

AGATHON

S W I T Z E R L A N D

COMBI *plus*

A continuation of development



Highly precise 4-axis grinding center for
the manufacturing of tungsten carbide,
CBN and PCD indexable inserts

flexible

Machine design

The AGATHON COMBI plus is the result of over 90 years of experience in building high-precision grinding machines. AGATHON grinding centers lead the way for the efficient production of indexable inserts achieving the tightest tolerances.



Proven system

Since 2003, the 400 Series machines have successfully established themselves in the market place. So far hundreds of these types of machines are in daily use worldwide. The machine has been continuously developed over the past few years and has been adapted to new customer requirements.

Productivity

AGATHON grinding centers are used worldwide. Further proof for highest reliability and productivity.

Thermal stability

Stable performance begins with a small but important detail. The thermal stability of the machine is quickly reached and maintained during production. To reach this goal, AGATHON has implemented a variety of measures that are part of the machine concept.

Swiss precision

All machine key components are manufactured in-house at the factory in Switzerland.

Easy maintenance

The machine is easily accessible from every side and meets all relevant technical safety requirements and conforms to the latest CE regulations.

Consistent dressing

With AGATHON wheel dressing concepts improved values are reached in regards to grinding wheel wear, stock removal and insert edge quality.



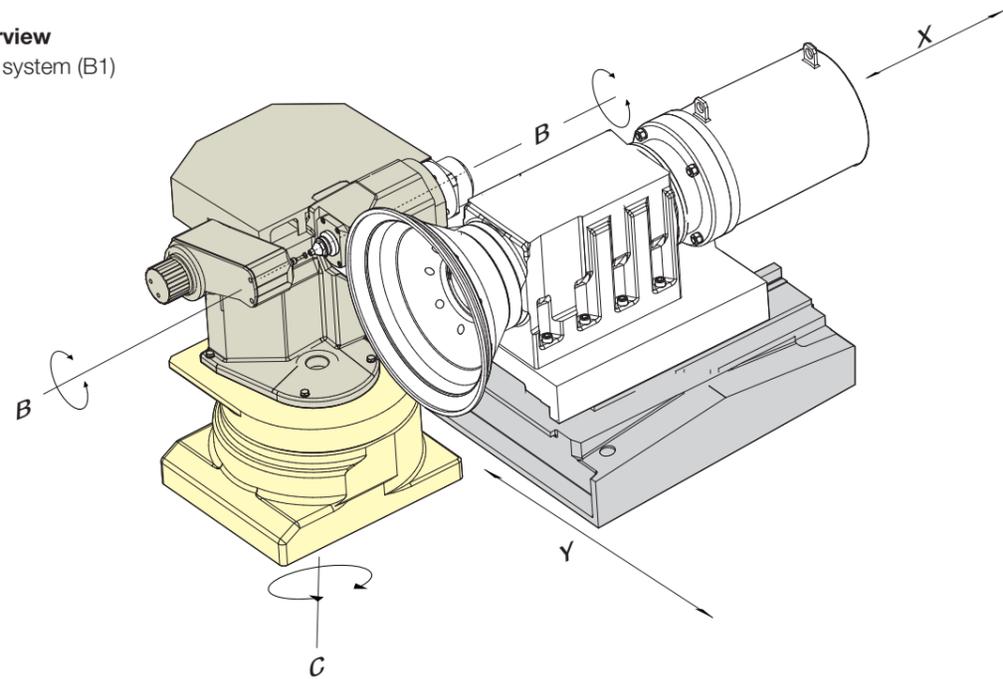
advanced

Axis overview and workpiece range



The swiveling ranges of all axis and clamping systems enable the production of highly complex indexable inserts.

Axis overview
Clamping system (B1)



Travel ranges and speeds

	B axis	C axis	X axis	Y axis
V_{max}	$500^{\circ} s^{-1}$ ¹⁾	$90^{\circ} s^{-1}$	$160 mm s^{-1}$	$500 mm s^{-1}$
V_{min}	$0.06^{\circ} s^{-1}$	$0.01^{\circ} s^{-1}$	$0.001 mm min^{-1}$	$0.001 mm min^{-1}$
Grinding speed	max. $300^{\circ} s^{-1}$			
Travel range max.		$-100^{\circ} / +110^{\circ}$	$-10 mm / +130 mm$	539 mm
Travel range min.			0.001 mm	0.001 mm
Resolution of measuring system	0.00034°	0.0001°	$0.1 \mu m$	$0.1 \mu m$

The stated travel and swivel ranges are maximum values and may, depending on the application (abrasive geometry and wheel adaptor) vary considerably. ¹⁾ V_{max} for continuous use = $300^{\circ} s^{-1}$

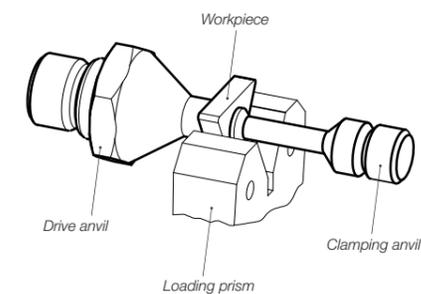


Rigidity

The mechanical rigidity of the proven axis concept guarantees maximum material removal rates. The tremendous axis accelerations and speeds contribute to the highest possible productivity.

B1 clamping system

The workpiece is positioned in a loading prism and clamped between clamping and drive anvils. These are individually adapted to match the workpiece shape.



optimized

Handling

The COMBI plus is equipped with the latest generation of robots. The TS SCARA robot has been successfully integrated into the productivity concept of COMBI plus.

Handling

The newest Stäubli robot featuring 4 axis guarantees maximum flexibility and highest utilization during loading and unloading of indexable inserts. The robot offers shortest loading cycles and is capable of self-optimizing its travel pattern.

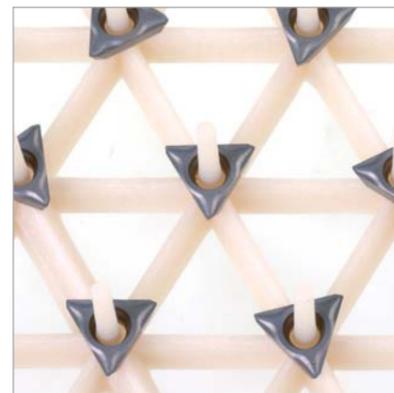
Vision-Spot detection (option)

The Vision-Spot detection (option) enables reliable position detection of the blank using the outer contour and surface characteristics (e.g. sintered markings). This guarantees a continuous identical orientation of the workpieces in the clamping system and thus constant sequence of processing stages.



Pin pallet (optional)

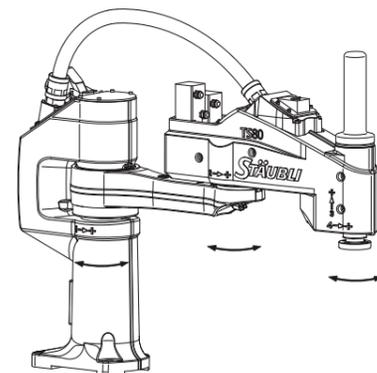
The pin pallet option enables automatic loading and unloading of inserts with a hole. The automation for smallest triangular inserts is also possible with the appropriate gripper system. With our variable clamping force (optional) the clamping force can be adjusted to the proper pressure for these inserts.



Pin pallet

Advantages of this option:

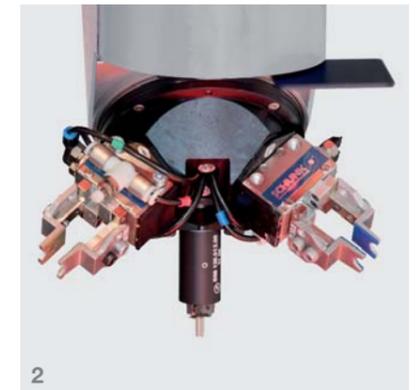
- Auto-loading of smallest triangular inserts (IC 3.362–9.525mm) is possible.
- Safe loading and unloading of the inserts.
- Variable clamping force (option).



Handling and robotic system

- 1 Gripper head equipped with magnetic, vacuum or internal hole part grippers.
- 2 Vision system with integrated camera inside the gripper head with diascopic light (option).
- 3 Indexing of inserts based on sintered markings with Vision-Spot detection (option).
- 4 Elevator system with up to 15 horizontal or 7 vertical pallets with Job management.

Changing of pallets without interrupting production is possible at any time.



simply brilliant

Software

real-time

Connected

The programming language (syntax) was originally developed by AGATHON specifically for the index-able insert programming. It is constantly adapted and improved to meet latest customer demands.

AGATHON software AGC+

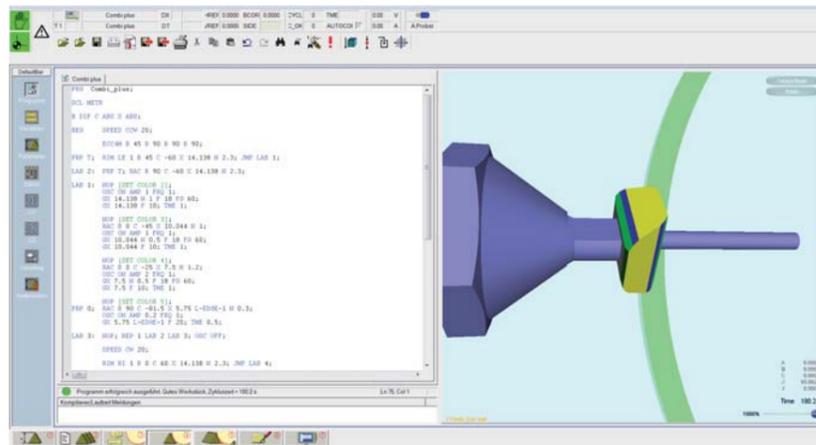
With very few commands a workpiece can be easily programmed – fast, precise, flexible.

Flexible programming and automatic rapid movements

The special characteristic of the AGATHON AGC+ software lies within insert geometry related programming. The necessary axis rapid movements are determined automatically by the software selecting only the shortest and fastest real time movements. The programmer must only concentrate on programming the workpiece.

External programming station

On an optional external programming station the programs can be created without interrupting the machine's production runs. The written program is then simulated and tested with the optional Graphical Program Simulation software. After the successful program testing has been concluded the workpiece can be transferred to the machine via the optional AGATHON Data Pool software and can also be dry-simulated (option).



GPS (Graphical Program Simulation)

AGATHON provides global real-time customer support connected directly to your machine with the Teleservice.

Teleservice

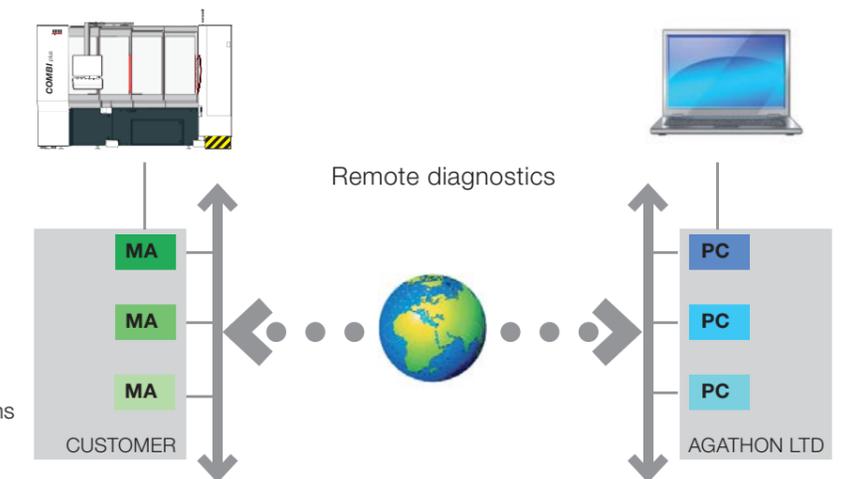
With our Teleservice feature we are able to log on and directly follow your machine. This option simply guarantees highest machine utilization rates which AGATHON is known for.

Remote diagnostics and support

The optional AGATHON Teleservice ensures competent support by AGATHON specialists.

Advantages:

- Immediate error diagnostics
- Error analysis and immediate solutions
- Parallel communication by phone
- User and expert team view the same screens
- Programming support
- Significant cost savings
- Your know-how remains safe with us. AGATHON treats all information absolutely confidential.

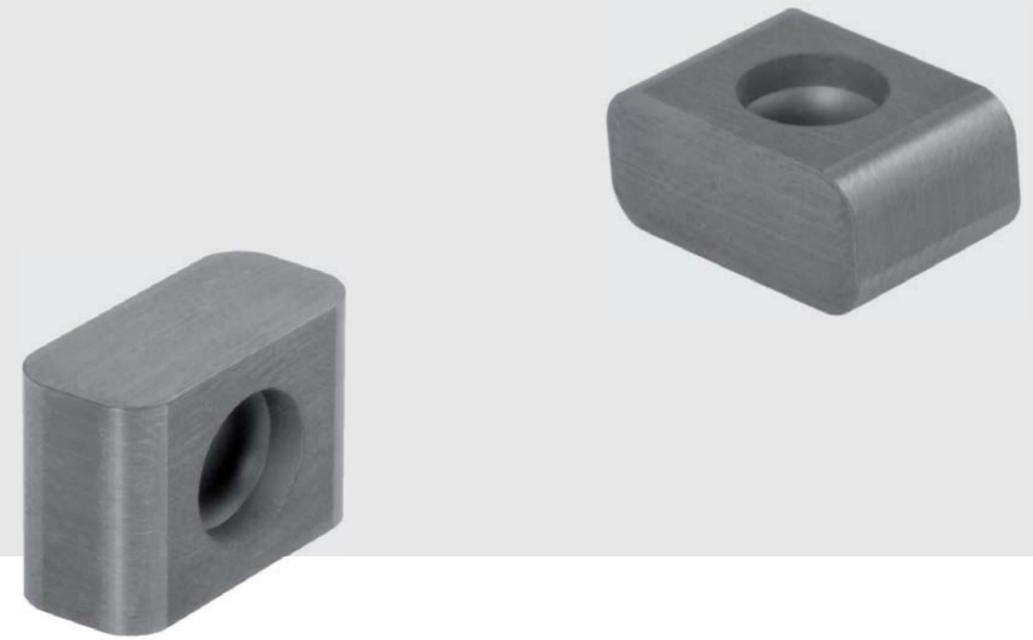


Parallel communication by phone



highly precise

Complete machining



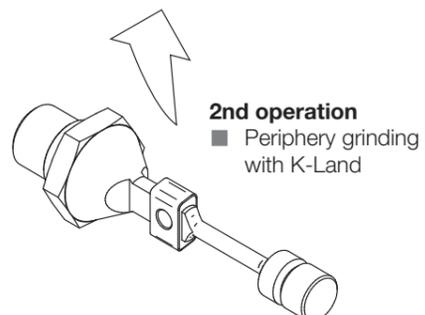
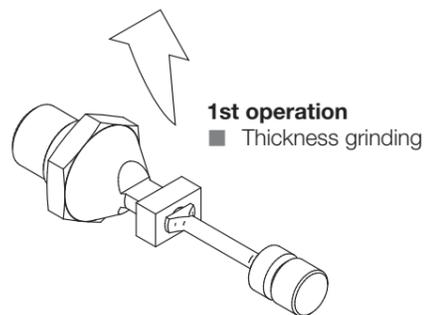
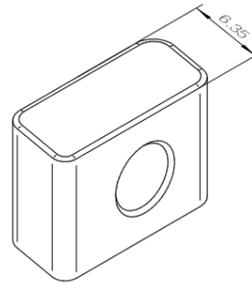
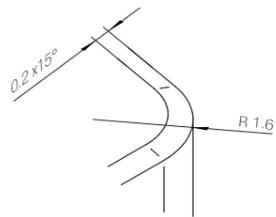
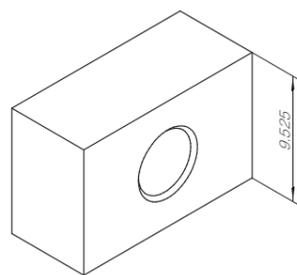
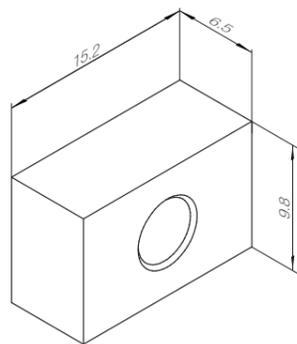
AGATHON has extensive knowledge of all types of indexable inserts. All this knowledge has been incorporated into the new COMBI plus.

Application example:

Complete machining

Material	Tungsten carbide
Total cycle time with automatic loading and measuring:	120 s

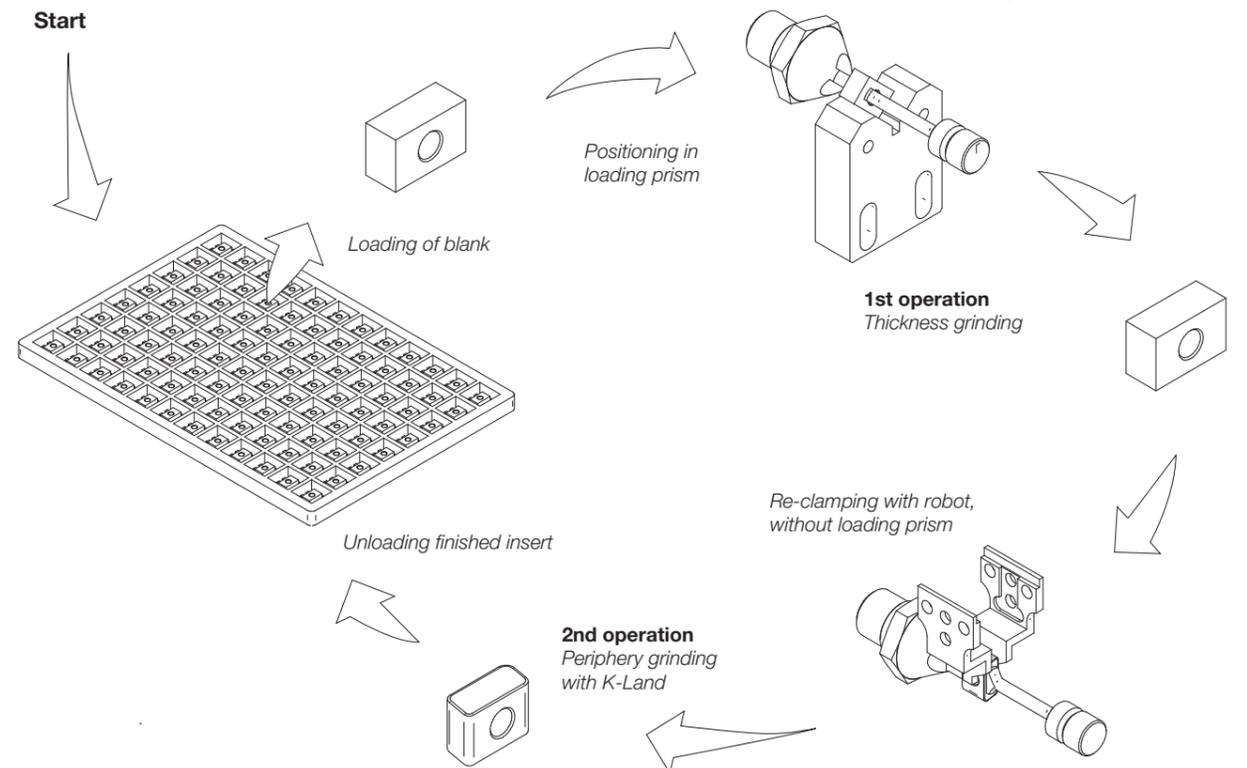
Blank



B1 - Workpiece re-clamping (optional)

The optional B1 re-clamping allows the complete machining of all external surfaces of a workpiece in one cycle. With B1 re-clamping on the COMBI plus blanks can be machined completely in one work order first by parallel grinding and then finish-grinding all remaining surfaces.

- Advantages of this option:**
- Time saving
 - No additional handling of pre-ground blanks.
 - No separate grinding machine necessary for pre-grinding.
 - No delay for the pre-grinding time to end.
 - Up to three different clamping methods possible.



Dressing concepts

The pre-requisite for an excellent and consistent grinding result is by selecting the appropriate dressing and cleaning process.



Dressing concepts

AGATHON offers four dressing devices whereby some can be combined. The TopCup-Dress in-process cleaning method can be utilized by one of the three external dressing devices. By integrating many years of established developments into the software, new processes have become possible and existing ones have been greatly improved.



External combined dressing
ExternCombiDress (option)

External dressing options

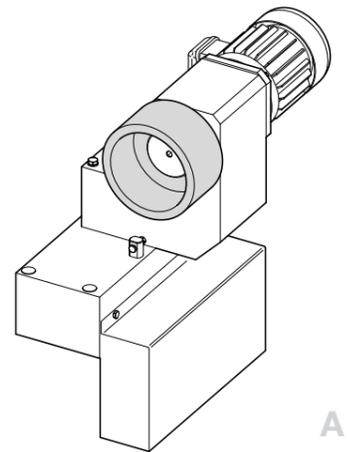
Amongst the three external dressing devices offered, select the most appropriate and economical unit:

ExternCupDress (A) - A proven dressing method with a cup wheel for high removal rates and constant peripheral dressing speed.

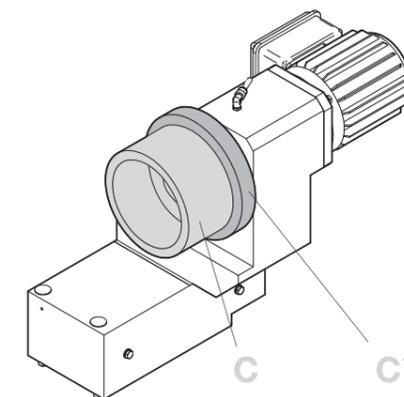
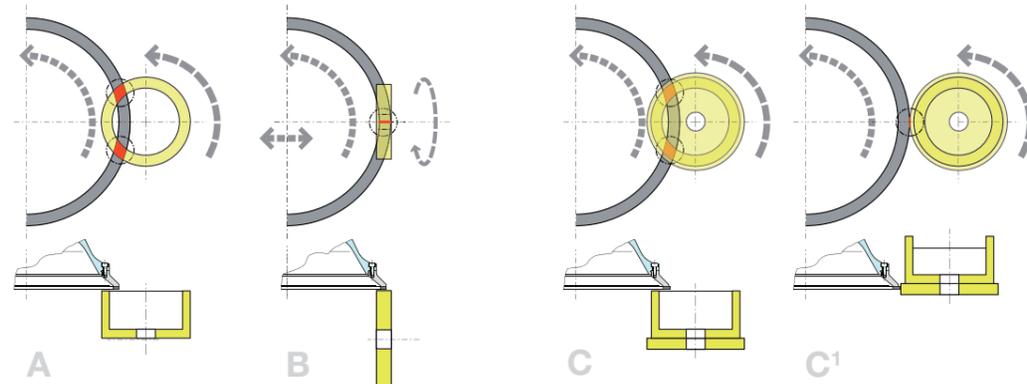
ExternPeriDress (B) - Lower costs for dressing wheels, different dressing-wheel widths can be achieved simply by stacking multiple wheels.

ExternCombiDress (C/C1) - Our latest development that for the first time also sharpens the outer diameter of the grinding wheels making new grinding processes possible. A defined wheel corner is automatically established when the outer diameter and the front of the wheel are dressed.

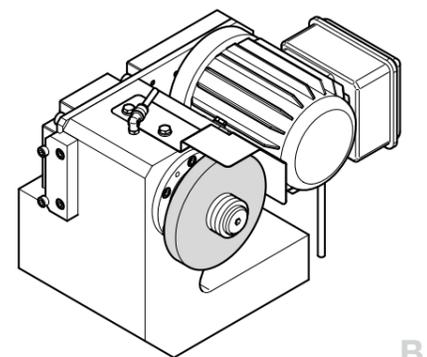
The dressing devices all have in common the quick and easy wheel changes and the reliability throughout the production process.



External cup dressing
ExternCupDress (option)



External combined dressing
ExternCombiDress (option)



External periphery dressing
ExternPeriDress (option)

new

Special possibilities

general

Technical data

We focus on our customers.

General dimensions and connection data. Additional specific data can be found in our customer specific quotations.

Special possibilities

Internal MONITORING (option) is a visualized force measurement which is displayed on the user interface. The grinding process can be closely monitored and evaluated. Possibility of manual intervention if needed (e.g. to optimize infeed rates or spark-out time).

This enables to optimally adjust the grinding wheel to the material to be ground. The option is very useful especially when machining hard cutting materials. The sensor is located in the X axis and measures the normal force. The tangential force is measured with the performance measurement at the frequency converter. These two forces are visually displayed as a graph.



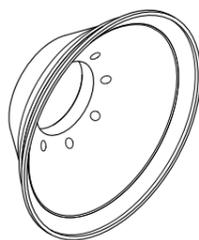
Visualized force measurement is displayed on the user interface

Everything counts

In addition to selecting the appropriate grinding wheel your choice of the correct wheel adaptor is equally important. Different shapes of wheel adaptors provide you with different axis swivel ranges. The high rigidity and stability is achieved thanks to the easy and well-proven adaptor mount. For maximum shape consistency along with a harder grinding wheel the peripheral speed of the grinding wheel can be increased up to 63m/s on the COMBI plus.

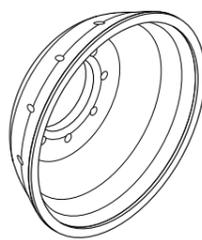
Tapered wheel adaptor

- full C-axis range
- complex shapes



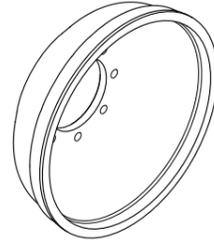
Parabolic wheel adaptor

- tough materials
- CBN with chamfers
- PCD

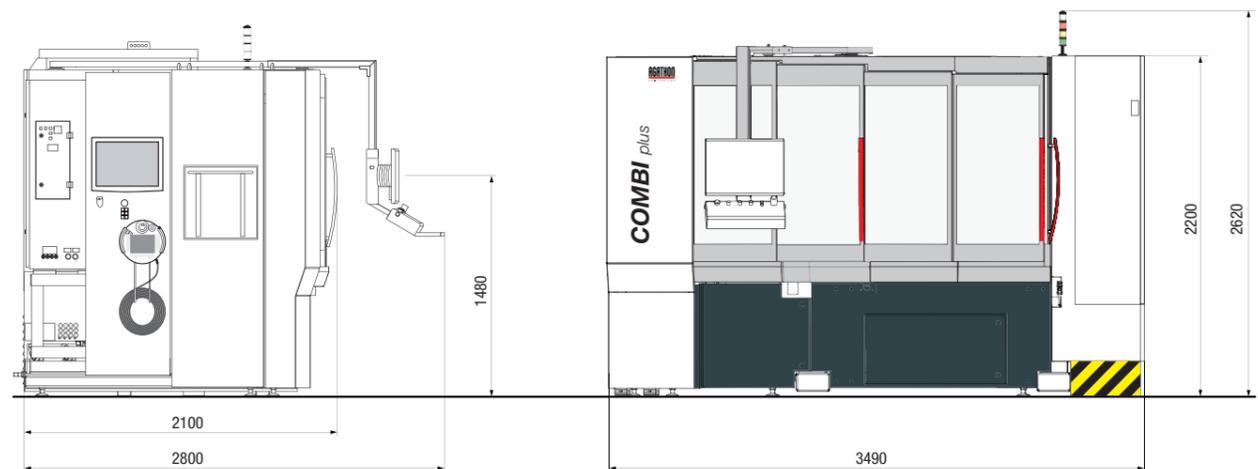


Cylindrical wheel adaptor

- for all materials
- heavy cutting operations
- CBN without chamfer
- PCD without chamfer



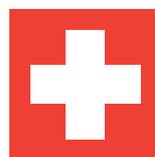
Dimensions of the machine



Connection data

	Data
Electrical connection	3×400 V
Maximum power consumption	40 KVA
Compressed air	5–6 bar
Grinding wheel diameter	400 mm
Maximum grinding wheel speed	63 ms ⁻¹
Smallest insert inscribed circle	4.76 mm
Conditional grindable inscribed circle	3.75 mm
Largest insert circumscribed circle (with measuring probe)	90 mm
Clamping range	max. 29 mm
Machine weight	approx. 6500 kg

COMBI plus 3002.2 / Date: 06.12.2012 / Subject to technical modifications



Quality makes it possible

Agency close to you:
<http://www.agathon.ch>

AGATHON

S W I T Z E R L A N D



AGATHON LTD

P.O. Box 332

CH-4512 Bellach

Tel +41 (0)32 617 4500

Fax +41 (0)32 617 4700

insert@agathon.ch

www.agathon.ch

