

Resato

HIGH PRESSURE TECHNOLOGY



WATERJET CUTTING MACHINE TYP R-CM

FOR PRECISION AND RELIABILITY
USER-FRIENDLY OPERATION

PRINCIPLES OF WATERJET CUTTING

With waterjet cutting, water is forced through the small nozzle of a cutting head at a pressure of 4000 bar. During the process the pressure of the water is converted into velocity. Water leaves the cutting head at a velocity of approximately three times the speed of sound. It is the impact energy on the material that causes a cut in the material. With soft materials pure water can be used for cutting. With hard materials more energy is required for cutting and an abrasive is added to the water.

ADVANTAGES OF WATERJET CUTTING

The prime important advantage of waterjet cutting is that virtually every material can be cut. This is true even for reflecting and laminated materials. Unlike other cutting techniques, almost any thickness can be cut with a waterjet. In addition waterjet cutting offers the following advantages:

- No heat-affected zones, no thermal hardening, no material stresses
- Dust-free, no spreading of smoke or toxic fumes.
- No need for sharpening of the tools.
- Little mechanical load of the work piece.
- Material cutting loss is limited.
- No need for deburring.
- No need for re-working.
- Relatively high cutting speeds for thick materials.
- Cutting up to 200 mm, depending on the type of material.
- High surface quality.
- Hygienic solution in food processing industry.

MATERIALS

Practically every material may be cut with water. Compared to laser cutting and plasma cutting, thick and exotic materials are better cut with waterjet cutting techniques.

EXAMPLES OF MATERIALS THAT CAN BE CUT:

- Stainless steel
- Aluminum
- Titanium
- Copper
- Brass
- Glass
- Marble and granite
- Ceramic products
- Hybrid plate materials

- Plaster
- Paper and cardboard
- Plywood
- Glass wool and rock wool
- Leather and rubber
- Compound materials
- Foam materials
- Floor covering materials
- Packing materials

- Pastry
- Meat
- Fish



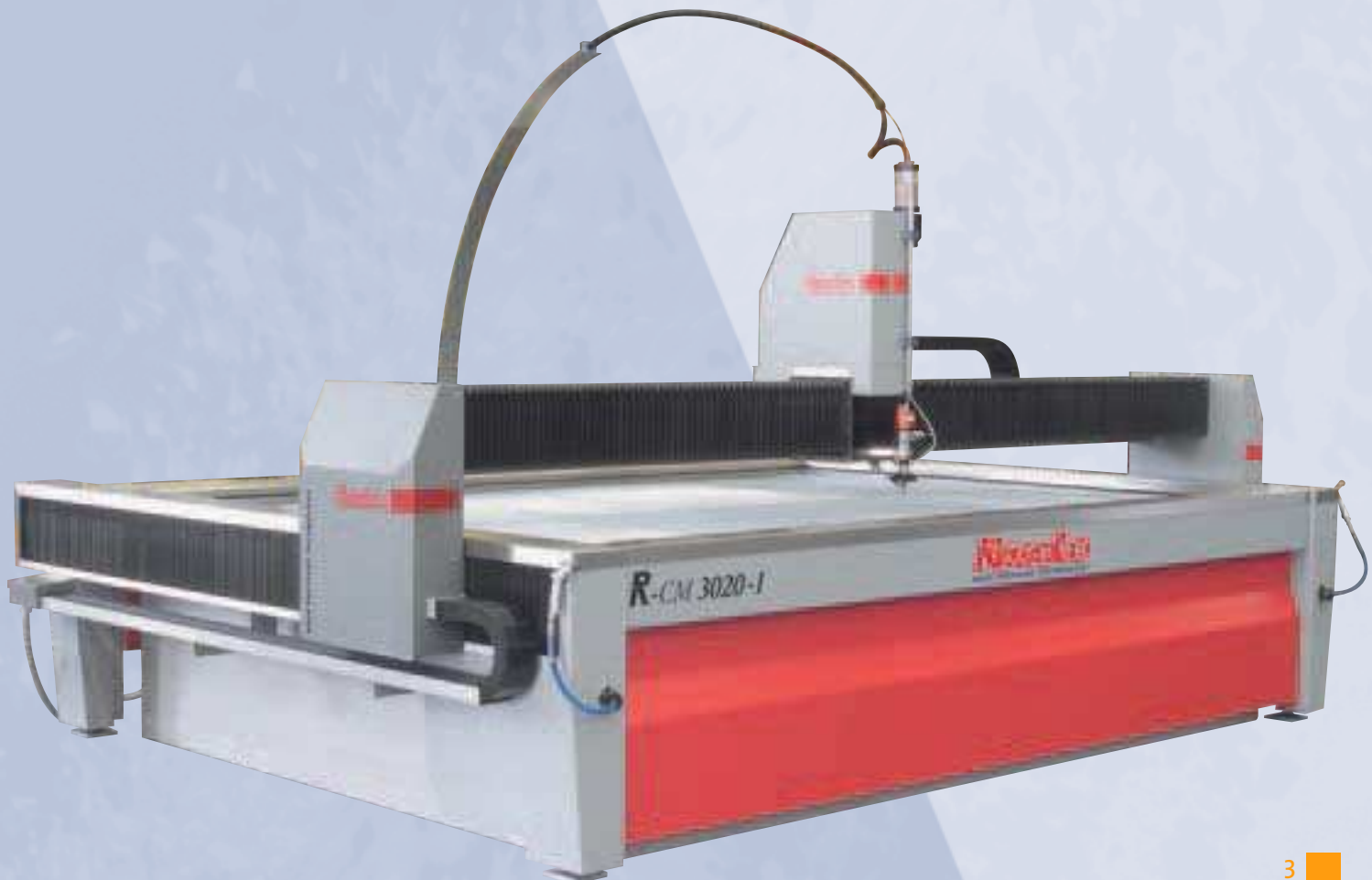
ADVANCED TECHNOLOGY: RESATO CUTTING MACHINE TYPE R-CM

Resato International currently offers a complete line of Powerjet R-CM waterjet cutting systems. The system consists of a Powerjet waterjet cutting pump and a cutting table. The cutting tables are characterized by their robust and stable construction. They are standard supplied with highly advanced CNC/PLC for control of the various drive axis. By way of a mobile 15" touch panel, cutting jobs can be selected and the cutting table, the waterjet cutting pump and the electronic abrasive feeder system can be remotely controlled.

On the 15" touch panel the cutting program can be simulated and the cutting order of the various products or parts of the product can be made visible. During cutting, the cutting process is also visible on the monitor. The combination of the powerful CNC and accompanying Powercam software allows you to "look ahead". Depending on the cutting speed, the speed of the cutting head will be adapted at bends

and small arcs. During cutting, speed and abrasive supply can be adjusted from the control panel.

A very important part of the CNC-control is the so-called return on contour. A button allows you to move the cutting head in a backward direction along the existing cutting contour.



VARIOUS TABLE SIZES AND MORE THAN ONE CUTTING HEAD

The **R-CM** cutting tables are available in various standard sizes and can be supplied with one, two or three cutting heads that are adjustable in height. The cutting heads can be operated independently of each other. As an option, custom-made machines with more than three cutting heads can be delivered.

THE JETLIFT LINEAR Z-AXIS

The newly developed Jetlift linear Z is equipped with a linear drive system. The Jetlift linear Z is provided with an integrated automatic height sensor. The cutting head, as part of the linear Z, is provided with a built-in collision protection using the abrasive nozzle as sensing element. In case of a collision there will be no damage to the Z-axis nor to the abrasive nozzle.

After starting the cutting process the cutting head will be placed at the right height above the work piece. During cutting the distance between the cutting head and the work piece will be measured and if necessary adjusted. It can be selected if the height sensor measures continuously or with a preselected time interval.

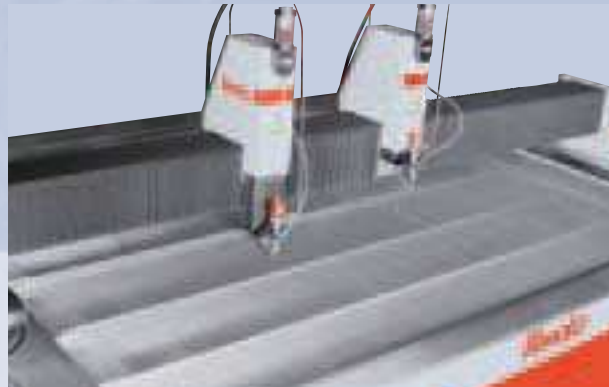
The height sensor also detects an obstacle, for instance a cut part which protrudes up, such that the cutting machine will stop automatically.

CUTTING TABLE CONSTRUCTION

The cutting table consists of a steel precision construction with mounted pre-stressed V- and roller guides. The drive system is guided by precision gear racks and self-cleaning pinions. This considerably decreases the sensitivity for contamination and minimizes the sound level of guides and drive. The guides, racks and pinions are hardened, polished and have hard chrome Duralloy corrosion protection with molecular binding of the basic material.

For further protection against water and abrasive, the guides and drives are adequately shielded by bellows and protective stainless steel plating. To guarantee accuracy, the bridge is driven by servomotors on both sides of the table.

As mentioned earlier, the bridge can be supplied with a maximum of three cutting heads. The cutting heads can be hand-adjusted in relation to each other. As an option, the cutting heads can be adjusted automatically from the cutting software.



CATCHER

The catcher (water tank) is made of stainless steel and is placed separately from the table. Thus any resonance that may occur in the water tank during cutting will not be passed on to the steel precision construction of the table.

- The catcher is made of stainless steel and is placed separately from the table and provided with self supported grating.
- The grating is curved in order to avoid reflections during cutting.

The water level in the catcher can be raised in such a way that water immersed cutting is possible (reduction of sound level). To facilitate rapid water level adjustments, we recommend fitting an optional pneumatic control system.

SPEED AND ACCURACY

The cutting speed of the system can be adjusted from 1 to 12,000 mm/min. For cutting of thick materials in particular a uniform movement is important at low velocities. Because we have paid special attention to the mass inertia of the various moving parts, the Resato **R-CM** table cuts with high quality and accuracy even at low speeds. The cutting accuracy of the table is +/- 0.1 mm.



RESATO CUTTING HEAD TYPE VJW

The Resato cutting head type VJW is suitable for cutting with pure water or for cutting with water and abrasive. The abrasive cutting head has a Long Life mixing chamber with only two wearing parts: the water nozzle and the mixing tube. The cutting head is pre-aligned. The water nozzle and the mixing tube can be replaced in a very short time without use of special tools. Thus standstill periods for the required replacement of wearing parts in the cutting head can be reduced to a minimum. Conversion to / from pure water cutting can be done rapidly.

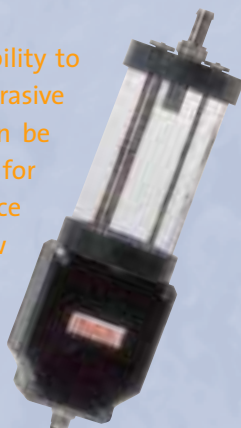


ELECTRONIC FEEDER SYSTEM EF2

In order to optimise the cutting speed and quality Resato offers an electronic abrasive feeder system, mounted on the portal of the cutting table close to the cutting head. This system guarantees a reliable and continuously adjustable abrasive flow rate to the cutting head.

The abrasive flow rate can be controlled from the CNC control panel and can be adjusted during the cutting process. The system offers possibilities to directly and automatically set the abrasive flow rate supplied to the cutting head from the Resato Powercam cutting software. The flow rate is adjustable from 100 to 1000 grams per minute.

The system also offers the possibility to automatically switch from a low abrasive flow rate to a high rate. This can be important for materials like glass, for which a low pressure must pierce the glass at a low abrasive flow rate. The flow rate can then be increased as the cutting pressure increases at the start of the cutting movement.



ELECTRONIC MONITORING SYSTEM EMS

Especially for unmanned operation, the electronic feeder EF2 is fitted with the EMS electronic monitoring system. In combination with the VJW cutting head all important cutting parameters are monitored. The system detects defects in nozzles, mixing tube and abrasive supply. In case of a detection the EMS system initiates an alarm or an automatic shut down of the cutting process.

ABRASIVE SUPPLY SYSTEM

The electronic feeder system EF2 is fitted with a small integrated storage chamber. It can be filled from an automatic supply reservoir. The abrasive is automatically transported from the supply reservoir to the abrasive dosing system on the portal of the cutting table by means of air pressure. The reservoir has a signaling system to indicate low level of abrasive. The system ensures that the cutting process is automatically stopped. Supply reservoirs with a 140 litres, 200 litres or 300 litres capacity are available.



EASY AND USER-FRIENDLY OPERATION

Resato has given much attention to simple and easy-to-learn machine operation (MMI). No specific knowledge of CNC is required.

The MMI software runs in a Windows XP embedded environment on a fanless industrial PC, which can communicate over Ethernet networks if required. Basic principle for the design of the MMI software was to leave out all non-essential data to ensure creation of a highly informative and user-friendly control interface. Cutting jobs can be selected on the mobile 15" touch panel. During the processing of a job, the cut path is continuously displayed on the touch panel. All essential machine and pump functions are controlled and displayed by the Resato MMI software.

In addition, a new job can be prepared while all essential functions of the job in progress can still be monitored.



CUTTING SOFTWARE POWERCAM

The efficiency and speed at which cutting orders can be executed depends largely on good preparation. Resato supplies the CAD/CAM cutting software package Powercam to assist in the preparation of cutting orders. The package is installed on a PC. A cable connection takes care of communication with the CNC control.

Features of the Resato Powercam package are:

- Quick and easy operation including drawing facilities
- Quick and logical method of working, i.e.:
 - importing of work pieces
 - entering material and thickness data
 - nesting and automatic generation of the CNC program
 - transmission of CNC program to cutting machine.
- Import facility for file formats like DXF, DWG and IGES

- Only one test cut for determination of the machinability of a type of material of a particular thickness.

The machinability determines:

- cutting speed
- increase or decrease of speed in corners and circles



- Database with materials and machine-related parameters:

- machinability with five different cutting qualities and most efficient cutting speed
- lead in and lead out

- Work pieces, nestings and rest sheets can be saved for further use
- Common cut: allows work pieces to be placed against each other to decrease cutting time.
- Calculation report:
This report allows you to accurately calculate beforehand the cutting time and the cost price of the material to be used. This is an important aid for scheduling and for preparing quotations.



- Very quick and efficient nesting possibilities both for hand-operated and automatic type. The nesting module automatically takes into account overlaps and the number of selected cutting heads. It is also possible to prevent movement over work pieces that have already been cut.
- Printing options for overviews, drawings, time and cost calculations and stickers.
- No knowledge of CNC-controlled machines required. However, basic knowledge of PCs and Windows is required.
- Including internet live software update contract.

MODEM SUPPORT

Resato offers an optional package consisting of a modem and support software for quick help in case of questions about the Powercam cutting software or maintenance status of the Powerjet pump.

FAULTS TRANSMISSION BY SMS (OPTION)

Special for unmanned operation of the cutting machine Resato offers the possibility of transmitting faults through SMS to a mobile telephone.

ABRASIVE REMOVAL SYSTEM

The water in the catcher (tank) will gradually become saturated with abrasive material during waterjet cutting. Abrasive material may be manually removed, depending on cutting volumes. Alternatively, an abrasive removal system for intensive use of the waterjet cutting machine may be installed. In this option, a special pumping system removes the abrasive / water mixture from the water tank and removes the abrasive / water mixture to a filter tank. A Big Bag filter is mounted in the filter tank to separate the abrasive from the water. Water is then recycled back to the water tank.

WATER TREATMENT

Because the quality of the water is very important for the quality of the cutting process and for machine life of the high-pressure seals and nozzles, Resato offers a series of water treatment installations. In these, water of drinking-water quality is filtered and softened. Water treatment installations for semi-continuous and for continuous use are available.

POWERJET R-CM MODELS

Types	working area
R-CM 21 / *	2 x 1 Meter
R-CM 22 / *	2 x 2 Meter
R-CM 24 / *	2 x 4 Meter
R-CM 32 / *	3 x 2 Meter
R-CM 33 / *	3 x 3 Meter
R-CM 34 / *	3 x 4 Meter
R-CM 36 / *	3 x 6 Meter

*=indicate the number of cutting heads (three maximum).

Customer-specific and deviating dimensions and types can be delivered optionally.

MODELS OF POWERJET HIGH-PRESSURE WATERJET CUTTING PUMPS

Type	Max. capacity L/min.	Max. pressure bar	Max. power KW
PJE-2-4000	2,1	4000	19
PJE-3-4000	3,1	4000	30
PJE-4-4000	3,8	4000	37
PJE-6-4000	5,5	4000	55
PJE-8-4000	7,6	4000	75



COMPANY PROFILE

Since 1985 Resato International has specialized in the development and production of high-pressure components and installations up to 14,000 bar. We have fully equipped engineering, R&D and production facilities. Pumps as well as cutting tables are manufactured on our own account. The waterjet engineers employed by Resato have multidisciplinary schooling and are proficient in mechanical-, electronic- and computer-related tasks. Our engineers take care of ready-to-use deliveries of complete waterjet cutting machines. That means:

- Advice concerning infrastructure of the machine room on electricity, water, pneumatics and discharge.
- Transport of the machine from Resato to the customer.
- Unloading of the machine on site.
- Placing and connecting table, pump, water treatment system and CNC control.

- Installation of the Powercam cutting software.
- Instruction and training concerning the cutting software.
- Instruction and maintenance training for pump and table.
- Cutting of reference examples with accompanying measuring protocol.

Resato has extensive cutting laboratory facilities to continuously further develop our waterjet cutting systems. We also use these facilities to execute cutting tests for potential customers.

Because we manufacture both the pumps and the cutting tables on our own account, efficient support and service are guaranteed.

All essential parts are kept in stock for manufacturing and for execution of maintenance and service.

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Feel free to contact our sales department if you need more definite information.