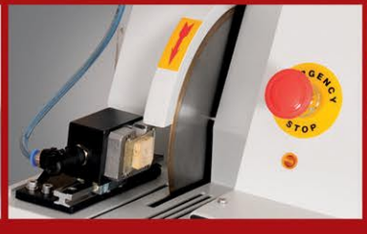


PETROGRAPHY

GEOLINE

metkon®
Technology behind Specimen

20 YEARS

GEOLINE®

Petrography is the science of investigating microstructure, composition and inter-component relationship of rocks, ceramics, minerals, man-made materials etc. The method of prepare petrographic samples for investigation is called "thin-sectioning". Preparation of thin-sections require very precise instruments and know-how.
METKON offers complete range of instruments for petrographic preperation, starting with a piece of rock and finishing at 20 microns…

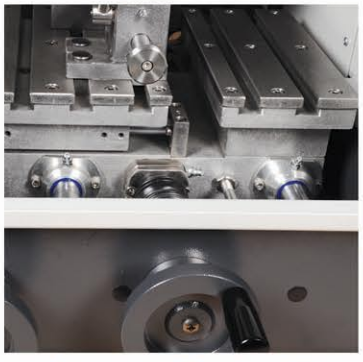
GEOCUT

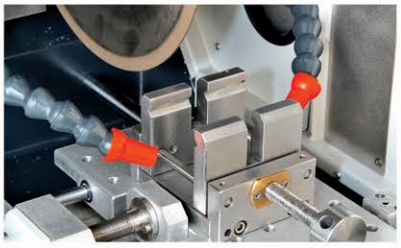
- Advanced Cutter for Minerals, Rocks and Geological Specimens
- Cutting capacity upto 100 mm in diameter
- Uses diamond blade 250 / 300 mm
- Linear Table Feed Cutting method
- X-Y table bed with cutting cross feed
- Various Clamping systems available

GEOCUT consists of a cast aluminium base on which the motor and the working space are provided in the form of two separate housing. A large window of Lexan and a sealed 12V lamp in the cutting chamber allow precise observation of the cutting process at an optimum degree of safety. A large feed table located in the cutter's generous work area can accommodate a variety of different clamping devices which need to be selected. The feed table provides a long travel depth making the GEOCUT ideal for cutting long or deep samples in a single pass. X-Y Cross table is available as standard for parallel and serial cutting. Cooling water recirculating system is an optional part of GEOCUT. Cooling is effected by two water jets located on both sides of cutt-off wheel.

GEOCUT cutting machines have the highest safety standards. The interlocking safety device does not allow the motor to be started unless the hood is closed. The hood can not be opened before the cutting motor is stopped. The electronic brake system, which is a standard feature, brings the cutter to a quick full stop in seconds after it has been switched off.

Many petrographic cutting applications require the sectioning of a specimen from an irregular shaped sample. The small size or irregular sample shape can create positioning and clamping difficulties for the operator. To overcome these difficulties, METKON offers a number of special clamping devices for use with GEOCUT petrographic cutter.





GEOCUT is a robust manual cutter with X-Y bed designed for cutting minerals, rocks, concrete, glass, ceramics, refeactory and other geological samples

GEOFORM

- Precision thin sectioning instrument for mineralogy.
- Cutting and Grinding processes combined.
- Specimen Holder with Vacuum for standard slides.
- Built in micrometer with digital readout.
- Water cooling

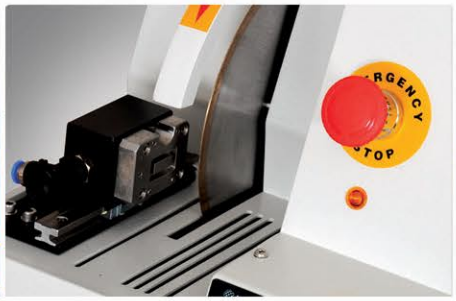
Preparing thin sections requires highly precise instruments and knowhow. GEOFORM is a bench-top instrument that will cut and grind down to 30 microns or less depending on the hardness of the material because mineralogical specimens usually contain hard and soft phases.

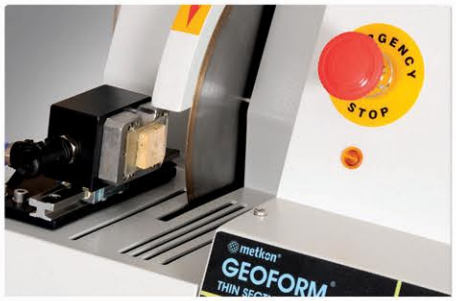
GEOFORM has two parts: Cutting and Grinding. On the cutting module, the specimen is fixed on a holder with vacuum and re-sectioned upto a thickness of approx. 0,5mm. Water cooling during cutting avoids deformation.

GEOFORM can accomodate diamond and CBN cut-off discs upto 250 mm diameter.

The grinding module is designed for precision grinding. A universal vacuum holder accepts different sizes of glass slides by changing the location pins. A vacuum pump delivered as standard holds the glass slide fixed on the holder during grinding process. A built-in digital micrometer ensures high precision and the specimen is ground with an accuracy of 2 microns. Diamond cutting disc and grinding wheels are both on the same spindle which is precisely alligned for high accuracy. A dual in-line filtering unit removes the moisture from the vacuum line and drains into the cutting chamber when the vacuum pump is turned off.

Ergonomically designed font panel (above) GEOFORM designed to accept most common petrography slides (left)





GEOFORM is a universal product that can be used for precision sectioning, re-sectioning and grinding operations

VACUMET

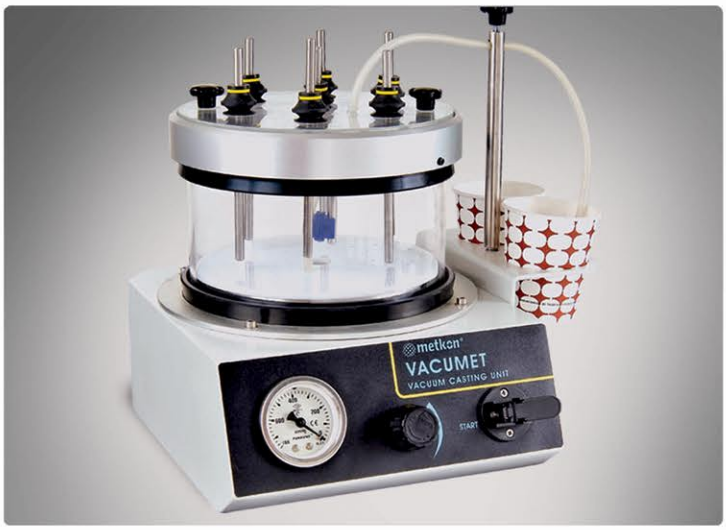
- Compact and simple
- Built-in vacuum sytem with Gauge
- Efficient impregnation
- Multi-specimen application.

VACUMET is designed for embedding and impregnation of porous materials. It removes the trapped air from the mounting material and eliminates the gaps between the specimen and the resin.

Most mineralogical specimens have porosities, cavities and cracks and ther fore need to be under vacuum. VACUMET fulfills this requir ment easily and efficiently. In addition, VACUMET can also be used for glueing the specimens on the glass slides for further processing in thin section preparation.

METKON offers wide range of cold mounting consumables high quality embedding forms for different types of mineralogical application.

Only air connection is necessary to operate VACUMET. No electric or water connection is needed.



FORCIPOL 300-1V with FORCIMAT-TS

- Automatic Operation
- Single force application for petrography
- Special holders for thin section lapping and polishing.

FORCIPOL 300-1V is a versatile & durable & reliable grinding/polishing machine. It can accommodate 300 mm diameter wheels with variable speed between 50-600 RPM. The modern electronics provide a smooth speed variation. Motor on/off and water on/off buttons are mounted on the front panel with digital display. This allows the setting of optimum speed and cycle time for each individual preparation process. By using appropriate working discs, it can carry grinding, lapping and polishing process very smoothly.

The drive elements are fixed on heavy duty aluminium alloy casting. The wheels are mounted on ball bearings allowing the application of high pressures to prepare even large specimens. Ball bearings used provide quite and vibration free operation. Water inlet and flexible water outlets with control valves for wet grinding are standard features.

FORCIPOL 300-1V, when coupled with FORCIMAT-TS, becomes and automatic thin section preparation system. FORCIMAT-TS is an low speed automatic head and it mounted on a rigid hardened post which is fixed to the base of the FORCIPOL 300-1V grinder/polisher. FORCIMAT-TS is driven by a 100 Watt DC motor at 35 RPM speed which provides high torque for big specimens and allows long operation time. Speed of head is specially adjusted for thin section and petrographic sample preparation. The pneumatically applied individual force is adjustable between 5 N (1.1 lb.) and 60 N (13.5 lb.) from the front panel and is displayed on a gauge.

DOSIONE Peristaltic Fluid Dispenser is an optional accessory of FORCIMAT-TS.

It is and automatic fluid dispensing instrument used in combination to obtain consistent specimens and to save time and consumables. Dispensing parameters like frequency and period can be controlled.

Combination of FORCIPOL 300-1V, FORCIMAT-TS and DOSIONE provides operator free, fast, precise and repeteable petrographic sample preparation.

Specially designed thin sections holders which called LAP-TS and POL-TS are used for lapping and polishing of thin sections. LAP-TS has special Boron Carbide stops which function is to precisely determine final thickness of specimen on the glass slide. POL-TS is used for polishing process.

GEOFIX

GEOFIX is fixture for mounting specimens to glass slides for thin-sectioning. It provides a uniform thickness of bonding material beetween specimen and glass slide. It has spring activated oading system which applies optimum force on specimen and glass slide. 8 specimens can be cured at the same time.

GEOFIX can easily be placed on HOT PLATE. The base of GEOFIX is made by high thermal conductivity material. This provides fast curing time of bonding material.

HOT PLATE

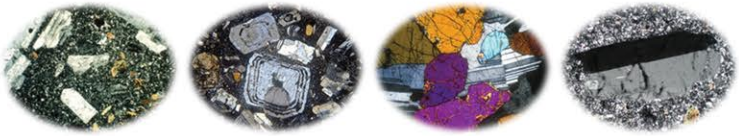
HOT PLATE is simple, reliable equipment and it used for fast curing of adhesive bonding material between glass slide and specimen. Heat can be set up to 300°C. Two GEOFIX can be put on HOT PLATE at the same time which means total 16 specimens can be cured. It significantly reduces total curing time.

IPP 901 POLARIZATION MICROSCOPE

IPP 901 is a Polarization Microscope and it specially designed for petrography. It equipped with strain-free plan achromatic objectives and wide field eyepiece. Further features of this microscope is that:

Coaxial coarsa/fine focus system with tension adjustable and limit stopper, minimum division of fine focusing:2mic. Take-down stylepolarizer, 360 rotable, have 0,90,180,270 four cale, located down the aperture diaphragm. Impellent style analyzer, 360 rotable, push in/out from optical path conveniently. Collector composed with field diaphragm and filter seat. Revolving round stage, 360 part scale and graduated in 1 increments, minimum resolution 6' when using vernier scale, center adjustable and with tightener. Illumination with 6V20W halgen lamp, adjustable brightness.

It has optional eyepieces with 10x magnification and objectives with 4x, 10x, 40x and 100x magnification.



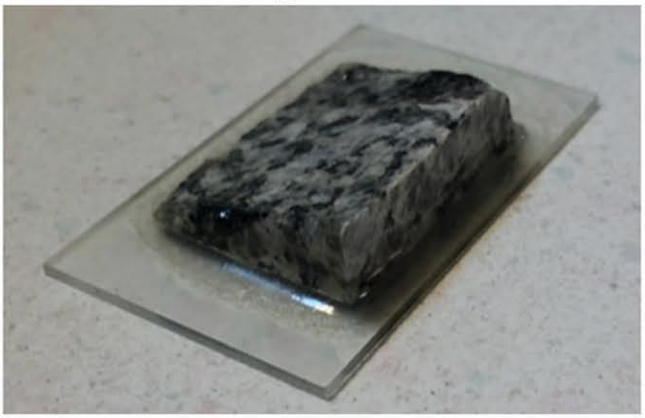
THIN SECTION PREPARATION

STEP 1: Sectioning

The first step is sectioning. Aim of sectioning is to obtain small piece of sample from big specimens. For big and irregular shaped specimens, GEOCUT is perfect choice.

For smaller specimens, you can use also GEOFORM.

The cut piece should be small enough to stick glass slides. Size of METKON glass slides are 27x46 mm.



Cutting petrographic samples usually done with special diamond cutting discs.

Cooling is done with fresh water. Cooling liquids are not recommended for most of petrographic application, because chemicals in the cooling liquids may negatively effect the specimen for microscopic examination. GEOCUT and GEOFORM can directly be connected to city water or can be used with stainless steel recirculation cooling tank.

STEP 2: Preparing Glass Slide

Glass slides have to have specific light transmittance and refractive index, in other words it should be suitable for petrography. METKON provides high quality glass slides for petrography.

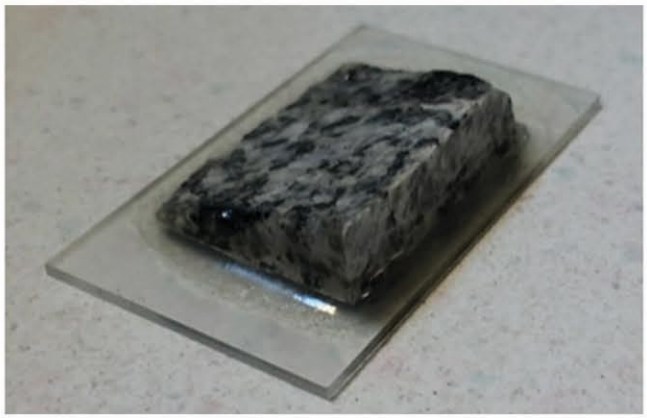
In order to stick sample on the glass slide, surface of the glass slide has to be made rough by rubbing on SiC powder. Otherwise, the sample does not stick well on the glass slide and may slip during grinding.

Put some water and silicon carbide powder on a metal plate and mix them. Rub one side of the glass slide on the SiC+water mixture. Also rub specimen likewise. This step will not take long time.


STEP 3: Sticking Specimen to Glass Slide

Adhesive resin have to has specific light transmittance and refractive index. Otherwise, microstructure can not be seen well under polarized microscope. Canada Balsam or Epoxy can be used as adhesive resin. The surface of sample and glass slide have to be clean and dry. The rough surfaces should be sticked.





STEP 4: Curing the Adhesive Resin

Adhesive resin have to be cured, after sticking specimen to glass slide. GEOFIX is used for curing adhesive. Put specimen+glass slide on GEOFIX.


8 specimens can be cured at the same time on GEOFIX

GEOFIX can also be put on a hot plate in order to shorten curing time.

Curing time without hot plate: Around 6-8 hours
Curing time with hot plate: Around 2 hours.

STEP 5: Reducing Thickness of Thin Section

Thickness of the specimen on the glass slide should be reduced by cutting in order to shorten grinding process. Cutting chamber of GEOFORM can be used for this process.
Place the glass slide on the vacuum chuck of GEOFORM and turn on vacuum and water. Cut slowly your samples by pushing vacuum chuck towards cutting disc. After cutting, thickness of sample will be 1.9 mm. Distance between vacuum chuck and cutting wheel can easily be adjusted as per requested sample thickness.

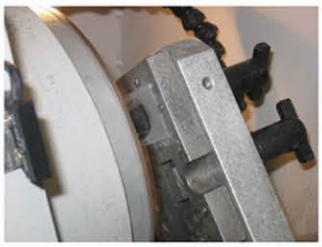



STEP 6: Initializing Micrometer for Grinding

Grinding chamber of GEOFORM will be used for this process. Grinding operation is done with diamond cup grinding wheel. Place the glass slide on the vacuum chuck and turn on vacuum. Two glass slides can also be prepared at the same time.


Move the vacuum chuck by the help of micrometer until glass slide touch the cup grinding stone. When glass slide touch the grinding stone, set micrometer to “zero”.


Move vacuum chuck rightwards by the help of micrometer until the specimen surface touch grinding stone. The value on the micrometer will be around 1900 microns (1.9 mm). This value is thickness of the specimen.



Close cover of grinding chamber. Specimen is ready for grinding.

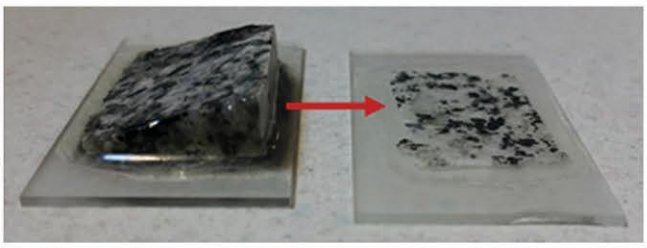
STEP 7: Precision Grinding

Turn on water and press start button. Grinding is done by pulling the grinding arm back and forward repeatedly. After grinding a couple pass, you will fell that moving the arm become easier and there is less grinding noise. It means that material has been removed from the surface of sample.

Now you should bring specimen closer to grinding stone by turning micrometer. Grinding depth should not be more than 100 microns. Otherwise the glass slide may be broken, so you may have to start from scratch. It is best to move specimen closer to grinding stone between 50 to 100 microns for everytime. When thickness of the specimen reached 200 microns, the grinding depth should be reduced to 20 microns.

After that, continue with grinding a couple pass like, later on bring specimen closer again. The cycle will continue like that until specimen thickness become 80 microns.

When you see thickness value around 80 microns on micrometer, turn of motor, water and vacuum. Take out the specimen.You will see that very thin layer of specimen has been left on the glass slide.



Before lapping operation, clean the specimen with water in order to wash away microparticules.

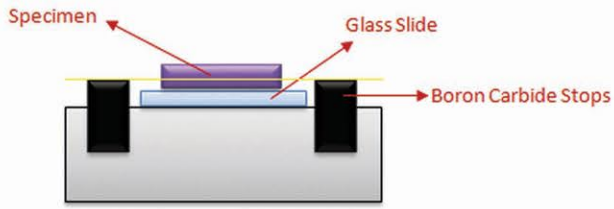
STEP 8: Lapping

Information:

Final thickness of specimen on the glass slide should be between 25 to 35 microns for microscopic examination. This thickness can be obtained with lapping process by using LAP-TS special specimen holder.

LAP-TS special specimen holder is used for determining final thickness. Put your glass slide on LAP-TS specimen holder and fix it by gently tighting screws, not too tighty.

LAP-TS specimen holder contains boron carbide stops. Level of glass slide is alwasy under the boron carbide stops. Boron carbide stops are extremely hard and abrasion resistant. Thus during lapping operation, boron carbide stops prevent specimen to over grinded. This level difference is the final thickness of your specimen and also optimum thickness for microscopic examination.



Some applications may required thinner or thicker specimens. In this case you can adjust level glass slide by removing or adding extra special shims inside the LAP-TS specimen holder. Special extra thin shims will be supplied together with the LAP-TS. Thickness of the shims are 60 μm, 30 μm and 20 μm.

In order the add shims inside LAP-TS, remove screws at the back side of it. You will see already installed copper shim which thickness is 60 μm.

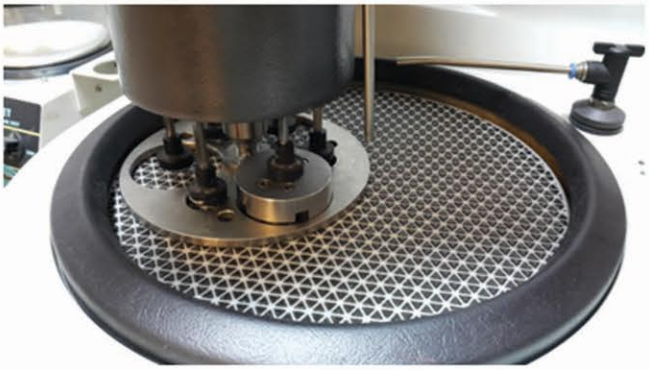
You can make different combinations in order to adjust level depending on application.

Lapping Operation:
FORCIPOL 300-1V & FORCIMAT-TS are used for lapping and polishing process.

There are two methods of lapping:
First one is using cast iron lapping discs. In this method you have to use SiC powders as abrasive. This method requires several steps such as lapping with 120, 320, 400, 600 and 1000 grit SiC powders and takes too much time.

Other method is using MAGNETO diamond grinding discs. MAGNETO provides very fast and cost effective lapping operation. In this method there are only 2 steps of lapping operation with very short preparation time. Another advantage using MAGNETO is that you can obtain more flat and precise specimen surface. In addition that there is not necessary to add any abrasives.

First lapping step should be done with 18 micron MAGNETO disc, second step with 6 micron MAGNETO disc.
Place MAGNETO 18μ disc on FORCIPOL 300-1V. Place LAP-TS on specimen holder of FORCIMAT-TS. You can put 3 LAP-TS at the same time on specimen holder. Set the force 15N. Set the base speed between 100-150 RPM. Set the base turning direction as clockwise. Base and head should turn in the same direction. Set lapping time between 30 to 60 seconds. Turn on water. Press start. Operation will finish when time is up. Wash your specimen and specimen holder before next step.
Take out MAGNETO 18μ and place MAGNETO 6μ. Repeat the lapping operation with same parameter on 6 micron MAGNETO disc. Wash your specimen again when operation is completed.



At the end of operation, thickness of the specimen should be between 25 to 35 microns and tranparent.

STEP 9: Polishing

POL-TS special specimen holder is used for polishing step. Increase height of setscrews by loosing them. Be sure that height of setscrew is not above surface of glass slide. Aim of setscrews is to prevent displacing of glass slide during polishing operation.

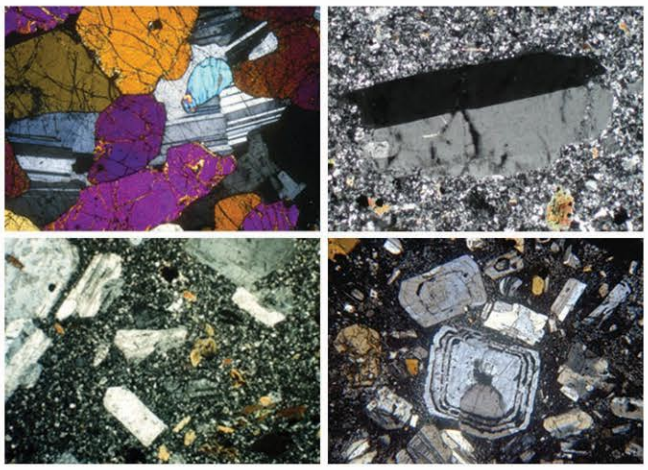
Polishing operation is done in 2 steps. Polishing cloths should be hard and suitable for petrography. First step is done with METAPO-B polishing cloth.
Place METAPO-P cloth on FORCIPOL 300-1V. Place POL-TS on specimen holder of FORCIMAT-TS. Put some 3 micron diamond paste on METAPO-P. Diamond pastes are recommended for petrography instead of diamond suspansions. Lubricate polishing cloth by using DIAPAT diamond lubricant.
Set the force 15N. Set the base speed between 100-150 RPM. Set the base turning direction as counter-clockwise. Base and head should turn in the opposite direction. Set polishing time between 1 to 2 minutes. Diamond lubricant should be used instead of water. Press start. During operation, you should lubricate the cloth when it become dry. You can manually lubricate with DIAPAT in every 15-20 seconds or you can use DOSIONE automatic lubricating unit. Operation will finish when time is up.
Wash your specimen and specimen holder before next step.
Take out METAPO-P and place PETRI polishing cloth. PETRI is specially designed for fine polishing of single crystal, glass, corindon, quartz, ceramics, rocks etc. Polishing with PETRI is same as METAPO-B. The only difference is that you should use 0.25 micron diamond paste with PETRI cloth and increase polishing time between 2 to 3 minutes.

Wash your specimen and dry with hot air. Your specimen is ready for microscopic examination.

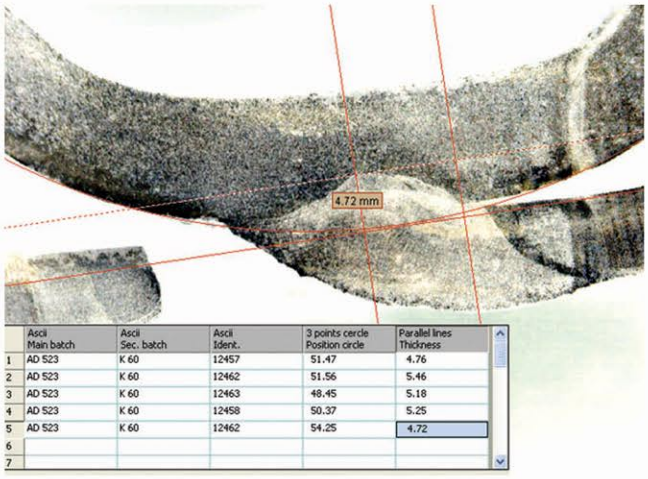
STEP 10: Microscopy

Final step is microscopy. Put your specimen on IPP 901 polarization microscope for observation.

Microstructure photos:



You can take photo, analyze and archive microstructure by using IMAGIN HARDWARE SET and IMAGIN MESURA software.



	Ascii Main batch	Ascii Sec. batch	Ascii Ident.	3 points cercle Position circle	Parallel lines Thickness
1	AD 523	K 60	12457	51.47	4.76
2	AD 523	K 60	12462	51.56	5.46
3	AD 523	K 60	12463	48.45	5.18
4	AD 523	K 60	12458	50.37	5.25
5	AD 523	K 60	12462	54.25	4.72
6					
7					

Specifications

14 03 GEOCUT
Geological Cutting Machine,
for sectioning of rock, ceramics, minerals, glass, concrete etc., with Z-axis cutting wheel positioning and table-feed cutting system, manual positioning of the specimen X and Y axis, X-Y table bed and cross feed table for cutting of plane parallel sections, mechanical display of cutting thick ness, cutting capacity upto 90/100 mm solid stock, for diamond wheels upto 250/300 mm, 4 kW compact cutting motor, electronic brake system, interlocking safety switch for hood, bottom part as rugged alloy base casting. 400 V, 3 phase, 50 Hz.
Without Recirculating System.
Without clamping devices.
Order No: 14 03

GR 1394 Recurcilating coolant tank, stainless steel, 40 lt. capacity, with pump, level indicator, hoses etc.

Clamping Devices for GEOCUT
GR 1811 Quick Clamping Device for round petrographic specimen
GR 1812 Universal Vise for large specimens,rocks, etc.

15 05 KPP 040 Vertical Clamping Device, with clamp.shoe, MRC201/Geocut

18 01 GEOFORM
Precision Thin Section Cutting and Grinding Machine, For fast and precise material removal of petrographic thin sections, vacuum chuck to hold a variety of slide dimensions, vacuum pump with gauge and filter, separate cutting and grinding compartments, corrosion free aluminium cast base, digital micrometer for precise grinding of material from the sample on the slide, for diamond cutting wheels upto 250 mm. in dia., complete and readyfor operation. 230 V, 1 phase, 50 Hz.
Without Recirculating System.
Without diamond cutting and grinding wheels.
Order No: 18 01

GR 1383-00 Recirculating Coolant System, composed of 40 litres stainless steel cooling tank, double 24V recirculating pump and connection hoses, etc.
GR 1815 Geoform accessories set for cutting large specimens. Includes 1" x 3" sample holder, set of flanges, ø73 mm, suitable for 12,7 mm arbor dia., adapter for diamond cutting wheel 32 mm arbor dia.(Should be ordered with ø250mm diamond cutting disc)
GR 1817 Geoform accessories set for cutting large specimens. Includes 2" x 3" sample holder, set of flanges, ø73 mm, suitable for 12,7 mm arbor dia., adapter for diamond cutting wheel 32 mm arbor dia.(Should be ordered with ø250mm diamond cutting disc)

25 06 VACUMET
Self-contained vacuum impregnation unit,
with built-in pneumatic vacuum system of –0.65 bar, vacuum gage and one set of supplies for casting epoxy resins.
Order No: 25 06
Includes a standart set of mounting consumables composed of 10 Scups, 10 silicon tubes, 10 wooden mixing spoons, 2 scale tubes

45 61 GEOFIX
Fixture for mounting specimens to glass slides for thin-sectioning, provides a uniform thickness of bonding material between thespecimen and the glass slide, spring activated loading system with capacity upto 8 specimens, easily placable on hot plate.
Order No:45 61

45 65 Hot Plate for Geofix

36 06 FORCIPOL 300-1V
Lapping and polishing machine, Single wheel, suitable for 300 mm wheel size, standard interface for FORCIMAT automatic specimen mover, variable speed between 50-600 rpm, with digital display, 1 HP motor with overload protection, including water inlet and outlet. 230 V, 1 phase, 50 Hz.
Order No: 36 06

Accessories for FORCIPOL 300-1V
33 12 Lapping disc, 300 mm
31 31 PVC wheel, 300 mm
31 73 Splash guard, 300 mm
31 34 Paper ring, 300 mm
31 36 Cover

30 10 FORCIMAT TS
Automatic Specimen Mover
For the preparation of mineralogical specimens, Microprocessor controlled, pneumatically adjustable individual force loading system, upto 6 specimens, 100 Watt DC Motor, low rotational speed of 35 rpm, front panel with touch-pad controls, audible warning signal, steel mounting column. Complete and ready for operation. 230 V, 1 phase, 50 Hz.
Order No: 30 10

Accessories for FORCIMAT - TS
33 09 FORCIMAT specimen mover, 3 x 60 mm
33 01 FORCIMAT specimen mover, 6 x 40 mm
33 02 Set of rings for 30 mm
33 03 Set of rings for 25 mm
33 10 LAP-TS special specimen holder with Boron Carbide stops for lapping of thin sections, 50 mm Dia.
33 11 POL-TS special specimen holder for polishing of thin sections, 50 mm Dia.

GR 0874 DOSIONE Peristaltic Fluid Dispenser
Microprocessor controlled, with peristaltic and non-misting pump for diamond suspensions, lubricant or 2 in 1 suspensions, with interface to be connected to FORCIMAT - TS Automatic Head.

*Other voltages and frequencies avaibable upon request.
Please state when ordering.
All specifications are subject to change without notice.

metkon
Technology behind Specimen

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20 YEARS