

TECHNICAL DATA

CNC – 5 – Axis – Simultaneous - Compact – Portal Milling Machine

Manufacturer	FOOKE
Type	ENDURA 704 LINEAR
Control	HEIDENHAIN iTNC 530 HSCI
Built	2015



travels

Longitudinal movement (X axis)	2.200 mm
Lateral movement (Y axis)	3.500 mm
Vertical movement (Z axis)	1.500 mm
Max. workpiece size for 5-sided machining (tool length 100 mm):	
Y = 2.760 mm, X = 1.460 mm, Z = 1.130 mm	

Clamping table

Clamping surface	3.500 x 2.100 mm
T-slots	22 mm distance 200 mm
Max. load	1.000 kg/m ²

Feeds, rapid traverse

Feed X-, Y- and Z - axis	5 - 65.000	mm/min.
Rapid traverse X-, Y- and Z - axis	65.000	mm/min
Acceleration	up to 3,5	m/sec ²

Axle drives

In the linear axes (X,Y,Z) water-cooled linear motors, X - axis as GANTRY - axis

fork milling head No. 4, with torque motor drives

A - axis (spindle swivel axis)

Swivel angle	220°	+/- 110°
Swivel torque (simultaneous)	500	Nm
Holding force (clamped)	3.000	Nm
Speed	360	°/sec
Axis acceleration	800	°/sec ²

Direct measuring system - distance coded

C - axis (milling head rotation axis)

Swivel angle	550°	+/-275°
Swivel torque (simultaneous)	500	Nm
Holding force (clamped)	3.000	Nm
Speed	360	°/sec
Axis acceleration	800	°/sec ²

Direct measuring system - distance coded

Base-tool length (pivot point A - axis to spindle nose) 270 mm

For heavy machining works, i.e. higher process forces, both rotary axes can be clamped.
Of course, the two rotary axes can also be used for simultaneous milling.

High frequency milling spindle

Manufacturer	FISCHER	Type MFW	
Power 100/60 % ED	42/48	kW	
Speed range stepless adjustable	0 – 24.000	min-1	
Torque	76	Nm	0 – 6.000 min-1
Tool Taper	HSK 63 – DIN 69893 Form A		
Ball bearing lubrication	Oil-air lubrication		
Automatic tool clamping	25.000	N	Tension force

CNC-control HEIDENHAIN iTNC 530 HSCI

Main computer MC 7222 (Pentium M / 1,8 Ghz CPU, RAM-memory 1 Gbyte)
Controller unit CC6110 (705/711)
Controller unit CC6106 (2-fold) (704)
TNC control panel TE730
Machine control panel MB720
15" TFT – color flat screen BF750
Portable electronic hand wheel (radio)

Operating modes

The following operating modes are set up:

- Automatic mode (production mode)
- Semi-automatic operation (production operation with limited axis speeds and limited spindle speed)
- Manual operation (limited operation for setup and service activities)
-

Dynamic parameter sets

The CNC-control of the machine is software-technically optimized for milling of free formed surfaces for the

- Roughing
- Prefinishing
- Finishing

Equipped with three different dynamic parameter sets, which can be adjusted according to the processing type can be selected.

The following HEIDENHAIN options are set up:

KinematicsOpt - Check and optimize machine accuracy

With the existing touch probe, a 3-D-cycle measures the parts on the machine fully automatically existing rotary axes (A and C). To measure the rotary axes a calibration ball (not included in the scope of delivery) is fixed at any position on the machine table and scanned with the touch probe. In doing so, the software minimizes the spatial error caused by the tilting and automatically saves the machine geometry at the end of the process in the respective machine constants of the kinematics table.

Global program settings

The global program settings can be used to define various coordinate transformations and settings that are globally superimposed on the selected NC program without having to change the NC program.

The following functions are available:

- Exchange axes
- Additional, additive zero offset
- Superimposed mirroring
- Locking of axes
- Handwheel superimposition, with axis-specific storage of the paths travelled by handwheel, also in virtual axis direction
- Superimposed basic rotation
- Globally valid feed factor
- Limit level for graphically supported definition of machining limits

Dynamic collision monitoring

- the complex machine movements in 5-axis machining and the high traverse speeds make axis movements difficult to predict. Dynamic collision monitoring is therefore a helpful function that relieves the machine operator and protects the machine from damage.
- Although NC programs from CAM systems avoid collisions between the tool or tool holder and the workpiece, they usually ignore machine components located in the work area.
- If a collision is imminent, the control interrupts the machining process, thus creating increased safety for the machine operator and the machine; unmanned shifts become safer.

Automatic Tool Changer ATC

Tool places	68	places	
Tool diameter max.	140 / 70	mm	Side places free/ occupied
Tool length max.	400	mm	
Tool weight max.	8	kg	
Change position			vertikal

Guides, drive and measuring systems

- All linear axes with linear motors make SIEMENS - water-cooled
- Both rotary axes of the milling head with torque motors
- Direct measuring systems for X, Y and Z axes made by HEIDENHAIN
- X-, Y- and Z-axis guidance by means of high-precision linear guides for highest precision and dynamics

Chip conveyor

- 1 pc. hinged belt chip conveyor installed in Y-direction in front of the machine table
- Drop-off height approx. 1.100 mm

Coolant equipment make KNOLL 450 S-2

- tank volume approx. ca. 950 l
- Internal coolant supply max. 40 l/min 60 bar
- External coolant supply max. 70 l/min 10 bar

Dimensions, Weight

Floor space machine l x w	ca. 6,5 x 4,5	m
Total height	ca. 5,6	m
Machine weight ca.	34.000	kg

Electrical connection data

Protection value	250 A
Operating voltage	400 V
Operating frequency	50 Hz
Power (Pmax.)	138 kW
Power (Peff.)	Ca. 60 kW

Network type: TN-C network with overcurrent protection device according to VDE 0100

No residual current protection device may be installed!

The customer must provide separate connections for the ENDURA machine and for additional units, e.g. an exhausting system..

Equipment / Accessories

- Highly dynamic **Gantry-high-bed Portal Milling Machine in compact design**
Portal moving in X direction.
- Machine bed in rigid cast iron, side walls, cross slide and portal as welded steel construction, walking beam in cast iron.
- **Foundationless installation of the machine.** Due to the inherently rigid machine bed, only a standard industrial floor, approx. 300 mm thick, steel-reinforced, is sufficient for installation. A special foundation, however, is not required. The machine is installed and aligned by means of fixators with anchor bolts.
- The linear axes (X,Y,Z) are equipped with water-cooled linear motors made by SIEMENS. The X-axis is designed as a GANTRY-axis.
- The linear and rotary axes are equipped with direct measuring systems.
- The Z-axis drive is supported by highly dynamic pneumatic cylinders (weight compensation).
- The linear axes are equipped with a safety system which brakes and safely holds the axes in case of voltage loss. The linear axes are equipped with hardened and ground, backlash-free preloaded linear-guideways.
- The guideways are protected by bellows.
- All guideways as well as the counterbalance cylinders, which have to be lubricated with grease or oil, are equipped with catching systems so that excess lubricant is collected in a controlled manner and the workpieces cannot be contaminated. The workroom is closed all around.
- A top cover prevents dust from escaping unhindered from the work area and also limits the upward flight of chips.
- The front part of the cover (loading side of the machine) can be manually unlocked or locked so that the machine can be loaded and unloaded by crane or forklift truck.
- The working area is illuminated with fluorescent tubes (IP 54, protected against water jets and solid foreign bodies).
- 2-axis simultaneous fork-milling-head No. 4,
- high frequency milling spindle make FISCHER, 24.000 min⁻¹, HSK 63
- CNC-control HEIDENHAIN iTNC 530 HSCI

- Portable electronic hand wheel (radio)
- 68-fold tool changer
- Compact coolant system make KNOLL
- 3-D radio probe make M&H, Type 20.41 MULTI
- Laser tool control system HEIDENHAIN, Type TL Micro 300
- Emulsion mist exhausting system
- Prepared for additional external exhausting system
- Chip conveyor
- Milling head mechanics overhauled
- Cylinder for counter weight overhauled
- Change of milling spindle on 25.Oct.2018 at 9.911 spindle hours
- Operating hours: control ON 38.595 h, Machine ON 32.535 h, Prog.Run 13.390 h, Spindle 13.466 h, Axes 13.230 h