

## *Die shoes and die sets made of carbon fiber*

Innovative



### **Benefits**

- Lighter than aluminum
- Vibration dampening
- Expansion close to zero
- Dimension stability
- Temperature resistant

# Innovative precision

## Application

- Die sets made of carbon (patent pending) for extremely precise cutting applications or high stroke frequencies. Suitable for parts made of materials such as aluminum, copper, plastic, steel, ceramic films with thicknesses of material up to 0.8mm, depending on the strength of the material to be processed (pressure load approx. 0.5 N/mm<sup>2</sup>). In applications with high selective surface pressures hardened plates should always be used.
- Machined die shoes for mold, machine and fixture construction.

## Technical data

Material	Density kg/dm <sup>3</sup>	Tensile strength N/mm <sup>2</sup>	Young's modulus N/mm <sup>2</sup>	Shear modulus N/mm <sup>2</sup>	Elongation at break %
<b>CARBON</b>	<b>1.65</b>	<b>1'600</b>	<b>135'000</b>	<b>19'000</b>	<b>1.2</b>
Aluminum alloy (3.4365)	2.78	450	72'000	28'000	min. 5
Carbon steel (1.1730 / C45)	7.85	735	210'000	81'000	min. 14

## Cost comparison C45 - Aluminum - Carbon

	C45	Aluminum	Carbon
Material (costs for die shoes)	100%	175%	490%
Machining according to drawing	100%	94%	162%
Total	100%	107%	212%

## Benefits of carbon die shoes respectively die sets

- Lightweight: 1.65 kg/dm<sup>3</sup>
- Vibration damping at high stroke frequencies (20 Hz)  
The unit Hertz is the number of vibrations per second.  
1 Hz = 1 vibration per second. E.g. a die set made of carbon reaches a vibration level of 0.001 - 0.002 mm at 20Hz, while a die set made of steel has a vibration level of 0.03 mm.
- Expansion close to zero. The expansion of carbon fiber is about 0.003 mm at a temperature of 300 ° C and for a length of 500 mm.
- Material is dimensionally stable even after years.
- Temperature resistance, depending on execution, up to 150°C resp. 400°C for continuous load



Example of die set made of carbon fiber

## Delivery options for die shoes respectively die sets

- Plate thickness according to standard 32, 40, 46, 52, 60 and 80mm.  
Special thickness available upon request.  
Current max. dimension: 2500mm x 1500mm x 500mm (LxWxH).
- Thickness ground +/- 0.01mm, circumference milled.
- Thickness pressed +/- 0.2mm, circumference cut.
- Plates entirely manufactured according to customer's drawing, for die sets including installation of the guide elements.
- Standard material for strength according to table.  
Special material with greater tensile strength upon request.
- Executions for up to 150° respectively to 400°C continuous load (without guides), coated on request up to 250°C continuous load.
- The affected areas of contact can be protected/reinforced by means of metal inserts. This will prevent the carbon plates to be damaged by mechanical contacts, such as knocks or from clamping devices. The places/points must be defined on the drawing.

### Note:

When using the plates of AGATHON for assembling a die set, this is not considered as patent infringement!

The machining of carbon fiber requires the use of special machine tools (carbon dust damages conventional machines). We therefore recommend to purchase plates which are manufactured according to drawings.

## Delivery times for die shoes respectively die sets

- Carbon fiber -150°C  
about 3 to 4 weeks for row standard plates  
about 5 to 6 weeks for machined standard plates  
about 7 to 9 weeks for special dimensions
- Carbon fiber - 400°C  
about 7 to 9 weeks for special dimensions

## Example of a die set made of carbon fiber



### Dimensions

Upper plate 720mm x 120mm x 30mm  
Lower plate 720mm x 320mm x 60mm

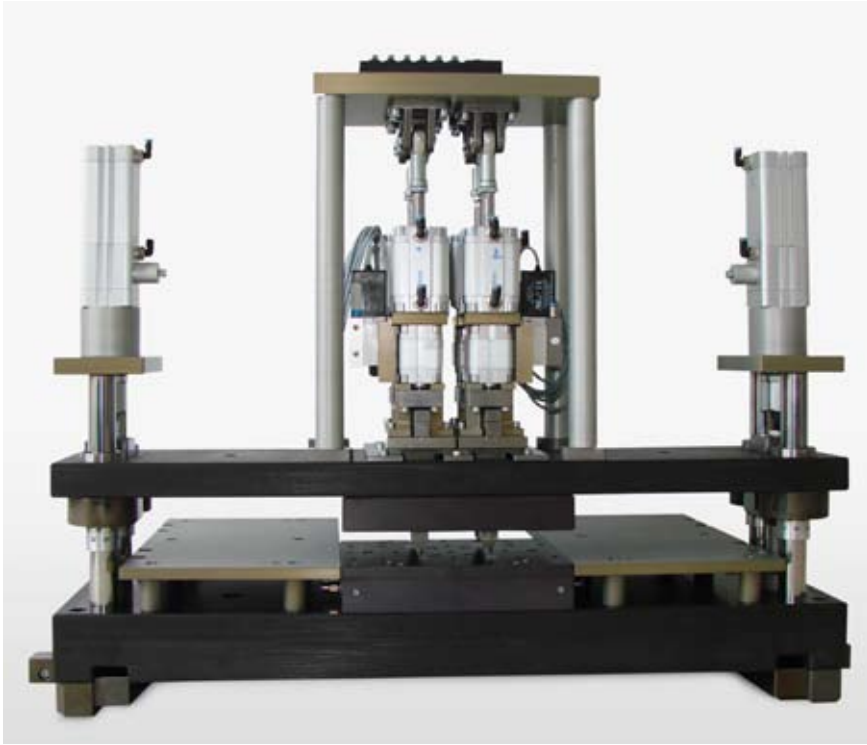
### Guides

4 Roller guide unit d1= 25mm

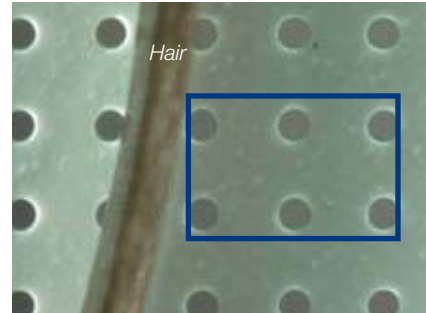
### Weight

including guiding units approx. 28kg

# Application example



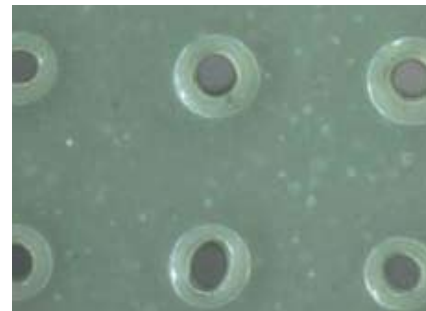
*Punching press tool with 4 pneumatic units*



*Size comparison with a human hair*



*0.05mm holes punched*



*0.05mm holes lasered*

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