



# Presentation Brakes

Wollastonite and MICA HLP in Brake Pads



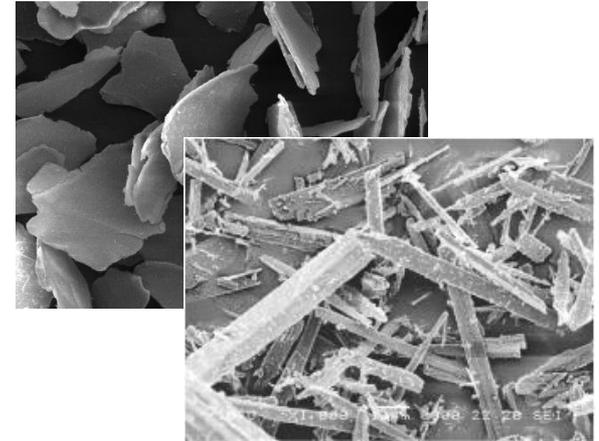


Kärntner Montanindustrie GmbH (KMI) is an Austrian company, founded in 1932. The company owns Micaceous Iron Oxide mines and mineral processing facilities. The headquarters are in the castle of Wolfsberg, the regional capital. The mine and processing plant are located not far from that in Waldenstein, both in the State of Carinthia.

KMI is an expert in delamination and micronization of industrial minerals.

The investment in state-of-the-art grinding technology enabled the development of high aspect ratio (HAR) products, such as

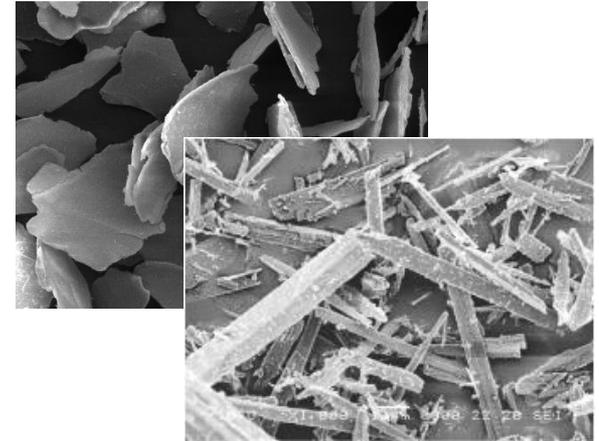
- ▶ Wollastonite “Wollastonite series”,
- ▶ Muscovite Mica “HLM-series”,
- ▶ Phlogopite Mica “HLP-series”
- ▶ Talc “Talmio series”.



## Functional minerals

- ✓ with a special particle shape (flaky, acicular) and
- ✓ high aspect ratio

add various functions to friction materials.



## ISO 9001:2015 & ISO 14001:2015

Product quality, consistency and supply reliability are the pillars of KMI's commitment.

KMI is aware of the stringent quality demands of their international customers.

We are aware of the importance for the environment and the future of our children. KMI is committed to ensuring that all industrial practices and products are socially, environmentally and economically sustainable.



Material:	naturally occurring mineral
Shape:	acicular (needle-like)
Chem. formula:	$\text{CaSiO}_3$
Color:	white
Density:	2,8 g/cm <sup>3</sup>
Hardness:	5 Mohs
Characterisation:	mild abrasive ( $\Leftrightarrow$ hardness) functional filler ( $\Leftrightarrow$ acicular shape) environmental-friendly and harmless



Raw material for various friction applications

- ✓ Clutch facings
- ✓ Grinding discs
- ✓ Abrasive paper
- ✓ Durable pulleys
- ✓ Replacement of Asbestos
- ✓ Partial replacement for chopped glass and synthetic fibers
- ✓ Brake pads and linings:

Applicable to all kinds of formulations, especially benefiting in

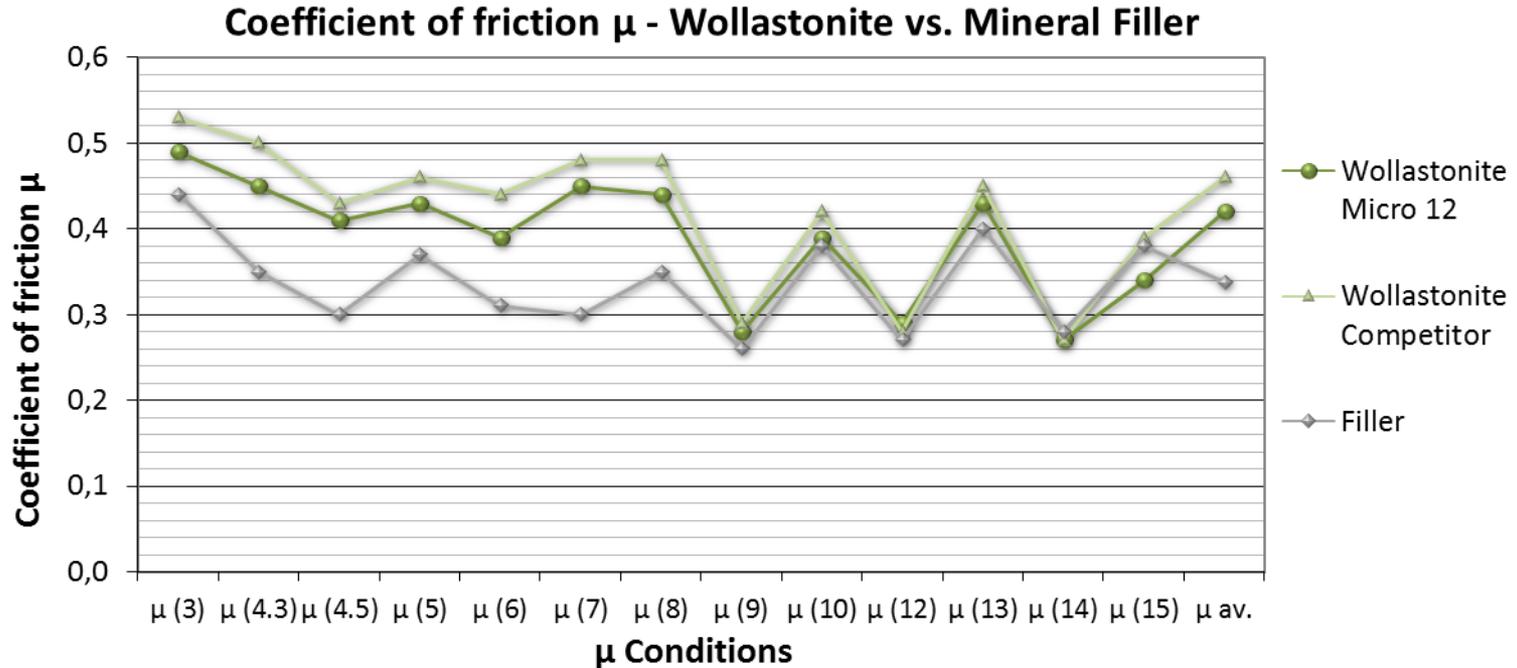
- ✓ Truck brake blocks
- ✓ Rolled linings
- ✓ ...



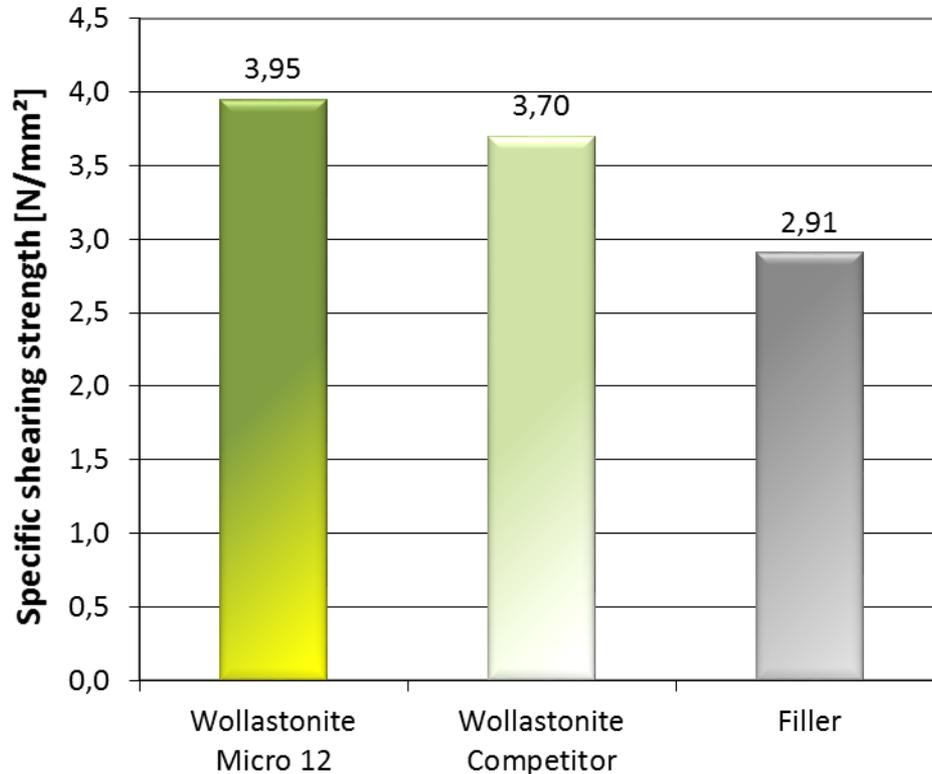
Composition	Composition No. 3	Composition No. 4	Composition No. 5
	[wt-%]	[wt-%]	[wt-%]
Metals	23	23	23
Fillers	42	42	42
Lubricants	10	10	10
Organic fibers	1,5	1,5	1,5
Abrasives	5,5	5,5	5,5
Resin	8	8	8
Wollastonite Micro 12	10		
Wollastonite Competitor		10	
Filler			10
Total	100	100	100

WE DELIVER SOLUTIONS

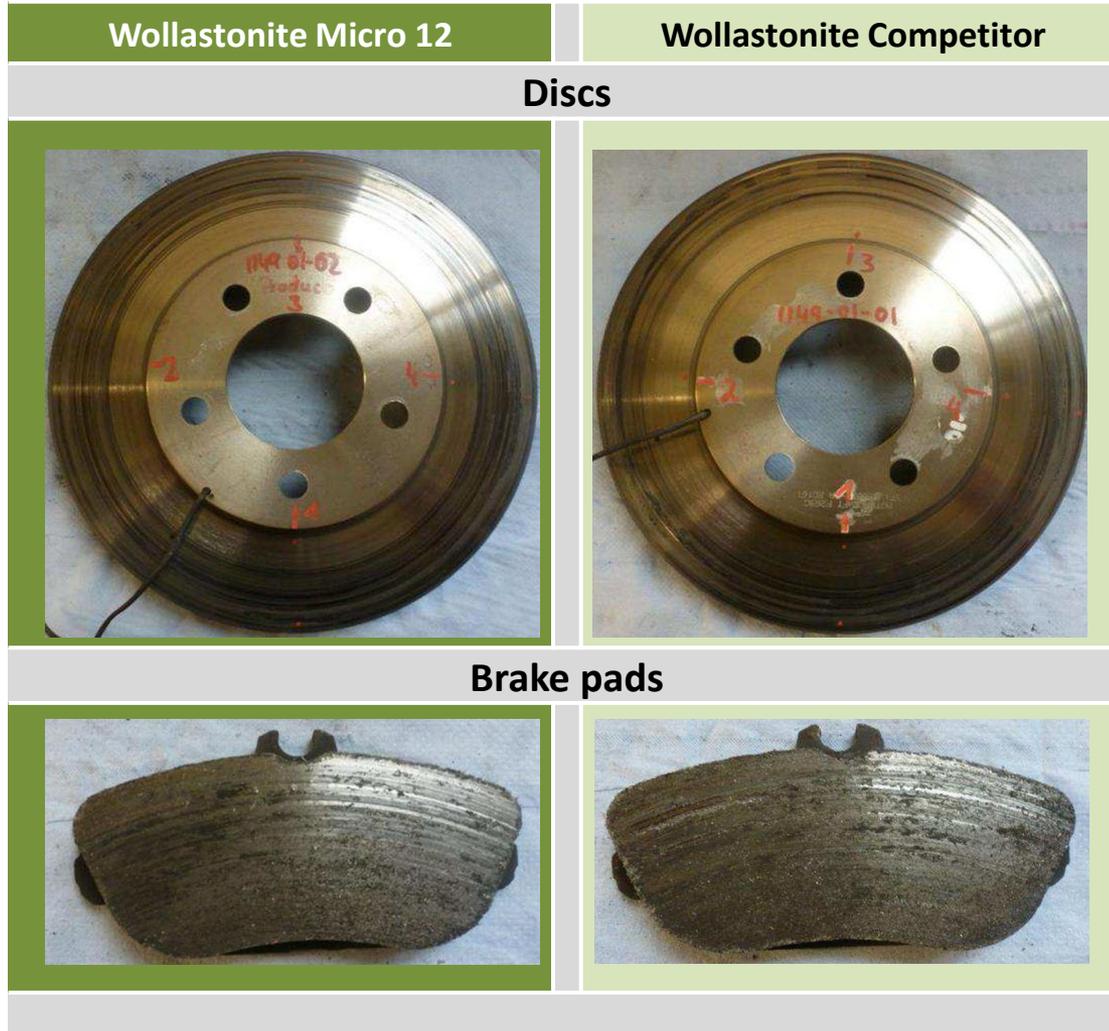
- ✓ Standard composition for European low-metallic brake pads
- ✓ KMI's Wollastonite Micro 12 (KMI) is compared with a competitor's Wollastonite product and a common filler.
- ✓ Application recommendation: 5 - 25 % Wollastonite



- ✓ Wollastonite Micro 12 increases friction compared to common filler
- ✓ Wollastonite Micro 12 provides stable friction values



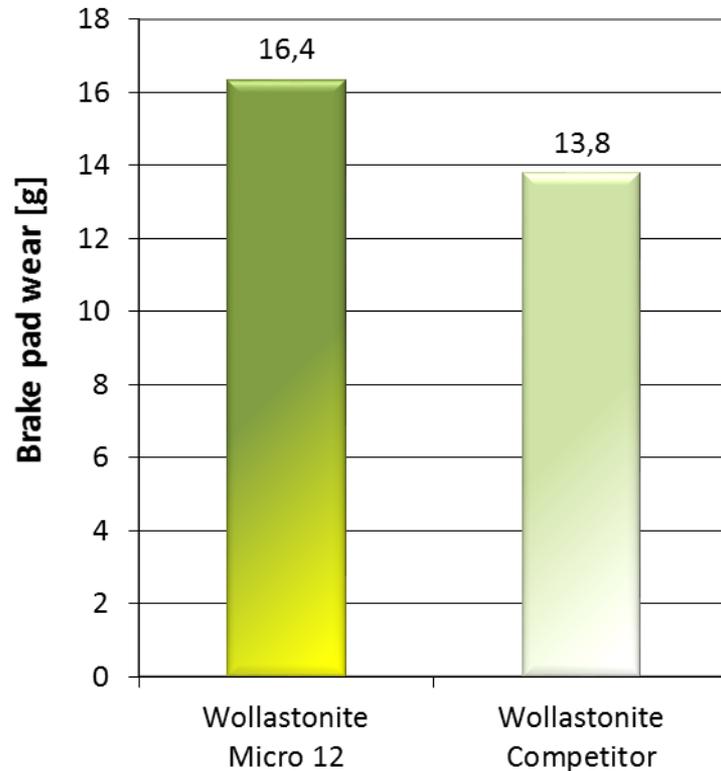
- ✓ Wollastonite Micro 12 provides slightly higher specific shearing strength than the competitor's Wollastonite.
- ✓ With a common filler only low specific shearing is achieved.



After AK-Master:

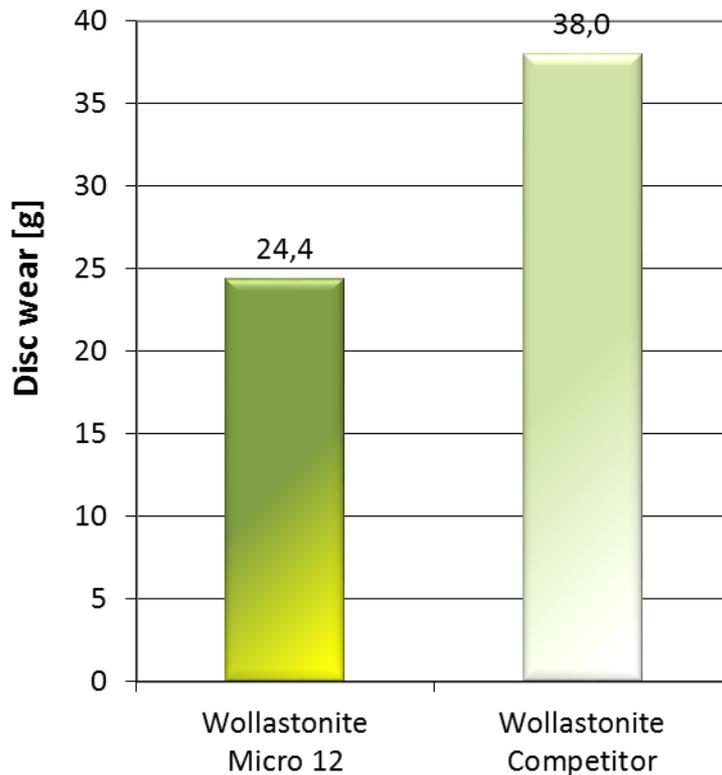
- ▶ Minor differences, comparable appearance
- ▶ Discs: few black striations
- ▶ Brake pads: smooth and dark surface

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- ✓ Measured after AK-Master
- ✓ Brakes pad wear is comparable for both products



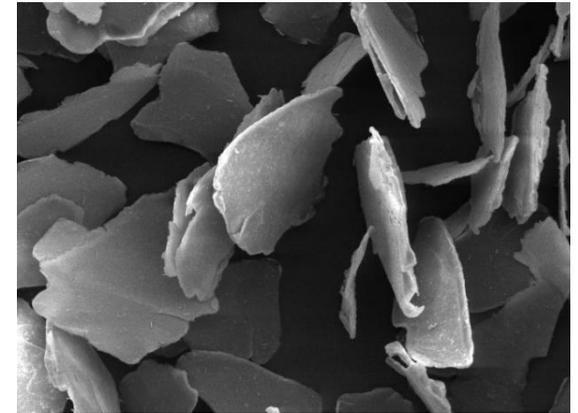


- ✓ Measured after AK-Master
- ✓ Wollastonite Micro 12 provides less discs wear

- ✓ Improved mechanics
  - shear strength
  - compressibility
  - reinforcement
- ✓ Improved friction stability
- ✓ Cracking reduction
- ✓ Rotor wear reduction
- ✓ High heat resistance
- ✓ Brake dust reduction
- ✓ Improved NVH, reduced vibration
- ✓ Reduced absorption of moisture
- ✓ Good processability (no volume increase, high green strength)

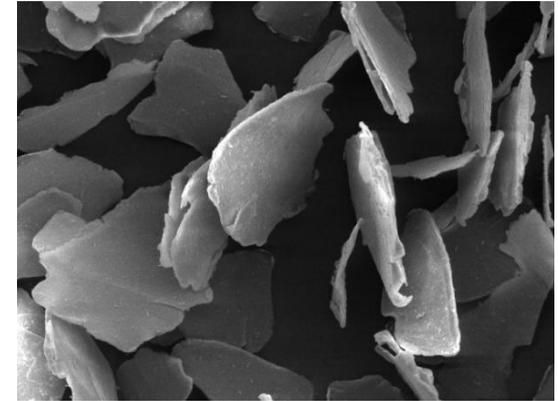


Material:	naturally occurring mineral
Shape:	platy
Chem. formula:	$\text{KMg}_3[\text{AlSi}_3\text{O}_{10}(\text{F},\text{OH})_2]$
Color:	beige to brown
Density:	2,8 g/cm <sup>3</sup>
Hardness:	2,5 Mohs
Characterisation:	functional filler (↔ platy shape) environmental-friendly and harmless



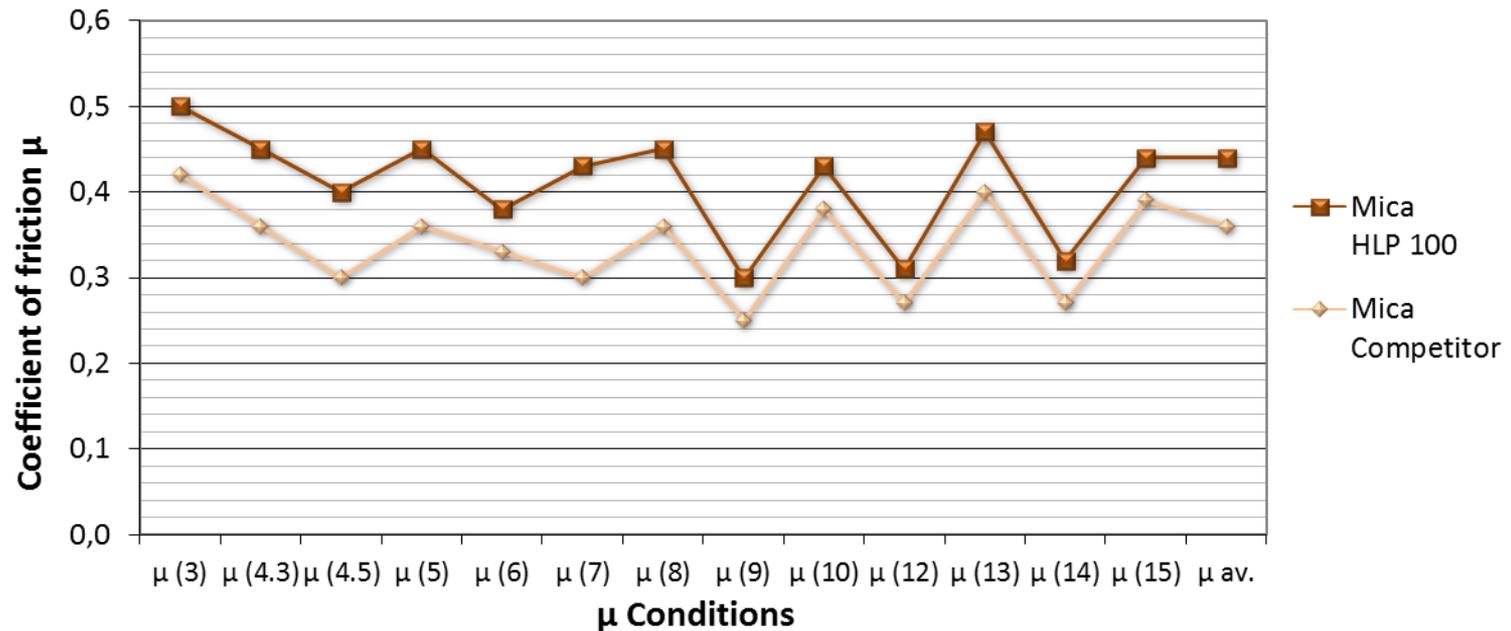
Raw material for various friction applications

- ✓ Clutch facings
- ✓ Grinding discs
- ✓ Durable pulleys
- ✓ Abrasive paper
- ✓ Brake pads and linings: applicable to all kinds of formulation
  - Ceramic formulations
  - NAO formulations
  - Semi-metallic formulations
  - Low-metallic formulations
- ✓ ...



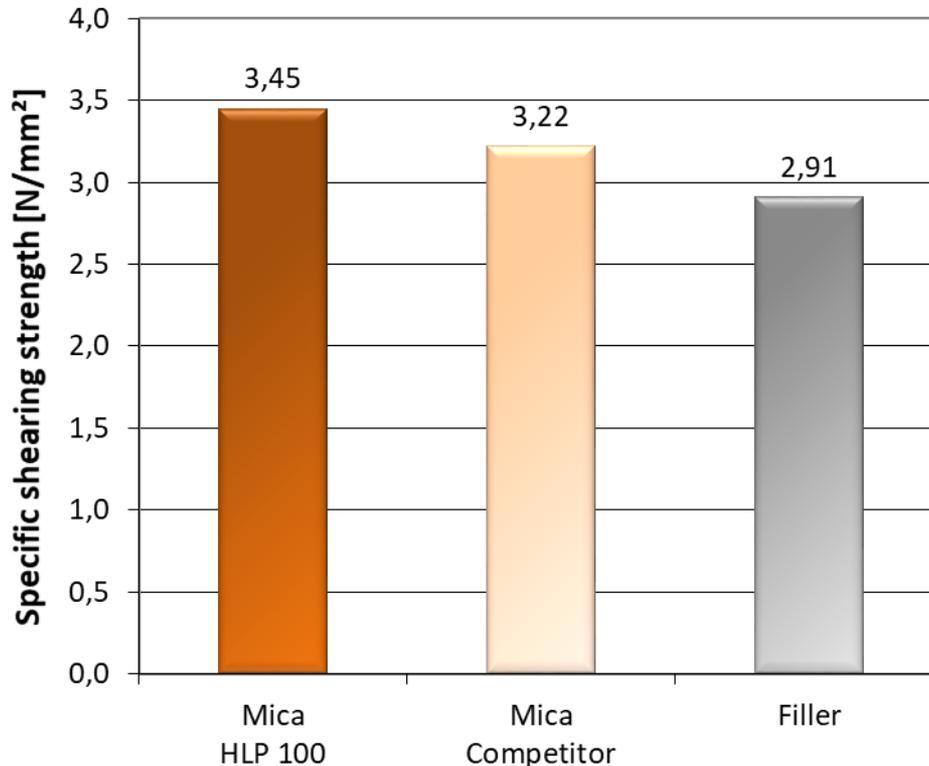
Composition	Composition No. 1	Composition No. 2	Composition No. 5
	[wt-%]	[wt-%]	[wt-%]
Metals	23	23	23
Fillers	42	42	42
Lubricants	10	10	10
Organic fibers	1,5	1,5	1,5
Abrasives	5,5	5,5	5,5
Resin	8	8	8
Mica HLP 100	10		
Mica Competitor		10	
Filler Competitor			10
Total	100	100	100

- ✓ Standard composition for European low-metallic brake pads
- ✓ KMI's Mica HLP is compared with a competitor's Mica product and a common filler
- ✓ Application recommendation: 5 – 15 % Mica



- ✓ Mica HLP 100 increases friction compared to competitor's product
- ✓ Mica HLP 100 provides stable friction values

Specific shearing strength Mica

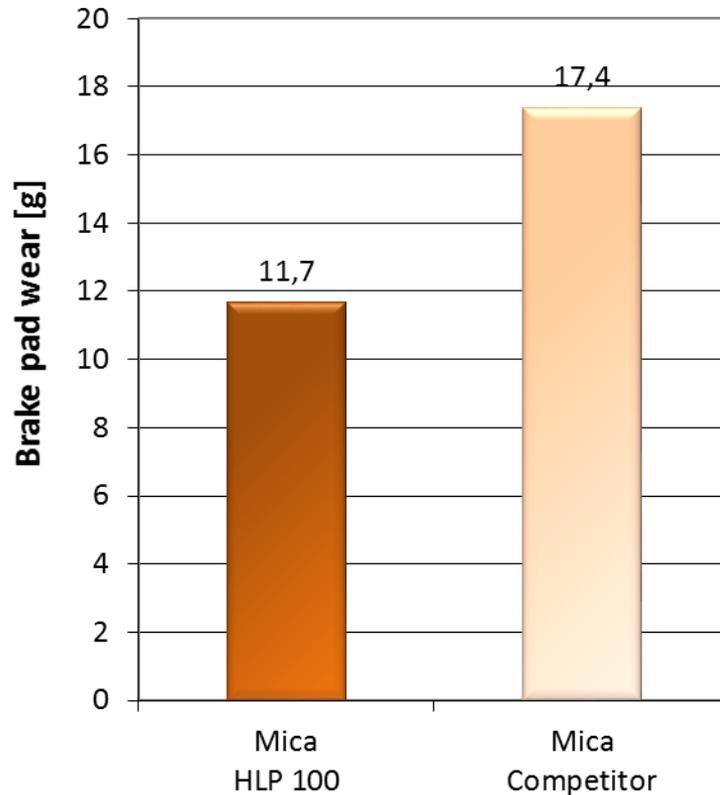


- ✓ Mica HLP 100 provides slightly higher specific shearing strength than the competitor's Mica
- ✓ With a common filler only low specific shearing is achieved

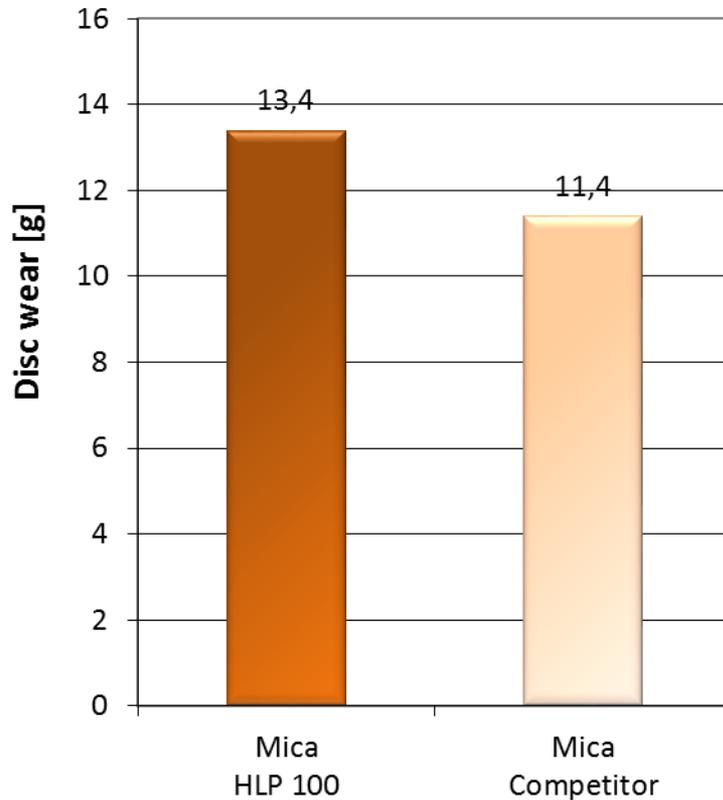


After AK-Master:

- Minor differences, comparable appearance
- Discs: few black striations
- Brake pads: smooth and dark surface



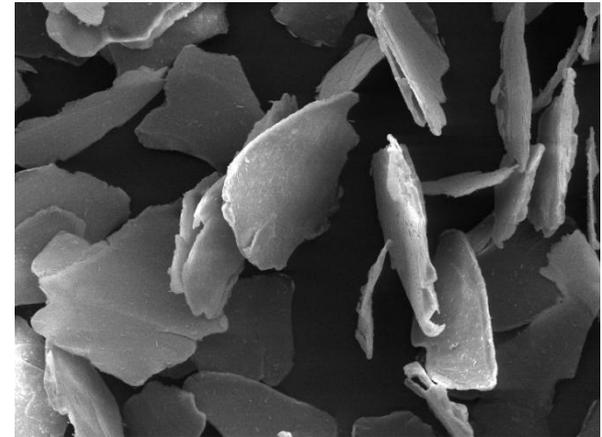
- ✓ Measured after AK-Master
- ✓ Mica HLP 100 provides less brake pad wear than the compared product



- ✓ Measured after AK-Master
- ✓ Disc wear is comparably low for both products



- ✓ Heat resistance & thermal durability
- ✓ Improved mechanical characteristics:  
Reinforcement, flexibility
- ✓ Higher coefficient of friction
- ✓ Improved friction stability
- ✓ Improved NVH, especially at low-frequency, reduced vibration
- ✓ Heat insulating
- ✓ Chemical resistance
- ✓ Non-hygroscopic properties
- ✓ Excellent processability – homogeneous mix



Kärntner Montanindustrie wants to be seen by its customers as a synonym for product innovation and customer orientation.

It is the company's objective to further extend its position as a major player and to develop new application fields and markets for functional industrial minerals.





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