

AFFOLTER AF160

AFFOLTER AF160 CNC gear hobbing machine has an horizontal working axis for hobbing or milling teeth on straight and helical spur gears, pinions, wheels, shafts and worms. It is equipped with a AFFOLTER Pegasus® digital control system. The machine frame is made of mineral cast iron, providing excellent thermal stability and better vibration damping, which increases tool life. The frame is mounted at 3 points on a mechanically welded base. The tool and workpiece are driven by a motor spindle (direct drive). The linear axis are equipped with optical scales, ensuring a linear resolution of 0.5 µm. The tilt angle of the hobbing head as well as the Shifting are automatic and programmable.



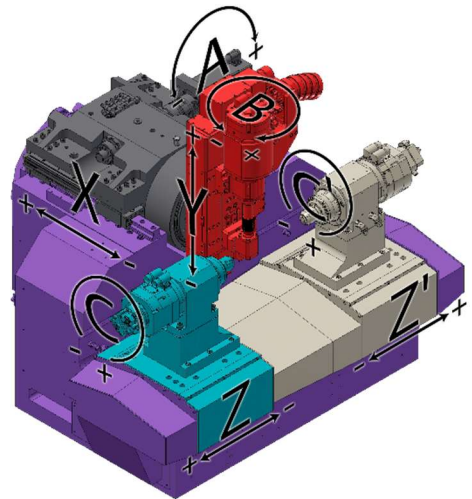
1 MACHINE SPECIFICATIONS

1.1 Machine capacity

Max. part diameter	60 mm *
Max. part length	250 mm
Max. machining length	110-180 mm
Max. module (depends on the material and required quality)	2.0 mm
Max. hob diameter (gear hobbing)	50 mm
Max. cutter diameter (worm milling)	100 mm
Max. cutter length	80 mm
Tilt angle of the hobbing head (A axis)	+/- 50° (option -115°) **
Max. rotation of the hob spindle (B axis)	9'000 – 16'000 min-1
Max. rotation of the workpiece spindles (C-C' axis)	5'000 – 12'000 min-1

*Up to diameter 100mm depending the gear material and module, as well as the hob diameter.

** Hobbing head tilt angle -115° as an option.



1.2 Axes controlled by CNC (standard configuration)

Axis	Description	Power	Couple	Speed	Course
A	Angular positioning of the hobbing head			14 tr/min	+/-50°
B	Hob cutter motor-spindle drive	8.1 kW	8.8 Nm	9,000 min-1	360°
C'	Headstock motor-spindle drive	8.1 kW	8.8 Nm	9,000 min-1	360°
C	Tailstock motor-spindle drive	8.1 kW	8.8 Nm	9,000 min-1	360°
X	Radial feed			10 m/min	70 mm
Y	Tangential feed "shifting"			10 m/min	90 mm
Z'	Headstock axial feed (without clamping option F)			10 m/min	200 mm
Z	Axial feed against tailstock			10 m/min	200 mm
C, C'	Headstock/counter-headstock clearance without driving centers and holders				345 mm

1.3 Motorspindles description and options

- Encoder position-controlled motor-spindles;
- Temperature stabilisation by means of a water-Glycol circuit;
- Tool holder clamping on B axis : HSK-C 40 interface;
- Part clamping on C-C' : Standard driving center, collet type W20/W25/F15/F20/F25/B32 or stepped collet with W25 interface, retractable pin system, expandable driving center, part clamping control;
- Continuous speed variation;

	AFFOLTER GROUP SA		
	TITLE	TECHNICAL DATA SHEET AF160	
	DOCUMENT	ATSA-R01-DO-013-e	005 22.01.2021

1.4 Linear axis

- Servo-motors coupled to ball screws by means of notched belts and couplings;
- Ball screw nuts with high preload;
- Guide rail with rollers on all axes;
- Position monitoring by means of an optical ruler with a linear resolution of 0.5 μm on the X-axis as standard;
- Positioning control by means of precision motor encoders with a resolution of 1 μm linear on the Z, Z' and Y axes as standard;
- Positioning control with ruler and 0.5 μm linear resolution, available as an option on the Z, Z' and Y axes;

1.5 Commissioning data / electrical connection

- Power consumption 4 kVA
- Connection value 3 x 400 V ($\pm 5\%$)
- Cross-section of the feed wire 5 x 2.5 mm²
- Power supply fuse 16 A type D delay
- Operating voltage 24 V
- Frequency 50 Hz ($\pm 5\%$)
- Control voltage 24 V

2 HOBGING PRODUCTION

2.1 Hobbing features

- Straight gear
- Helical gear
- Straight bevel gear
- Face gear
- Crowned gear: straight or helical
- Worm screw
- Worm wheel
- Cylkro gears
- Chamfering
- Internal gear

2.2 Quality features

CNC GEAR line hobbing machines are highly accurate. The quality of hobbing is strongly dependent on a number of factors such as the quality of the cutting tool (hobbing cutter), the precision of the clamping tool and, last but not least, the quality of the blank parts. The Quality is commonly classed DIN 6 according to DIN 3962. In any case, only machining tests with specific parts will allow us to make a statement based on the quality of hobbing.

2.3 Production analysis

Machining time, production per hour, Shifting number counter, total number of parts.
Pre-heating program and machine stop by programming the time or number of parts.

2.4 Electrical distribution cabinet

Includes all control and drive units.
Cooling by air circuit.

2.5 Chip removal - filtration

The cooling liquid tank is integrated in the machine base. It can be easily removed for cleaning, draining and chips evacuation.

The coolant flows out of the machining environment through an opening in the machine base and frame.

- An SF-compact chip conveyor* can be added as an option.
- A band filter system can also be added as an option.

* with integrated filtration 50 μm

	AFFOLTER GROUP SA		
	TITLE	TECHNICAL DATA SHEET AF160	
	DOCUMENT	ATSA-R01-DO-013-e	005 22.01.2021

2.6 Oil cooling system

1. Tank with a capacity of 120 litres, with a pump with a flow rate of 40 l/min at 10 bars;
2. An active cooler can be added as an option;
3. A hose is available to rinse manually the machining zone.

2.7 Centralized lubrication

Automatic and programmable lubrication of linear guides and ball screws by means of a minimum-flow system.

2.8 Full protection

Retractable, transparent Plexiglas cover of the machine makes it easier to access during machine set-up.

3 NUMMERICAL CONTROL

3.1 CNC AFFOLTER Pegasus numerical control

The AFFOLTER digital control is equipped with a high-performance industrial PC offering high processing power and ensuring extremely fast regulation and interpolation cycle times. It controls all machine axes as well as a multitude of peripherals for various options and automations. Programming is simple and user-friendly with its 19" colour TFT touch screen. Among other things, there is the possibility to connect the machines on the workshop network and to load the programmes on a PC.

- 12 axes interpolated simultaneously at high speed;
- Human machine interface with 19-inch touch screen;
- Simple handling and programming, no CNC knowledge required;
- Specially developed software for hobbing with full functionality such as jog mode, tool definition, program editor and production monitoring;
- Creation and editing of the part programme by simple parameterisation or in APD (Affolter Plaintext Dialog) with plain-text programme functions, specially adapted for hobbing;
- Saving of part-programmes on the CNC, or on a PC using the CNCnet software;
- Programme transfer via USB stick or optionally via Ethernet or WLAN (wireless) workshop network.

3.2 Affolter CNCnet software (option)

The CNCnet software centrally manages the production as well as the part programmes. Program transfer between machine and PC can be done via USB stick or optionally via Ethernet or WLAN/WIFI.

4 HOBGING OPTIONS

4.1 Deburring


The AF160 machine offers 3 deburring modes:

1. Double hob deburring: 2 hobs mounted on the same cutter holder shaft for milling in opposite directions (this mode is included in the basic machine);
2. Deburring with a cutter or deburring wheel: AF54 deburring unit (mechanical option);
3. End mill deburring (only available without the counter bearing) → Mainly for face gears and bevel gears.

4.2 Skiving

4.3 Part orientation

4.4 Face detection

	AFFOLTER GROUP SA		
	TITLE	TECHNICAL DATA SHEET AF160	
DOCUMENT	ATSA-R01-DO-013-e	005 22.01.2021	

4.5 Type of hobs and cutters

1. Single start hob
2. Multi start hob
3. Chamfering cutter
4. Single start index cutter
5. Multi start index cutter
6. Power skiving cutter
7. Worm milling cutter
8. Worm generation cutter
9. CYLKRO cutter
10. Straight bevel gear cutter (CONIXS / CONIKRON).
11. Shank type hob

5 OTHERS

5.1 Paint

Machine standard colour

- NCS S light Grey;
- IGP 334ME71319A10 charcoal Grey.

Other colours upon request (option)

5.2 Size and weight

- Basic machine dimensions (L / D / H)* 1'500 mm / 2'010 mm / 2'650 mm
- Weight (basic machine without liquids)* 3'900 kg

**Dimensions and weight may vary depending on the type of automation and options.*

5.3 Basic technical documentation on USB stick:

- Instruction manual (use and maintenance);
- Technical manual (mechanical and electrical);
- Electrical circuit diagrams.