Struers
Ensuring Certainty

Cut-off Wheels

- Superior surface quality
- Faster results
- Cost-efficiency

Cut-off wheels specially developed for materialographic specimen preparation

The first step in the materialographic process

The first step in a process sets the pace and determines the quality of the finished result. In the materialographic process, the first step is most often cutting. The purpose of cutting is to section a representative, yet manageable sample from a large or irregular piece of a given material or to obtain sections at specific angles, e.g. cross-sections. Cutting makes high demands on a number of factors: Speed, planeness, amount of thermal damage and degree of deformation.

About abrasive wet cutting

The most commonly used method to section a material is abrasive wet cutting. The cut-off wheels consist of two main components: abrasives and bonding material. During cutting, the cut-off wheel is flushed with a cooling liquid to avoid thermal damage and to remove debris, providing the highest possible material removal.

A complete product range

Struers cut-off wheels have been specially developed for materialographic specimen preparation: they produce specimens that are in perfect condition for the next preparation step. Our large range of different wheels assures that all materials can be cut without structural changes due to overheating or deformation, and guarantees maximum life time of the wheels.

The wheels are designed for Struers machines, taking into consideration the most recent developments in wet cutting techniques. Various abrasives are used for the cutting of different materials. However, Al_2O_3 or SiC in a resin bond is used for cutting most metals.

The selection of bond hardness must be based on an evaluation of the hardness of the material. Soft materials should be cut with cut-off wheels having a hard bond as the abrasive grains retain their cutting ability for a long time. Harder metals require a softer resin bond, which gives a fast replacement of abrasive grains.

For the cutting of materials with hardness above HV 700, diamond or CBN (cubic boron nitride) are used as the abrasive. Because of the high cost of these abrasives only the outer rim of the wheel is covered with abrasive particles in a resin or a metal bond. Metal bonded wheels are used for cutting of brittle materials, such as ceramics or minerals, while bakelite bonded wheels are used for more ductile materials, such as sintered carbides or composites containing predominantly hard phases.

Intelligent cut-off wheels

With cut-off wheels from Struers the abrasive density varies across the wheel radius – with increasing density towards the center of the wheel. This means that the cutting performance of the wheel remains constant even as it wears to a smaller diameter (please see illustration on page 5).

As a conventional cut-off wheel with uniform abrasive density wears, the cutting performance changes from the outside to the inside. The number of grains is reduced, the load of each grain increases and the wheel appears to get softer and softer. The drawback is higher wear and a less controllable cut.

3D cut-off wheels* for increased cutting performance

Struers also offers cut-off wheels with a hexagonal surface pattern. The cut-off wheels are designed so that each side has a 3 dimensional hexagonal surface pattern, also called the 3D surface.

With the 3D cut-off wheels cooling of the workpiece is much more efficient. As the aim in materialography is to obtain the true, undisturbed structure, less heat damage due to more efficient cooling is an important step towards faster, more reliable preparation results.
In addition, with the 3D design the problem of cutting debris building up during cutting is completely eliminated. The cutting table and the entire cutting chamber stay clean as the small particles easily are washed away. Cleaning of the equipment is far easier, and the risk of overflowing because of a blocked outlet is greatly reduced.

Cost efficiency

Selecting the right cut-off wheel is not just a matter of preparation quality, it is also the best way to save time and consumables. Choosing the correct wheel for an application will produce a surface which requires less subsequent preparation steps. Thus producing specimens in a shorter time and at a lower cost per sample.

With the 3D surface all the water sprayed into the channels between the hexagons is transported into the cut, thus cooling the workpiece much more efficiently.

Struers range of cut-off wheels are under constant improvement and gives you:

- Specimens that are in perfect condition for the next preparation step with no thermal damage
- A complete product programme covering all materials and materialographic applications
- Intelligent wheels with the abrasive density varying across the wheel radius. The result is controlled cutting and uniform results
- 3D wheels offering less heat damage due to more efficient cooling. In addition the 3D surface means less cutting debris and easier cleaning of the equipment
- Specimens in a shorter time and at a lower cost per sample

*United States Design Patent granted, patent no. US D560,991 S

To select the correct cut-off wheel:

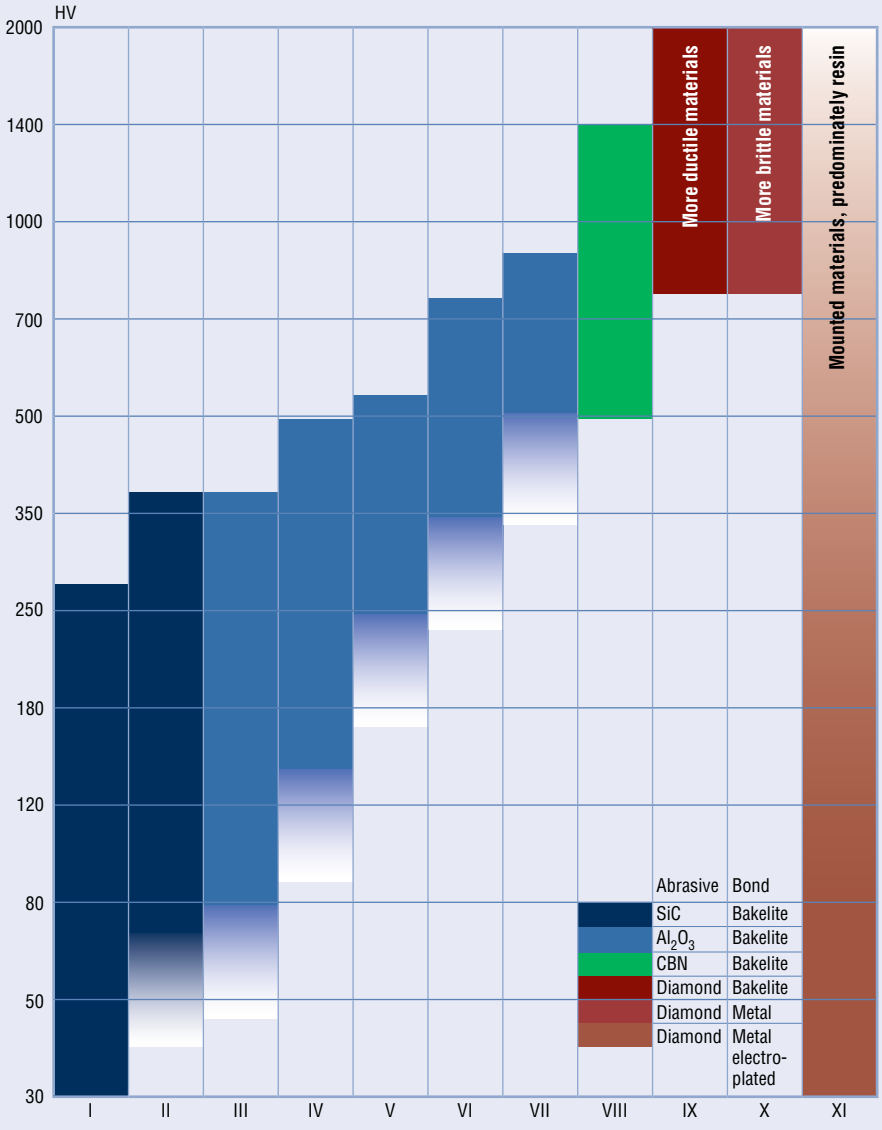
Struers offers a wide variety of wheels, which means that you can select the hardness that optimally balances durability with finish.

If the hardness of the material is known, use the table at the top of the page. In the table at the bottom, you will then find the cut-off wheel codes for the specific cutting machines. If the hardness of the material is not known, find a suitable cut-off wheel according to material group in the table below.

1. Go upwards on the y-axis of the overview to the right until you find the hardness value of your material.

2. Move to the right, until you cross the cut-off wheel that fits your application. If you only have one material to cut, find the wheel where your material's hardness is placed as close to the middle as possible. For two or more materials, see if you can find a wheel that covers the whole hardness range. The bars that fade out at the bottom represent wheels that can be used for lower hardness also. However, this is not a very economical solution, and it should only be used in exceptional cases.

3. Find the number (I-XI) of the respective wheel, and see the table below for the code of the correct wheel for your cut-off machine.

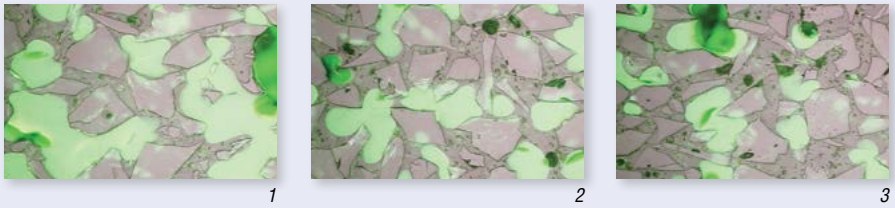


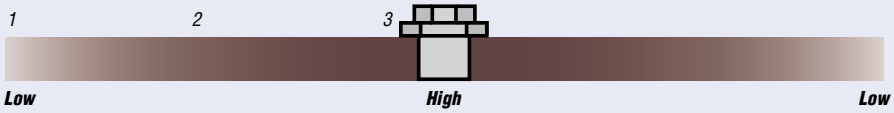
Application	Non-ferrous soft metals	Very ductile metals (Ti)	Soft ferrous metals	Medium soft ferrous metals	Medium hard ferrous metals	Hard ferrous metals	Very hard ferrous metals	Extremely hard ferrous metals	Sintered carbides, hard ceramics	Minerals and ceramics	Plastics and resins, mounted materials
Cut-off machine	**Std. wheel size* (mm)**										
Magnutom-500	508 x 3.5 x 32	10S51			30A51	40A51 42A51[10]	50A51 52A51[10]	60A51 62A51[10]	B0C41[1]	B0D51[17]	M0D51[16]	E0D36[3]
Exotom-100/-150 Magnutom-400	432 x 3.0 x 32	10S43	20S43		30A43	40A43 42A43[10]	50A43 52A43[10] 58A43[18]	60A43 62A43[10] 66A43[12] 68A43[18]	B0C41[1]	B0D35[2]	M0D35[2]	E0D36[3]
Axitom-5 (1,950 rpm)	350 x 2.5 x 32	10S35	20S35	20A35	20A35	30A35	40A35	50A35 56A35[12] 58A35[18]	B0C35[6]	B0D35[2] B7D35[2/15]	M0D35[2]	E0D36[3]
Labotom-15 (2,350 rpm)		10S35	20S35	30A35	40A35	50A35 56A35[12]	60A35 66A35[12]	60A35 66A35[12]	B0C35[6]	B0D35[2] B7D35[2/15]	M0D35[2]	E0D36[3]
Exotom/Unitom-2/-5/-50 (2,775 rpm)		10S35	30S35	20A35	30A35	40A35	50A35 56A35[12] 58A35[18]	60A35 66A35[12] 68A43[18]	B0C35[6]	B0D35[2] B7D35[2/15]	M0D35[2]	E0D36[3]
Unitom/Discotom-50/-60/-65/-100	300 x 2.0 x 32	10S30	20S30		30A30	40A30	50A30	60A30 66A30[12]	B0C31[4]	B0D31[4]	M0D31[5]	E0D31[5]
Discotom-5/-6/-10/Labotom-3/-5	250 x 1.5 x 32	10S25	20S25	20A25	30A25 33A25[9]	40A25 46A25[12]	54A25 50A25[11] 56A25[12]	60A25 66A25[12]	B0C25[7]	B0D25[8]	M0D25[8]	E0D25
Discotom/Labotom	235 x 1.5 x 22	10S24	20S24		30A24	40A24	50A24	60A24				
Discoplan-TS	200 x 1.0 x 22									B4D20	M4D20	

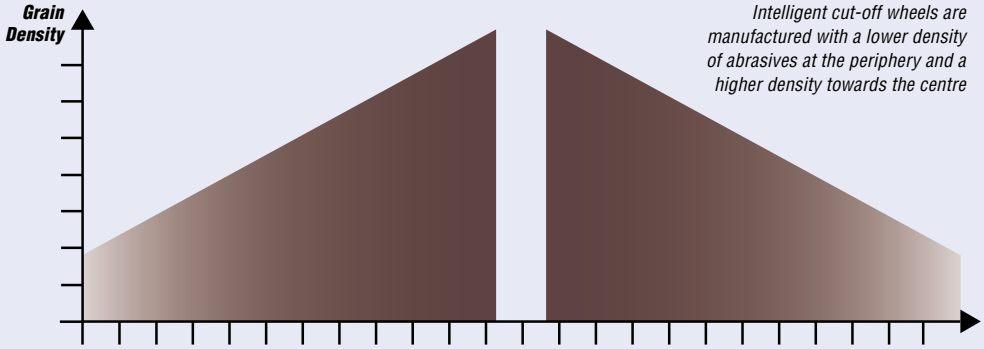
1) *406 x 1.8 x 32* **2)** *350 x 1.5 x 32* **3)** *356 x 1.5 x 32* **4)** *305 x 1.8 x 32* **5)** *305 x 1.5 x 32* **6)** *350 x 1.8 x 32* **7)** *Width = 1.3* **8)** *Width = 1.1* **9)** *Width = 0.8* **10)** *Fibreglass reinforced*
11) *For hard and ductile materials, Ni-base alloys* **12)** *3D cut-off wheels* **13)** *Width = 0.6* **14)** *Width = 0.4* **15)** *For sintered carbides in steel* **16)** *Width = 2.4* **17)** *Width = 3.2* **18)** *Premium Cutt-off wheels*

Precision cut-off machine	**Std. wheel size* (mm)**										
Secotom-1/-10/-15/-50**	200 x 0.8 x 22	10S20	10S20	30A20	30A20	50A20	50A20	50A20	B0C20	B0D20	M0D20[13] M1D20[13]	E1D20
Accutom-10/-100/-5/-50	150 x 0.5 x 12.7	10S15 SAW13	10S15	40A15 30A15	40A15 30A15	50A15	50A15	50A15	B0C15	B0D15	M0D15 M1D15	E0D15 SAW13
Accutom-2	125 x 0.5 x 12.7	30A13	30A13	30A13	30A13	50A13	50A13	50A13	B0C13	B0D13[13]	M0D13[14] M1D13[14]	M1D13[14]
Minitom	125 x 0.5 x 12.7	M1D13[14]	M1D13[14]	B0C13[13]	B0C13[13]	B0C13[13]	B0C13[13]	B0C13[13]	B0C13[13]	B0D13[13]	M0D13[14] M1D13[14]	M1D13[14]
Wheels with special sizes	100 x 0.3 x 12.7	These wheels can be used on both Accutom-2/-5/-50 and Secotom-1/-10/-15/-50 for cutting of small specimens where high precision or minimum material loss is required.									M0D10 M1D10	M1D10
	75 x 0.15 x 12.7										M0D08 M1D08	M1D08

**) Diameter x Width x Bore in mm, **) On Secotom-1 only use M0D20 + B0D20*







Intelligent cut-off wheels are manufactured with a lower density of abrasives at the periphery and a higher density towards the centre

Constant improvement

Struers cut-off wheels offer the widest variety of abrasive types and bond properties, allowing you to find the optimal wheel for all materials and materialographic applications.

At Struers, we are constantly striving to develop new improved and environmentally friendly consumables. To you this means superior preparation quality, faster results and better cost-efficiency. Make your lab more efficient, more productive and successful with performance products from Struers.

The Struers cut-off wheels are boxed with cardboard flanges and detailled instructions

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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Ensuring Certainty

With offices and affiliates in 24 countries and a presence in more than 50 countries worldwide, Struers is the world's leading materialographic solution supplier. We are dedicated to enabling our customers to ensure certainty in all aspects of materialographic preparation and testing as well as material hardness testing - wherever they are in the world. Struers offers a complete range of equipment, consumables, service and training programmes – all supported by the most comprehensive knowledge base, global applications support and a certified global service set-up.

Learn more

Contact a Struers sales representative today or visit www.struers.com

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