MD-System

Struers

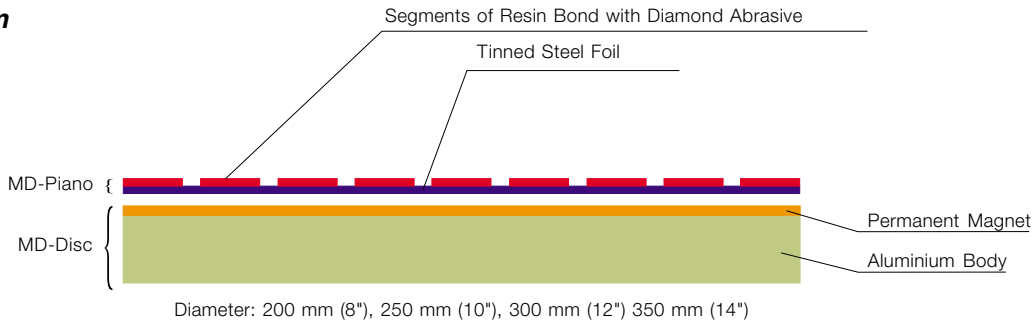
The unique consumables for grinding and polishing of materialographic specimens

Struers advances the technology of grinding and polishing materialographic specimens

The MD-System is simply a better way to grind and polish materialographic specimens:

- Easy handling makes your job easier
- Better quality specimens
- Fewer preparation steps
- Reduced preparation time
- Reduced preparation costs
- Low maintenance

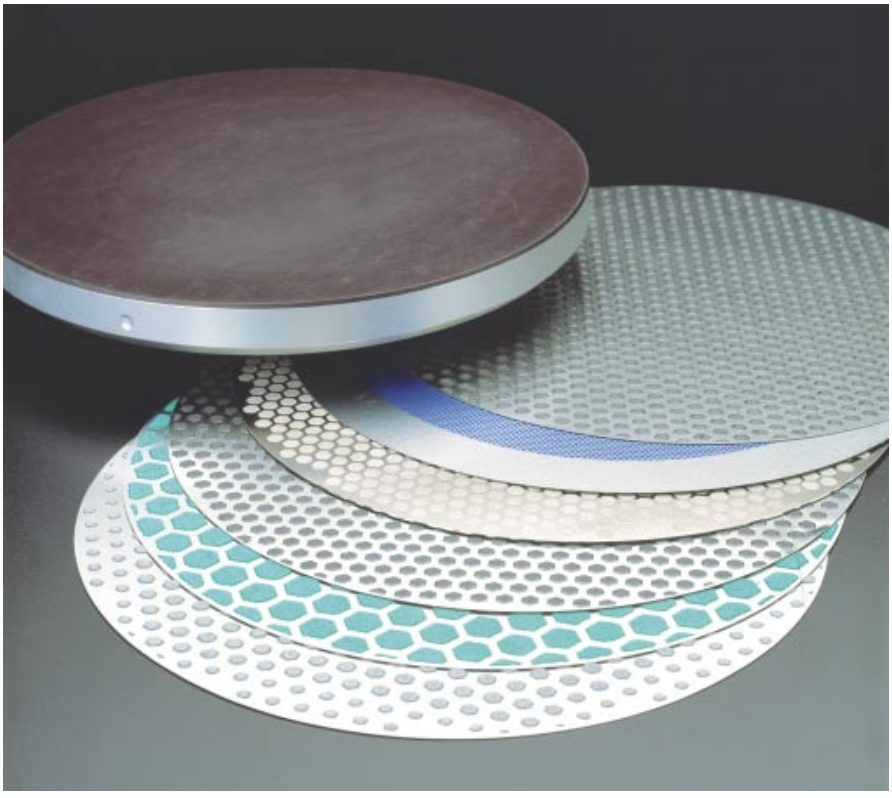
Principle of the MD-System



Introducing the MD-System to your lab

Introducing the MD-System to your lab does not require large investments. All you need is a magnetic supporting disc: the MD-Disc. The MD-Disc is the supporting disc for all preparation surfaces. It will be available for most of your existing grinding and polishing equipment. The MD-Disc is equipped with a magnetic layer and is designed precisely to provide the magnetic attraction required. Simply place the MD grinding and polishing surfaces of your choice on the magnetic disc, the magnet will hold the preparation surface in place during the preparation. One disc is sufficient to support all preparation surfaces, so both space and money can be saved.

The MD-Disc and MD-Grinding Discs



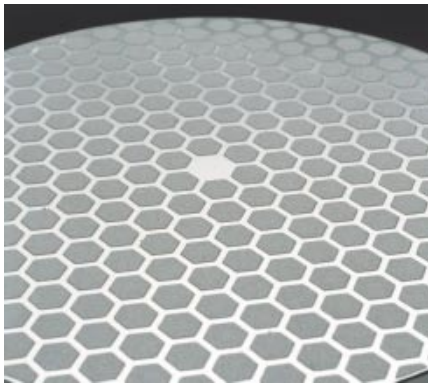
MD-System grinding discs and polishing cloths

As a complement to MD-Disc, Struers has engineered a comprehensive line of metal-backed coarse and fine grinding discs as well as polishing cloths available in 200, 250, 300 and 350 mm diameters. MD-System grinding discs and polishing cloths adhere magnetically to the MD-Disc.

Common features

- ***A thin and flexible steel plate***
  MD-preparation surfaces are all based on a thin flexible steel plate which makes positioning, removal and storage easy.

- ***A patterned segment***
  All MD-grinding discs have a segmented surface, specifically designed for the actual grinding phase, which minimizes build up of abraded material, allowing consistently high material removal rates and optimum planeness.

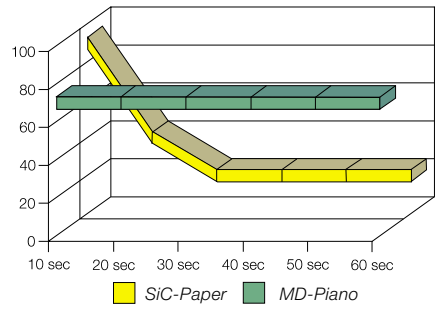


MD-Allegro patterned segment

- ***An anti-slip backing***
  The coarser grinding discs are equipped with an anti-slip backing to ensure safe attachment to the MD-Disc even when there is high friction during the grinding process.

A new grinding technology with many advantages

The patterned segments of the MD grinding discs minimize build up of abraded material, allowing consistently high material removal rates and optimum planeness. Disc flatness is maintained throughout the life of the disc.



Removal Rate

As shown on the graph, the removal rate decreases dramatically right from the beginning of the preparation when using conventional grinding techniques with SiC paper while the MD-Piano diamond grinding disc shows a substantially high and long lasting removal rate ensuring better quality specimens

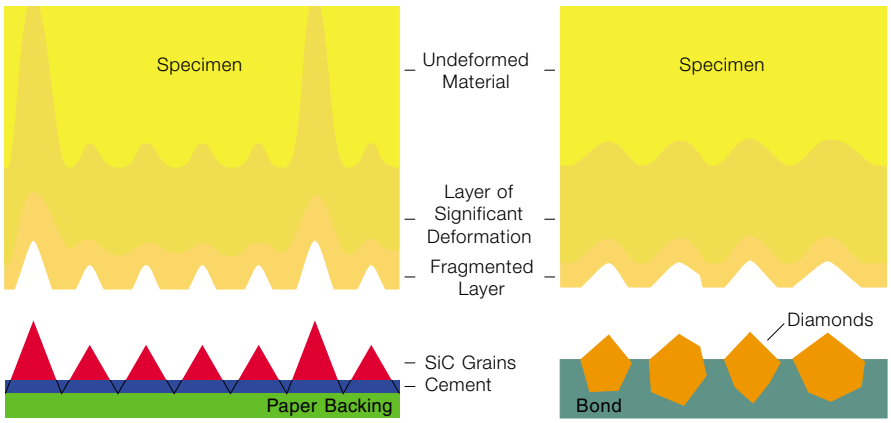
Consistently high material removal

A newly designed bond formula ensures that there is no build-up of abraded material and results in consistently high material removal rate and very short grinding time.

Maximum flatness

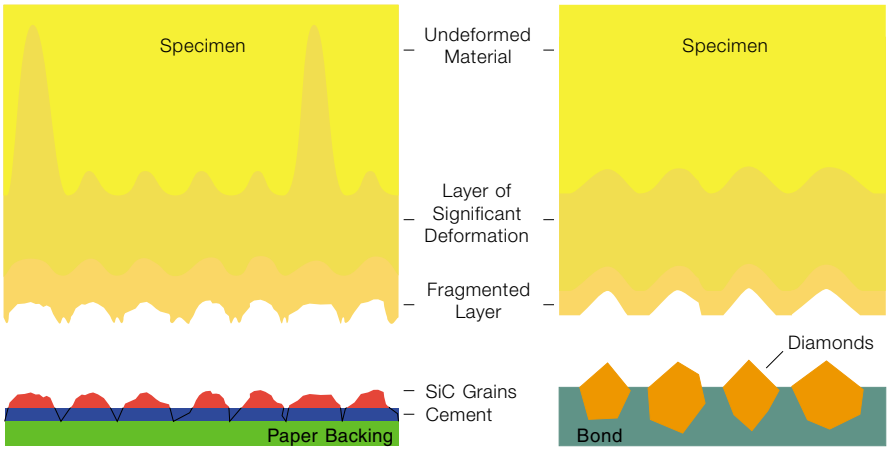
The diamond bond used in MD-Piano and Forte ensures a uniform material removal from both hard and soft phases during cutting action thus resulting in absolutely plane specimens with no relief between different phases. It also ensures that there will be no smearing in soft phases or chipping in brittle phases. See Surface Damage Graph. Edge rounding at the interface between resin and sample material is completely eliminated thus giving high quality specimens.
See Surface Planeness graph.

Surface Damage



SiC Grinding Paper first 2-5 sec.

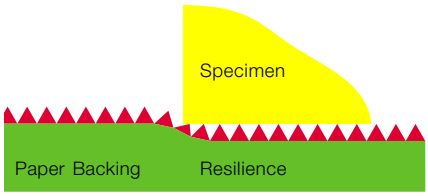
New Plane Grinding Disc after 2-5 sec.



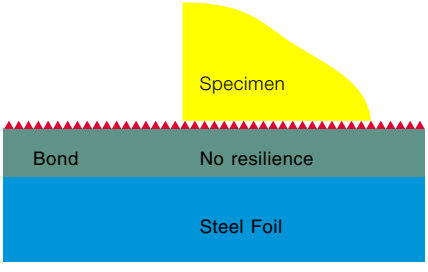
SiC Grinding Paper first 60 sec.

New Plane Grinding Disc after 60 sec.

Surface Planeness



SiC paper's drawback: Edge Rounding.



New Plane Grinding Discs.

Reduced preparation time

Plane and fine grinding are reduced to two steps, shortening the preparation process consistently. As the specimens are totally flat after grinding on MD-Grinding discs, the time spent on the following Fine Grinding step can be reduced to about 50%. The succeeding polishing steps can also be carried out in a shorter time thanks to the outstanding planeness achieved in the fine grinding steps.

Longer lifetime

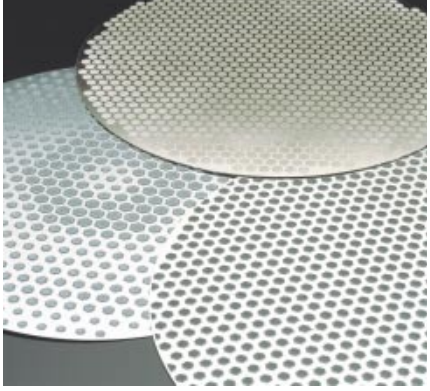
MD-Grinding discs have a much longer lifetime than any SiC-Paper.

Reduced preparation cost

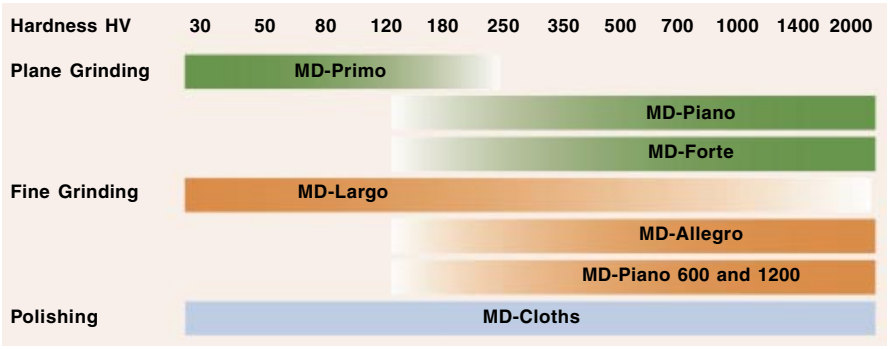
The MD-System produces better quality specimens, reduces maintenance and preparation time, has a longer lifetime than SiC-Paper thus it potentially reduces preparation costs.

Low maintenance

The MD-Grinding discs need practically no maintenance, which makes them very easy to use.



MD Plane Grinding Disc



The MD-System Step by Step

MD Consumables are available for every step in the preparation process:

Plane Grinding

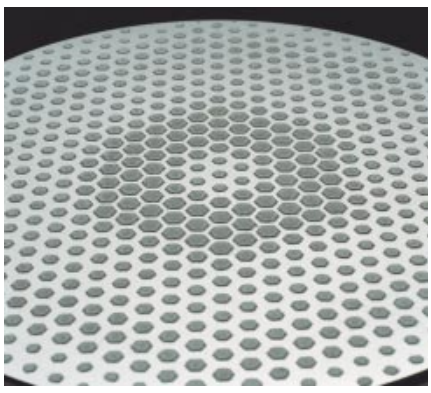
For plane grinding the discs MD-Primo, MD-Piano and MD-Forte are available

MD Primo

MD-Primo is a grinding disc with SiC abrasive in a resin bond. MD- Primo is designed and developed primarily for grinding of non-ferrous metals and soft materials in the hardness range from HV 40-250.

Application Areas
MD-Primo can be used for all materials where SiC-Paper would normally best apply. Whereas diamonds become clogged with abraded material and cannot be used efficiently when grinding soft materials, SiC has different features, making it suitable for the grinding of soft ferrous and non-ferrous materials. MD-Primo can be used for both manual and automatic grinding e.g. on Prepamatic or MAPS and is always water-cooled.

MD-Primo is available in two different grades or grit sizes, 120 and 220, producing scratch patterns similar to that of corresponding SiC-Papers.



MD-Primo

MD-Primo 120 is used for
- Higher material removal
- Larger specimens
- Specimens clamped in holders

MD-Primo 220 is used for:
- Smaller specimens
- Softer materials

Lifetime
One MD-Primo can replace 50-60 pieces of SiC-Paper. For the longest possible lifetime the design and distribution of the hexagons have been optimized. More material has been deposited towards the center to allow abrasion evenly across the surface thus prolong the lifetime.

MD Piano

MD-Piano is a resin bonded diamond disc, designed and developed for plane and fine grinding of materials in the hardness range HV 150-2000.
- MD-Piano can be used to replace SiC-Paper.
- MD-Piano is the first diamond disc which actually works well when grinding ferrous materials.
- MD-Piano can be used instead of Diamond grinding discs or Diamond Pads for the preparation of larger samples of ceramics or sintered carbides and similar hard materials.

MD-Piano for Plane Grinding is available in three different grades or grit sizes namely MD-Piano 80, 120 and 220 producing scratch patterns similar to SiC-Paper of corresponding grit sizes. MD-Piano is also water-cooled and requires no other additives.

When should you use MD-Piano 80, MD-Piano 120 or MD-Piano 220?

MD-Piano 80
MD-Piano 80 is specially designed for grinding of specimens clamped in a specimen holder but can also, of course, be used manually.

MD-Piano 120
Should be used for larger specimen (>30 mm diameter) as well as harder materials (<400 HV).

MD-Piano 220
Should be used for single smaller specimens (<30 mm diameter) of all kinds of materials as well as larger specimens of softer materials (>400 HV) and composite materials with harder particles in soft matrix.

Lifetime
MD-Piano 80, 120 and 220 can, thanks to their resin bonded diamonds, replace up to 100 pieces of SiC-Paper.

MD Forte

MD-Forte 120 is a nickel bonded diamond grinding disc designed for plane grinding of materials moderately soft and ductile to hard and brittle in the hardness range HV 150-2000.

A higher material removal rate
The nickel bond allows the diamonds to stick further out from the matrix and thus guarantee a higher material removal rate.

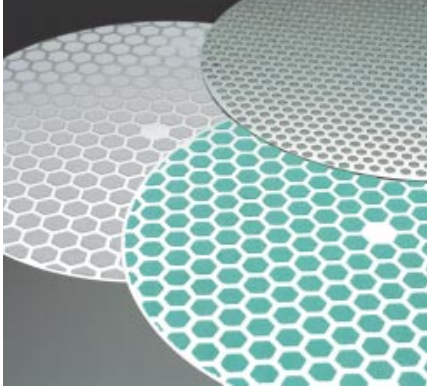
Preparation of ductile materials
MD-Forte and MD-Piano are suitable for materials harder than 150 HV. For very ductile materials it can be an advantage to use an additive together with the cooling water, such as cooling fluid ADDUN or ADDFl as it reduces clogging of material onto the surface of the disc.

A longer life time
MD-Forte's nickel bond is much stronger than a resin bond and grants therefore an even longer lifetime compared to our other MD-Grinding discs such as MD-Piano.

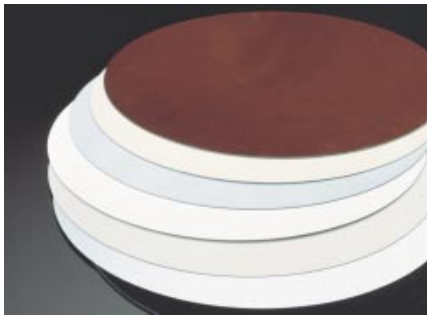
Fine Grinding

MD Largo MD Allegro

MD-Largo and MD-Allegro are composite discs for one step fine grinding. Both discs are used with diamond suspension or spray.



MD-Fine Grinding Discs



MD-Polishing Cloths

As with the plane grinding discs, the application areas depend on the hardness of the material to be prepared

- MD-Largo is designed for soft materials in the range HV 40-250, or for composites with a soft matrix. Experience shows that MD-Largo gives very good results where MD-Allegro tends to be too aggressive, for example grey cast iron.
- MD-Allegro is used for materials with a hardness higher than HV150

Application Areas

MD-Largo and MD-Allegro can be used to replace two different types of preparation routines.

- MD-Largo and MD-Allegro combine Fine Grinding in one step with typically 15-6µm DP-Suspension or DP-Spray instead of the normal steps like SiC-Paper 500, 1000 and 4000#.
- MD-Largo and MD-Allegro can also be used instead of fine grinding cloths.

Lifetime

Experience from the field has shown that both MD-Largo and MD-Allegro have a lifetime equivalent to about 900-1000 pieces of SiC-Paper.

MD-Piano 600/1200

MD-Piano for Fine Grinding is available in two different grades or grit sizes namely MD-Piano 600 and 1200 producing a surface finish similar to SiC-Paper of the same respective grit sizes.

Advantages

- Shorter preparation time, thanks to the perfect planeness of the specimens after grinding on MD-Piano 80, 120 or 220, it is possible to go directly to MD-Piano 600 or 1200.
- Automatic fine grinding is also possible.
- Grinding times are shorter than 1 minute.
- Very long lifetime compared to SiC-Paper.
- Easier cleaning if MD-Piano 1200 is used instead of MD-Allegro as the black swarf is avoided.

When should you use MD-Piano 600 or MD-Piano 1200?

MD-Piano 600 will reduce grinding time when grinding larger specimens. A sample finished on MD-Piano 600 can be used directly for electrolytic polishing or micro-hardness testing.

MD-Piano 1200

Can be used instead of MD-Allegro for both manual Fine Grinding and automatic specimen preparation.

Lifetime

Similar to the other discs in the MD-Piano series, MD-Piano 600 and 1200 can replace up to 100 pieces of SiC-Paper.

Polishing

MD Cloth™

Description:

The MD-Polishing Cloths make a comprehensive line of cloths suitable for all final polishing procedures. The MD-Polishing Cloths are equipped with a magnetic backing for the supporting layer and an intermediate layer which keeps the diamond grains in the active layer.

All types of DP and OP-Polishing Cloths for fine grinding, diamond polishing and oxide polishing are available in types for magnetic fixation in 200, 250 and 300 mm dia.

Name	Hardness	Resilience	Abrasive	Application
MD-Plan	Hard	Very low	9, 6, 3 µm DP-Products	Fine grinding and polishing of ceramics, sintered carbides and minerals
MD-Dur	Hard	Medium	6, 3, 1 µm DP-Products	Fine grinding and polishing of ferrous metals, non ferrous metals, coatings and plastics
MD-Dac	Hard	Medium	9, 6, 3, 1 µm DP-Products	Fine grinding and polishing of ferrous metals, non ferrous metals, coatings and plastics
MD-Mol	Soft	High	6, 3, 1 µm DP-Products	Polishing of ferrous metals, non ferrous metals and final polishing
MD-Plus	Soft	High	3 µm DP-Products	Polishing of ferrous metals, sintered carbides. One step polishing
MD-Nap	Very soft	Very high	1, 1/4 µm DP-Products OP-U, OP-S, OP-A	Final polishing of all materials for oxide polishing
MD-Chem	Soft	High	OP-U, OP-S, OP-A and OP-S with additives	Final polishing of all materials

Maintenance

The MD-Consumables are practically maintenance-free which makes them very easy to use.

MD-Primo	No maintenance
MD-Piano for PG	A brief trueing of the diamond layer is necessary from time to time
MD-Forte	No maintenance
MD-Largo	Are virtually maintenance-free though occasional cleaning is recommended.
MD-Allegro	Are virtually maintenance-free though occasional cleaning is recommended.
MD-Piano for FG	A brief trueing of the diamond layer is necessary from time to time
MD-Cloths	No maintenance

MD-Concert and MD-Concertino for easy storage and immediate identification of MD-Consumables

MD-Rondo

Storage

MD Concert™

MD-Concert is a storage cabinet for 200 mm / 8", 250 mm /10" and 300 mm /12" MD-Consumables.
- MD-Concert has 10 identical compartments.
- Storage cabinet for 9 MD-Consumables.
- Easy to clean.
- Manufactured in recyclable material (ABS).

MD-Concert consists of a steel spindle on which the compartments are stacked. A steel support is mounted on the back of the assembly to ensure that the compartments are kept in line. The compartments can be turned to the left and the right, so that they can be accessed from both sides, no matter where the MD-Concert is placed. The storage cabinet allows the consumables to dry effectively, and protects the preparation discs from contamination. The top compartment is used as dust protection and is not meant to be used for storage. The identification labels delivered with the MD-Consumables can be inserted at the front of each compartment to allow individual disc information at a glance.

MD-Concert

MD Concertino™

MD-Concertino is a storage cabinet exclusively for 200 mm / 8" MD-Consumables.

As the name reveals, MD-Concertino is a smaller version of the existing MD-Concert.
MD-Concertino has the same structure as MD-Concert and can be used exactly the same way.

It differs as follows:
- MD-Concertino has 8 identical compartments.
- It holds 200 mm / 8" MD-Consumables only.
- It takes up less storage room than the larger MD-Concert.

Accessories

MD Fuga™

MD-Fuga

MD-Fuga is a metal disc with a reusable adhesion surface on one side. The adhesive layer is designed to hold SiC grinding papers safely during preparation, while at the same time allowing for easy removal after the completion of the preparation step.

Adaptability
With MD-Fuga, you can use any kind of SiC consumables in combination with your MD-Disc when necessary.

Lifetime
For a longer lasting MD-Fuga, it is important to cover the adhesive surface again after use so it remains clean when not in use.
More than 50 pieces of grinding paper can be applied on the same MD-Fuga.

MD Rondo™

MD-Rondo is a revolutionary adapter for the use of self-adhesive consumables with the MD-System.

Adaptability and multi-functionality
With MD-Rondo, widen your MD product range with any kind of self-adhesive consumables (polishing cloths, SiC-Papers and Diamond Pads) and thereby add all the advantages of the MD-System to your favorite self-adhesive consumables.

Features
MD-Rondo has several unique features:

- A new dual-adhesion surface
It makes the polishing cloths stick safely but also easy to remove. The self-adhesive consumables are placed on the top surface of MD-Rondo. This surface is covered with two different coatings with similar properties, thus dual-adhesion: a 2 cm wide outer rim with high adhesion properties which makes the cloth stick safely and the center which is coated with a low adhesion coating, allowing for very easy removal of the polishing cloth. The combination of these two coatings ensures that the edges of the cloth do not lift up from MD-Rondo, and that at the same time, removing the cloth towards the center where the contact area gets larger, is very easy.

- A surface with a three dimensional topography

The three dimensional surface makes it very easy to apply a polishing cloth without trapping air bubbles underneath. Both types of coatings are printed on the surface of MD-Rondo in a hexagon pattern. Between these hexagons are small air channels. When the polishing cloth is applied on the surface of MD-Rondo, air can easily escape thereby completely avoiding air bubbles. It is virtually impossible to trap air under a polishing cloth applied to this unique surface.

Lifetime

MD-Rondo has practically an unlimited lifetime. As long as the plate is not bent or the coated surface not scratched, it can be used endlessly.

Magnetic Foil

MD-Foil is a self-adhesive, magnetic foil that allows you to use your MD consumables onto a standard aluminium-supporting disc.

Adaptability

MD-Foil comes as a square sheet and with a knife so it can be cut to the exact size of your aluminium supporting disc. MD-Foil is a soft foil which is easy to apply and can be used only on aluminium supporting discs.

Preparation methods overview

10 Metalog Guide preparation methods

		PG	FG	DP 1	DP 2	OP
Method A *Al 99,5 sand cast*	Surface	SiC-Paper (on MD-Fuga)	MD-Largo	MD-Dur	MD-Mol	MD-Nap/ Chem
	Abrasive, Grit/Grain	# 320	DP-Suspension 9 µm	DP-Suspension 6 µm	DP-Suspension 3 µm	OP-S, OP-U
Method B Cu pure	Surface	MD-Primo 220	MD-Largo	MD-Mol	MD-Nap/ Chem	
	Abrasive, Grit/Grain	SiC	DP-Suspension 9 µm	DP-Suspension 3 µm	OP-S, OP-U	
Method C Cu 58 Zn 42	Surface	MD-Primo-220	MD-Largo	MD-Dac	MD-Nap/ Chem	
	Abrasive, Grit/Grain	SiC	DP-Suspension 9 µm	DP-Suspension 3 µm	OP-S, OP-U	
Method D Nodular cast iron	Surface	MD-Piano 220	MD-Allegro	MD-Dac	MD-Chem	
	Abrasive, Grit/Grain	Diamond	DP-Suspension 9 µm	DP-Suspension 3 µm	OP-A	
Method E Grey cast iron	Surface	MD-Piano 120	MD-Allegro	MD-Dur	MD-Nap	MD-Chem
	Abrasive, Grit/Grain	Diamond	DP-Suspension 9 µm	DP-Suspension 6 µm	DP-Suspension 1 µm	OP-S, OP-U
Method F WC in Cu matrix	Surface	MD-Piano 120	MD-Allegro	MD-Largo	MD-Dac	MD-Chem
	Abrasive, Grit/Grain	Diamond	DP-Suspension 9 µm	DP-Suspension 3 µm	DP-Suspension 3 µm	OP-S, OP-U
Method G Al_2O_3	Surface	MD-Piano 120	MD-Allegro	MD-Largo	MD-Dac	MD-Chem
	Abrasive, Grit/Grain	Diamond	DP-Suspension 9 µm	DP-Suspension 3 µm	DP-Suspension 3 µm	OP-S, OP-U
Method X MgAl alloy	Surface	MD-Primo 220	MD-Largo	MD-Nap		
	Abrasive, Grit/Grain	SiC	DP-Suspension 9 µm	DP-Suspension 1 µm		
Method Y Medium carbon steel	Surface	MD-Piano 120	MD-Allegro	MD-Plus		
	Abrasive, Grit/Grain	Diamond	DP-Suspension 9 µm	DP-Suspension 3 µm		
Method Z Sintered carbide with coatings	Surface	MD-Piano 120	MD-Allegro	MD-Dac		
	Abrasive, Grit/Grain	Diamond	DP-Suspension 9 µm	DP-Suspension 3 µm		

Specifications

Magnetic supporting disc

Name	Disc dia. 350 mm (14")	Disc dia. 300 mm (12")	Disc dia. 250 mm (10")	Disc dia. 200 mm (8")
MD-Disc	DEMFI 02426933	DEMAL 02426918	DEMIF 02426919	DEMLA 02426920

Grinding surfaces for plane grinding

Name	Application	HV	Abrasive/ Bond	Grit	Disc dia. 350 mm (14")	Disc dia. 300 mm (12")	Disc dia. 250 mm (10")	Disc dia. 200 mm (8")
MD-Primo 120	Soft materials	40-250	SiC/ Resin	120	MAROB 40800118	MARXA 40800087	MARFI 40800086	MAROT 40800085
MD-Primo 220	Soft materials	40-250	SiC/ Resin	220	MARBO 40800119	MARAX 40800090	MARIF 40800089	MARTO 40800088
MD-Piano 80	All materials	>150	Diamond/ Resin	80	MANPX 40800116	MANPA 40800100	MANPI 40800099	MANPO 40800098
MD-Piano 120	All materials	>150	Diamond/ Resin	120		MANAX 40800093	MANIF 40800092	MANTO 40800091
MD-Piano 220	All materials	>150	Diamond/ Resin	220	MANOX 40800117	MANXA 40800096	MANFI 40800095	MANOT 40800094
MD-Forte 120	All materials	>40	Diamond/ Nickel	120		MAFAX 40800103	MAFIF 40800102	MAFOT 40800101

Grinding surfaces for fine grinding

Name	Application	HV	Abrasive/ Bond	Grit Grain size	Disc dia. 350 mm (14")	Disc dia. 300 mm (12")	Disc dia. 250 mm (10")	Disc dia. 200 mm (8")
MD-Largo	Soft materials and composites	>40	*	from 15 to 3 µm	MALBO 40500141	MALAX 40500099	MALIF 40500098	MALTO 40500097
MD-Allegro	All materials	>150	*	from 15 to 6 µm	MADBO 40500140	MADAX 40500067	MADIF 40500066	MADTO 40500065
MD-Piano 600	All materials	>150	Diamond/ Resin	600		MANEL 40800107	MANIL 40800106	MANOL 40800105
MD-Piano 1200	All materials	>150	Diamond/ Resin	1200		MANLE 40800107	MANLI 40800106	MANLO 40800105

Other consumables

Name	Application	HV	Abrasive/ Bond size	Grit Grain	Disc dia. 350 mm (14")	Disc dia. 300 mm (12")	Disc dia. 250 mm (10")	Disc dia. 200 mm (8")
MD-Fuga	Adhesive disc for SiC-Paper	30-800	**	#80-4000		MUGMA 49900023	MUGFI 49900022	MUGTO 49900021
MD-Rondo	Adapter for use with self-adhesive polishing cloths	All	***	All	RONBO 40503083	RONAL 40503002	RONIF 40503001	RONLA 40503000

Polishing cloths

Name	Disc dia. 300 mm (12")	Disc dia. 250 mm (10")	Disc dia. 200 mm (8")
MD-Plan	MEPLA 40500088	MUPLA 40500087	MAPLA 40500086
MD-Dur	MEDUR 40500076	MUDUR 40500075	MADUR 40500074
MD-Dac	MEDAC 40500073	MUDAC 40500095	MADAC 40500071
MD-Mol	MEMOL 40500079	MUMOL 40500078	MAMOL 40500077
MD-Plus	MEPLU 40500091	MUPLU 40500090	MAPLU 40500089
MD-Nap	MENAP 40500082	MUNAP 40500081	MANAP 40500080
MD-Chem	MECHE 40500094	MUCHE 40500093	MACHE 40500092

* *Abrasive has to be added*
** *Non-adhesive SiC-Paper is glued on the disc*
*** *Self adhesive consumables are glued on the disc*

Struers' products are subject to constant product development. Therefore, we reserve the right to introduce changes in our products without notice.

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