

PETROGRAPHIC CUT-OFF MACHINES



In petrographic sample preparation, cutting is the first operation to reduce their dimensions allowing the following processing steps.

During this step it is also possible to isolate structures for specific observations and analyses.

Cutting by diamond wheels can induce a thin deformed layer which has to be removed during the subsequent operations of pre-grinding and lapping, that also produces better planarity and reduced roughness of the surfaces.

For this reason and because samples are frequently very delicate, the cut-off machines must perform accurate cuts, avoiding any surface alteration.

The large range of **REMET's** cut-off machines allows the cutting of any petrographic sample, from chunk of rocks and large pebbles processed with the **MT 500**, to small fragments of minerals cut to thin parallelized sections using the **MICROMET**, a precision cut-off machine.

The cut-off machines **MT 60, MT 70, MT 80, MT 100** and **TR 100S** allow rapid and precise petrographic sectioning.

To avoid problems related to abrasive wearing and to corrosion, these machines are built with:

- body and hood in stainless steel AISI 304 with micro-compact surfaces
- wide polycarbonate window for monitoring cuts
- machine components

in stainless steel and in cast iron protected with electroless nickel

- the powerful cutting wheel motor is in cast iron; the cutting wheel spindle is driven by a Poly-V belt that avoids sliding problem; the spindle is mounted with high precision ball bearings double sealed.

All the mentioned cut-off machines can cut slices thanks to a translating table, with a 100 mm run, that is operated by an external hand-wheel.

The translating table is corrosion proof because it is coated with electroless nickel.

Two adjustable nozzles, attached to the cutting wheel guard and directly connected to the water supply, provide adequate cooling during

sectioning; the delivery of water is controlled by an electric valve that delivers water when the cutting wheel motor starts.

Inside the body of the machine there is the decantation of cutting residues, while the liquid goes to the laboratory sewer system.

The described machines are built according to the CE norms (low tension external push-button control panel, hood with interlocked microswitch, wheel motor protection etc.)

The machine are supported with antivibrating adjustable feet and are provided with instruction manual and proper working tools.

MICROMET

MICROMET cut-off machines are ideal tools for reproducible precision cuts and thinning, with a minimum material loss and without inducing alterations (microcracks, etc.) in mineralogic samples. **MICROMET** is available in three versions:

AUTOMATIC: the frontal push-button panel controls all the cutting operations. A very sensitive electro-hydraulic system controls the sample advancement and the cutting stress is controlled on a display.

SEMI-AUTOMATIC: adjustable weights with balancing counterweight control sample advancement.

MANUAL: the operator

controls sample advancement with the use of an external hand-lever.

The continuously adjustable cutting wheel speed (0-3000 rpm) and the micrometric controlled transversal traslation of the sample holding arm allows cutting and thinning any type of material. Great attention has been paid to avoid wearing and corrosion problems:

- the machine body and all the main components are in stainless steel
- the internal components are in electroless nickel coated steel or in "anticorodal" aluminium alloy.

MICROMET are built



according to the existing safety regulations:

- low tension (24 V) push-button panel
- transparent polycarbonate hood to protect the working area
- a safety microswitch stops the machine when the hood is opened
- emergency stop push-button



MT 500 - LARGE SECTIONS



The **MT 500** cut-off machine is used for preliminary cuts of large samples (max 400 x 170 mm). It is built with a robust stainless steel body, with an anterior polycarbonate hood, fastened to a strong steel structure in which a wheeled stainless steel tank is located. The machine has a strong work-table with longitudinal and transversal manual movements for cutting slices. A fast clamping device locks the petrographic sample to the work-table. Cooling and cleaning systems are directly connected to the water supply. When the cutting wheel

motor starts, automatically a water-spout hits both sides of the cutting wheel. Water is also sprinkled in the bottom of the machine for cleaning the inside walls.

A metallic grid holds coarser cutting residues while the water falls underneath in the stainless steel tank that is connected to the sewer system of the laboratory. The machine is equipped with a manual washing gun for internal cleaning. Special attention has been paid to guarantee maximal operating security:

- the electric board is water tight

- the push-button panel has low tension (24 V)
- the hood opens only when the cutting wheel is not moving
- an internal light allows the control of all cutting steps
- full protection of the operator is guaranteed with the strong structure of the cut-off machine, the irremovable cutting wheel guard and the transparent polycarbonate hood.

The longitudinal translation can be made automatic using an advancement system with adjustable speed (0-250 mm/min), with engaging clutch and anterior and posterior stop sensors.

TECHNICAL SPECIFICATIONS		MT 60	MT 70	MT 80	MT 100	TR 100 S	MT 500	
Cutting wheel diameter (mm)		200	230	250	300	350	500	
Max cutting section (mm)		60	70	80	100	120 x 300	170 x 400	
Distance between spindle axis and work-table (mm)		220	230	280	300	350	260	
Motor power (CV)		1,5	1,5	3	4	4	7	
Pump power (CV) (optional)		0,25	0,25	0,25	0,25	0,25	0,25	
Power supply		Standard 380V third phase - other solutions on request						
Tank capacity (liters)		20	20	25	25	50	100	
Weight (Kg)		100	105	130	145	250	550	
Dimensions (mm)	Width	800	800	850	900	800	900	
	Length	910	910	1030	1030	1000	1300	
	Height	590	590	640	680	1650	1750	
Transversal run of the work-table (mm)		100	100	100	100	100	100	
Longitudinal run of the work-table (mm)		-	-	-	-	500	600	

THIN SECTIONS

TECHNICAL SPECIFICATIONS		MICROMET Automatic	MICROMET Semiautomatic	MICROMET Manual
Max cutting wheel diameter (mm)		150	200	200
Max cup-wheel diameter (mm)			150	
Max cutting diameter (mm)		45	60	60
Motor power (HP)			0,25	
Cutting wheel speed (rpm)			0+3000	
Pumps capacity (liters/min)			8	(optional)
Tank capacity (liters)		5,5	4	4
Max working load (kg)		3,5	2	manual
Lateral translation (mm)			25	
Power supply		220V Single phase (other solutions on request)		
Weight (Kg)		45	38	36
Dimensions (mm)	W	500	500	500
	L	600	460	460
	H	420	380	380

IMPREGNATION

Friable and porous samples, without the structural characteristics to allow the cut or not enough solid to allow the preparation of the cementing surface, must be embedded in cold resins using the proper molds. The vacuum impregnation equipment allows the embedding of sand-like samples and the impregnation of delicate and fragile samples. Thanks to a translatable and rotatable crucible, it is

possible the separate deaeration of the sample and of the resin. Once the proper vacuum has been achieved, the resin can be poured on the sample. This procedure allows the preparation of compact and bubble free samples.



POLISHERS: GRINDING AND POLISHING

Before cementing the sample to the glass slide, all the deformations induced during the cut must be removed obtaining a uniform, planar and polished surface.

REMET's polishers allow the preparation of planar surfaces either manually or

automatically, thanks to the proper sample holders. Using the polishers with diamond discs (having different grain size), it is possible to carry out the desired pre-grinding and final polishing operations. This operation is also

performed on cast iron discs or polishing cloths charged with abrasive powders or diamond pastes.



TECHNICAL SPECIFICATIONS

MODEL	LS2	LS250V	LS3V
Disc diameter (mm)	200	250	300
Rotation speed (rpm)	0-300	0-300	0-300
Motor power (HP)	0,25	0,30	0,35
Power supply	220V/50Hz single phase		
Weight (Kg)	32	37	45
Dimensions (mm) W x L x H	370 x 500 x 300	370 x 500 x 300	460 x 630 x 380

REMET's petrographic polishers perform grinding and polishing operations with perfect planarity in a short time due to the special design and the large availability of accessories for manual and automatic operations.

Great attention has been paid to the choice of the components and of the construction materials: the steel body of the machine is oven painted, the drainage

bowl and the splash-guard ring are made of stainless steel, the transmission gearbox guarantees a perfect operation also in case of heavy loads, the working discs are interchangeable with rapid coupling, a flush jet keeps clean the drainage bowl removing the grinding residues, the push-buttons is supplied with low tension (24V), while the variable speed working disc allows slow rotation for grinding

and polishing fragile and delicate samples.

REMET's polishers are available with working discs of 200-250-300 mm diameter and can be equipped with automatic devices for polishing and for lapping.



MOUNTING - CEMENTING

Having obtained one flat surface in the sample, it is possible cementing it on a glass slide.

The slides may be of the polished type, if properly calibrated, or prepared to the desired thickness with a MICROMET equipped with a grinding unit or with the REMET's thinning system operating with micrometric adjusting ring.

The cementing must be very accurate and the air-bubbles must be totally eliminated to guarantee the proper contact between sample and glass slide.

The choice of the proper

resin is extremely important for a good adhesion.

The device for cementing petrographic samples is built with a robust structure having four pressing springs with plastic pressure discs. Using this equipment it is possible to get cementing specimens with parallel surfaces and therefore minimal and constant quantity of resin.

A hot plate with adjustable temperature may accelerate the bonding process.



COLD RESINS

IMPREGNATION

Epoxy resin with very high fluidity. It can be dyed.

MOUNTING

Epoxy resin with very high fluidity. It can be dyed.

CEMENTING

Epoxy resin with good adhesion characteristics, for cementing samples to glass slides.

UV CEMENTING

U.V. polymerization resin, used for cementing samples to glass slides.

THINNING OPERATIONS

RESECTIONING

The sample cemented to a glass slide, after proper cleaning from exceeding resin and marking, has to be resectioned to remove excess material. Such operation may be performed with a petrographic cut-off machine or a **MICROMET** cut-off machine fitted with

the glass slide vacuum sample holder. Thanks to the micrometric movement of the sample holder, it is possible the proper precise positioning of the slide compared to the cutting wheel, obtaining specimens of the desired thickness.

After the cut it is possible to perform the thinning of the sample with the following procedures:

GRINDING with MICROMET LAPPING with the thinning system on the polishers.



GRINDING

MICROMET GRINDING

A **MICROMET** cut-off machine, fitted with the grinding system, allows the thinning operation of the glass slide with micrometric precision using a diamond cup-wheel of fine grain size. The slide is held by a vacuum sample holder.

This holder has been studied to hold all kind of glass slides, including the circular ones with 1" diameter. The structural characteristics of this machine allow thinning without vibrations and the preparation of flat parallel-faced samples. The preparation of thin

sections is simple and fast and with reproducible results.



LAPPING

THINNING SYSTEM WITH MICROMETRIC ADJUSTING RING

This system includes a polishing machine, a sample holder with micrometric adjustment (the slides are held by vacuum) and a series of accessories.

The thin sections are obtained by lapping with papers or abrasive powders. This system can be used also for polishing glass slides.

The two described preparation systems are interchangeable or complementary. Both have been developed to offer adequate answers to the different needs. Both systems allow the preparations of glass slides with the desired thickness.



FINAL FINISHING

Once obtained the thin section with the desired thickness, it is possible to cover the sample with a cover glass or to perform the polishing. The cover glass is bonded with Canada balsam or with a cementing epoxy resin. Samples prepared for Microanalyses measures and observation with the SEM must be polished with very fine grain size abrasive ($< 1 \mu\text{m}$) to produce a perfectly scratch-free surface.

