this practice is not very current in the industry since the “recycling” costs (money and energy) for the water way surpass the cost of new water.

Can I use a different size nozzle/orifice?

You can vary orifice size to a very small extent that will not modify cutting characteristics. And for cutting foam you can use a smaller jewel so you water only cut will be more accurate.

Can I use a different supplier of nozzle/orifice?

You can purchase your cutting heads from most producers, you are not tied in with us or with your local provider. Even though we try and make every effort to ensure that our products are optimal for our customers, we may not always be right on target.

Abrasive

What is this abrasive material?

The only abrasive that can be used with TiniJet, like most waterjet cutters is Garnet, a natural, chemically neutral material (almandine) that is either extracted from a mining process (hard rock) or from natural erosion (alluvial). Recommended grain (used for tests) is alluvial 120 mesh.

How much does abrasive cost?

Abrasive is the biggest portion of the budget when you are using an abrasive waterjet cutter. Depending on purchasing quantity/quality and location, prices can vary widely from 350 dollars a ton to 800 dollars a ton. While we set up the most adapted system for supplying in your area, we have agreements in most of the world to supply 25 kg bags. It is a rather important part of the budget on which you cannot really cut on quality. Please note that TiniJet can work with hard rock or alluvial garnet even though we use and recommend alluvial for economical reasons.

How much abrasive does TiniJet use?

120 g/min is standard, but this value can be adjusted on the CNC to save abrasive. Cutting speed will change automatically to ensure the quality of the cut.

Where do I buy the abrasive?

Get in touch with us at abrasive@tinijet.com with your location / quantity desired and we will provide you with a quote or with the best arrangement for you to find abrasive in your area. Of course, you can use abrasive that you did not purchase from us, please make sure to share experiences with the community.

Can I reuse the abrasive?

Using recycled abrasive does not decrease cutting performance, so yes, it is possible. However, it is not very common due to the relative complexity of the technical solutions that need to be implemented.
Some commercial systems are currently available to recycle the abrasive. Basically, they remove all the debris and abrasive grains that are outside the size range optimal for the machine, make sure that the abrasive is well dried and then render it ready for re-use, typically about 70% of the original quantity.
If this is relevant to you for a makers-lab or school project, get in touch, we have some ideas that may be worth sharing for a micro recycling factory.

Can I just put the abrasive in the trash?

In most countries you can dispose of small(ish) quantities of dried, debris-less abrasive by throwing them in the trash. However, we advise you to contact your local waste or waste removal agency to make sure you are disposing of used abrasive in the appropriate way, or start an abrasive recycling business!

Cutting

What materials does TiniJet cut?

TiniJet can cut “all materials” but note that density, hardness and thickness are the main factors when it comes to cutting speed. So that very hard and very dense materials are going to be very difficult to cut. Cutting speeds are calculated via a verified algorithm, a result of years of experience in waterjet. Please, if you do have a specific question on cutting capability or cutting speed on a specific material, do let us know and we will provide you with a clear answer based on years and thousands of hours of cutting experience.

Can I cut foam and other soft materials?

Yes, TiniJet is supplied with a specific cutting head that you mount in a couple of minutes and that produces a very fine jet allowing you to cut any soft material like pizza or apples! If you can cut it with a cutter knife, you can cut it with “water only”. You could also cut it with a normal head, without abrasive, but the cut would be nowhere near as sharp.

Can I engrave?

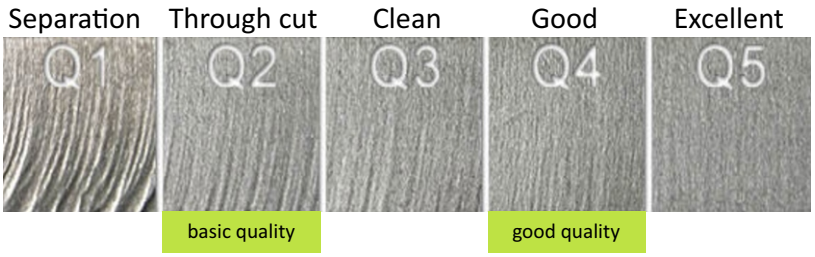
Engraving is one of the latest evolutions in the programming capabilities of TiniJet, you can definitely use TiniJet to engrave anything on your hard material of choice.

Up until what thickness can I cut?

Density and Hardness of the material are combined to calculate machinability which will affect how much thickness of a material TiniJet can cut. Please note that when we say “thickness it can cut” we actually mean cutting with a reasonable quality surface and taper. Because of its soft nature, the “waterjet tool” does not create a straight cut, such that in a 1 mm thick material you could not notice taper but that in a 25 mm stainless steel you would. TiniJet will “always” cut a material, even very thick, but it would do so with a taper in the cut and with very low cutting speeds. Generally, we consider that thicknesses of hard materials up to 12 mm (1/2 in) are ok.

What are some typical cutting speeds?

As mentioned before cutting speed is a function of material thickness, machinability and abrasive type and feeding rate as well the geometry of cutting path (slowing down when turning for example). But you should also not forget about quality, in our (the waterjet) industry people typically use the following classification of 5 qualities. For the sake of giving speeds here, we have qualified Basic and Good quality as presented below.



Please find some common speeds / materials and thicknesses below.

1200 BARS :: 0,5 LITTER PER MINUTE
Nozzle 0,18 mm; focusing tube 0,5 mm; abrasive flow rate 110 g/min, kerf width approx. 0,7-0,8mm
this is most likely over limits of the jet to be sure better use mined garnet (Barton type)

		MATERIAL THICKNESS				
	mm	1,6	3,2	6,4	12,7	25,4
	inch	1/16	1/8	1/4	1/2	1
basic quality	Aluminium	265	119	53	24	11
		10,43	4,69	2,09	0,94	0,43
	Ceramic (basic)			225	102	46
				8,86	4,02	1,81
	Copper	124	55	25	11	5
		4,88	2,17	0,98	0,43	0,20
	Granite			86	39	17
				3,39	1,54	0,67
	Marble			155	70	31
				6,10	2,76	1,22
	Mild Steel	95	43	19	8	3
		3,74	1,69	0,75	0,31	0,12
	Polycarbonate	1025	461	208	94	42
		40,35	18,15	8,19	3,70	1,65
	Stainless Steel	88	39	17	8	3
		3,46	1,54	0,67	0,31	0,12
	Titanium	130	58	26	12	5
		5,12	2,28	1,02	0,47	0,20
good quality	Aluminium	166	74	33	15	6
		6,54	2,91	1,30	0,59	0,24
	Ceramic (basic)			101	64	28
				3,98	2,52	1,10
	Copper	77	35	15	7	3
		3,03	1,38	0,59	0,28	0,12
	Granite			54	24	11
				2,13	0,94	0,43
	Marble			97	44	19
				3,82	1,73	0,75
	Mild Steel	60	27	12	5	2
		2,36	1,06	0,47	0,20	0,08
	Stainless Steel	55	25	11	5	2
		2,17	0,98	0,43	0,20	0,08
	Titanium	81	36	16	7	3
		3,19	1,42	0,63	0,28	0,12

Values in blue boxes can be achieved more easily by using hard rock garnet.

What accuracy do you offer?

Cutting accuracy is around ± 0,05 mm (2/1000 in).

Running the machine

What do I need to use TiniJet?

When you order your TiniJet, you have to tell us what location exactly you wish to install it in and the exact electrical characteristics of single phase current so that we can provide you with the exact machine you need.
Once in your house you need an electrical plug that includes a connected ground connection and a water main or a tank (Min pressure into the machine 1 bar).
Any computer running Windows with an RJ45 connection.

Maintenance and operation cost

Below you will find some indicative prices / hours of use for the different consumables: (Prices estimation ex. taxes and shipping)

	Estimated life time (hours)	Price (Euros) ex,tax	Hourly cost incidence		
Seal Kit	1000	600 €	0,60 €	26%	6,0%
Distribution kit	4000	1400 €	0,35 €	15%	3,5%
Attenuator	4000	500 €	0,13 €	5%	1,2%
HP hose	2000	500 €	0,25 €	11%	2,5%
Cutting head	2000	700 €	0,35 €	15%	3,5%
Focalizing tube	300	120 €	0,40 €	17%	4,0%
HP filter	500	90 €	0,18 €	8%	1,8%
Water filter	150	8 €	0,05 €	2%	0,5%
		Hourly maintenance costs		2,31€	23%
	Hourly consumption	Unit price	Hourly cost incidence		
Abrasive *	7,2	1,00€	7,20€	93%	71,9%
(Kg)Electricity *	1,5	0,30€	0,45€	6%	4,5%
(Kw/h)Water * (l)	30,00	0,00€	0,06€	1%	0,6%
		Hourly Using costs		7,71€	77%
			Hourly Total costs		10,02€

* pessimistic values, may varies due to local conditions

How do I cut a part?

Either import direct from your favorite software in a usual format like dxf or draw direct in the software.
Once done with the drawing implement cutting quality path in path out and then you are ready to post process it (one click). The cutting file should then be imported in the CNC software where you select material and thickness and the starting point and then it is ready to cut.

CAD Formats I can use?

Any format accepted by FreeCad, traditional formats such as dxf or dwg are OK.

Is TiniJet CE certified?

Yes, TiniJet is delivered with CE certificate and plate.

Price and Conditions

What is the price of TiniJet?

17 000 Euros.

Is packaging included in the price?

Yes TiniJet comes in a wooden case/pallet protected for long haul transport. The wood packaging is IPPC-ISPM-NIMF-15 compliant.

Is shipping included in the price?

Shipping is not included in the price.

Are import and duty taxes included?

For all territories out of European Community local custom costs and duty taxes are not included, please refer to local customs office.
For all sales in European Community, no custom costs.

What do I get for that price?

For this price you get a wooden case/pallet including everything you need to install and run the machine. Follow the instructions and install it within a day of work.

Open sourcing / Documentation

We will be sharing step files of each and every one of the parts with our customer, if you damage a part or want to customize it, then you will have the means to do it locally. Also we have chosen global brands for electronics and electrics and will provide documentation for a maximum of those parts so that you can get them replaced locally as well. The CNC is not open source but the preparation software is and we encourage people to share their improvements with the community.

We provide a comprehensive user guide in English.

What warranty and support do you offer?

Unless specific local agreements apply warranty is offered over a period of 2 years (except consumable parts). Online/email support in English with guaranteed response within 24 h of time in French working hours/days (UTC/GMT) +2.

Can I distribute TiniJet?

We are always looking to increase our network of distributors with people willing to follow TiniJet users and offer them great service and after sales. Get in touch! contact@tinijet.com