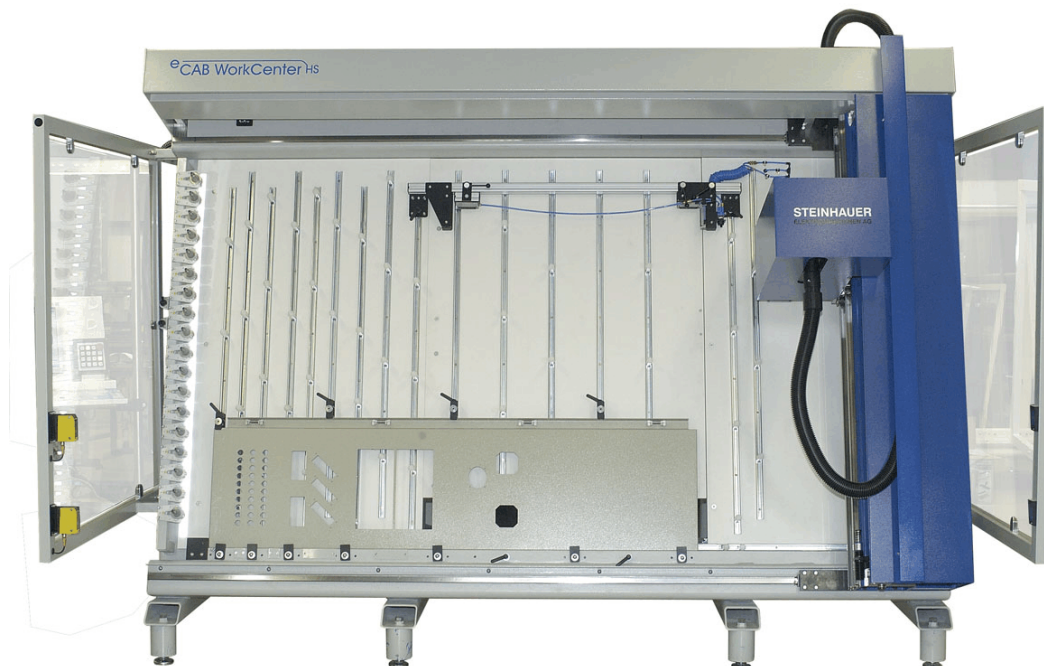




## The Machining Center for Panel Builders

eCAB WorkCenter HS Revision 2



For automatic machining of electric enclosures and mounting plates we present the

## STEINHAUER Machining Center



Yesterday you had

Scale paper,  
A hammer,  
A punch,  
A hand drill,  
A set of thread cutters,  
A compass saw,  
A hole punching press,  
And a couple of hours time



Today you should have a STEINHAUER **eCAB WorkCenter** Machining Center.

We would like to present you this machine as an **affordable** workshop equipment for your enclosure production, which will pay off very quickly.

By means of a sophisticated high-frequency CNC spindle motor with excellent concentricity tolerances all materials from switchgear production can be processed, including stainless steel, aluminium, copper and various plastics.

We have set a large store on the aspect of **efficient single piece production** with an automatic machine during development of the machine-control and application software.

The use of a CAD-drawing as base for an automatic machine code generation fulfills the needs of panel builders in an ideal way. The drawings of mounting plates and outer enclosure components are automatically translated by a postprocessor to a machine program for the Machining Centre. The software allows the planning of single enclosures as well as complex multispan assemblies.

The required CAD application as well as large component libraries are part of the scope of delivery.

## Product-Highlights at a Glance

### Machine Construction and Drive Technology

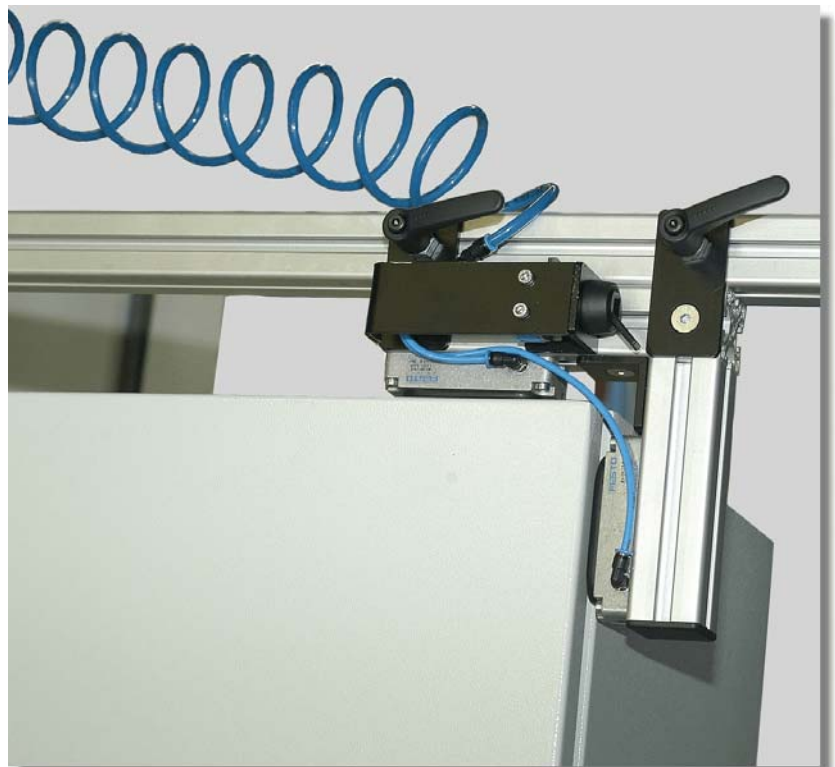
- Rugged machine construction, designed for metal work in switch panel manufacture.
- Clearly laid out and barrier-free machine design.
- Noise optimized construction for quiet machine operation in wiring area of workshop without need for ear protection.
- Chip resistant positioning techniques with linear guides and ball screws by Star/Bosch-Rexroth®.
- High positioning speed over all axes (X, Y, Z) of typical 45 m/min (max. 60 m/min).
- High precision over all axes. Repeat accuracy better than 0.04 mm.
- Brushless and maintenance-free servo drives by Beckhoff® on all axes.
- Industrial certified and maintenance-free CNC high-frequency spindle motor 5.5 kW (ISO 30/ DIN 69871), 0-18,000 min<sup>-1</sup>, low-noise and low-vibration by means of excellent concentricity tolerance. Forced air ventilated.
- Automatic tool changer set at industry standard SK30 (DIN 2080), high-precision and low-vibration concentric running by means of hardened and grinded ER full metal collets (DIN 6499 Form B). No manufacturer dependency due to proprietary and/or modified tool fittings. All positions can be optionally equipped with drills, thread-formers, milling cutters or tools for special purposes, e.g. engraving tools.
- Standard tools according to DIN/ISO (available from many sources). Tool diameter from 1 to 20 mm. Each collet chuck is suitable for any type of tool.
- Threads are manufactured with thread pitch (metric/non-metric) over the Z-axis. A high torque of 7.5 Nm allows cutting and forming of threads.
- High speed milling with up to 2,000 mm/min in 3 mm steel with inexpensive powder-metal milling cutters. No expensive solid carbide cutting tools are needed.
- User programmable automatic minimum quantity lubricating system for tool life optimization.
- Pneumatically driven chip-catcher with optional chip exhaust.
- No travelling feed rolls or vibration absorbers needed, since vibrations are minimized by means of precision components.
- Optical personnel protection equipment on front and rear safety fence.
- Minimum need for maintenance (daily cleaning, refilling of the lubricant and 3-monthly greasing).

## Product-Highlights at a Glance (Continuation)

### Machining of workpieces

- Automatic manufacture of drilled holes, threads, engravings or cutouts of any shape in all materials of panel building.
- Processing of flat or folded workpieces (Mounting plates, doors, side- or roof panels, console covers) up to oversize measures on the front side of the machine (max. 1,550 x 2,400 mm, cant-off height max. 70 mm).
- Processing of compact enclosures and non dismantable boxes up to 1,600 H x 1,000 W x 1,600 D mm) with pneumatic clamping. Easy access to the enclosure opening by means of a conveniently accessible door in machine front. Two-way driven motorized depth stop with end switch at working position for ergonomic loading of heavy loads > 150 kg.
- Fixation of flat workpieces by means of 7 fluidic muscles on lower side (individually switchable for avoidance of keepout areas for clamping) and mechanical quick clamps on upper side.
- Great variety of material for machining: Steel, special/stainless steel, aluminum, copper and various plastics (e.g. Makrolon, GRP etc.) or other, if needed.
- Many accessories for increased productivity and batch processing.
- Inexpensive deburrer option for automatic removal of outer burr (main burr formation takes place on the outside of the workpiece).
- Optional True Type font interface with WYSIWYG visualization for milling of typefaces.
- Circular milling option for manufacture of large threads and screw connections M16 - M63 in thick-walled material.
- Optional engraving function for holohedral engraving with height compensation for bent workpieces.
- Optional flange plate holders for batch processing of flange plates.
- Optional bus bar holder for batch production of bus bars.

Picture: Electrical enclosure, fastened through pneumatic quick clamp fixture in enclosure opening of the machine.



## Product-Highlights at a Glance (Continuation)

### CNC-Control and PC Hardware

- Modern, all-digital 4-axes CNC control. A long term reliable investment due to established and major supplier Beckhoff®.
- Cross linking of all active control components up to the last bus terminal by means of Realtime Ethernet EtherCAT®.
- Integrated and scalable industrial PC, mounted in the switch cabinet, for administration of the NC kernel and operation of the application software. Running under Windows XP Professional®.
- Automatic optimization of path and route of all tools to prevent needless tool change- and positioning cycles.
- Automatic optimization of milling cutter abrasion: By means of permanent variation of Z-axis the milling cutter will be worn evenly over the whole cutting area. Thereby a typical cutting length of 60-100 m in 3 mm steel is possible with a cheap powder metal milling cutter.
- A couple of thousand CNC-programs can be archived directly in the control of the machining center for instant use, only dependant on the size of the hard-drive in the PC.
- Fully remote maintainable by Internet (encrypted and secure connection). The remote connection can be additionally used for user guidance and training.
- 32-Bit Windows user interface for administration of CNC kernel and control.
- A fully featured and open DIN code interface allows direct programming as a machine-tool by the user, in addition to automatic machine code generation.
- Automatic cutter compensation allows planning with final dimensions independent from the diameter of the milling cutter used.
- Automatic tool breakage monitor (contouring error detection in realtime) for all critical tools (i.e. thread-moulders). No special tool handling or calibration necessary.

Two additional tool monitoring systems available as options:

1) Via dynamic airspeed indication with compressed air. In contrast to optical fork light barriers this method is insensitive against dust and dirt. The calibration of tools is fulfilled automatically.

2) The optional tool monitoring system detects tool breakage of all tools but also tool wear and tool erosion in realtime on a basis of energy-control, power-control and divergence-control. Unlike less convincing optical monitoring systems, which only control the quality of tools after deposition in the tool-bin and which must be measured in after any tool-change our tool monitor has no influence on tool handling.

- The 17" TFT-DVI Panel, console and input devices (keyboard and mouse) are not integral part of the switch cabinet of the machine allowing ergonomic operation at any location in the surroundings of the machine. As an option an industrial terminal is available.
- 10/100 Mbps full-duplex Ethernet interface for network integration (Microsoft, NetWare and Unix/Linux).

## Product-Highlights at a Glance (Continuation)

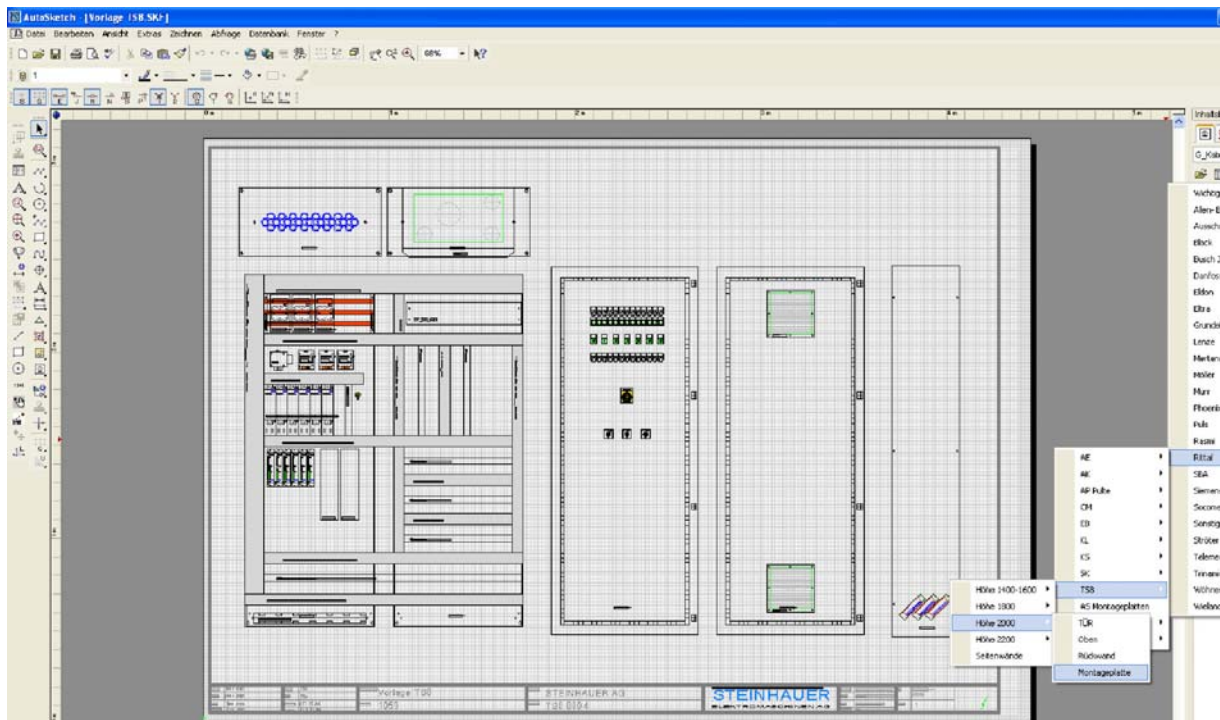
### Application software (included in delivery)

#### 1a. Steinhauer Layout Software eCAB Sketch (for panel builders)

- Fully graphical work preparation software eCAB Sketch for panel builders. No need of entering measures, usable by the workshop personnel as well as the construction office.
- By usage of the established and inexpensive CAD software AutoSketch no own CAD environment had to be designed and maintained. Maintenance of the base product remains with world market leader Autodesk®.
- The AutoSketch functionality has been extended dramatically by own and standard-compatible program add-ons for switch cabinet design at Steinhauer's during the last 12 years. Today the product provides a functionality no competitor can offer. The software can be used intuitively and even unpracticed users will be able to handle it after only one day of training.
- Construction planning takes place on a 32-Bit WYSIWYG environment by means of drag & drop.
- Real CAD functions, like automatic object snaps (on center, on grid, on edge etc.), relative and absolute copy functions as well as extensive dimensioning and lettering functions help to ease the design phase.
- The construction planning software gives the opportunity for complex multi-span switch cabinet layout including all external cabinet components in one project file. Cable channels and top hat rails can be designed field-spanning. The subsequent segmentation to single machine programs will be performed automatically during export to the post-processor.
- A multi-document interface allows parallel editing of multiple projects as well as selective transfer of layout objects from previous projects to a new project (drag & drop).
- Construction planning will be assisted by extensive component libraries presented in tree structure. Presently there are more than 3500 symbols in the library. This corresponds with some thousands of real components from switch cabinet manufacture. The library symbols are detailed. Switch cabinet doors are shown with frame and lock elements, mounting plates with fixing holes etc. The naming of library symbols is practical but can be changed at the user's discretion.
- Keepout areas can be added to the library symbols by the user if needed, for example to ensure minimum distances to other components or space for connectors.
- A one-to-many interface allows assignment of single symbols to a group of real components to keep data administration easy. For example a 92x92 mm cut-out can be assigned to a great variety of components fitting in this measure.
- The library symbols for eCAB Sketch can be generated automatically from the postprocessor (refer to Postprocessor). Alternatively a symbol can be designed in eCAB Sketch and transferred to the database of the postprocessor, saving the need to make database entries by hand.
- In addition to construction planning and automatic machine code generation the Steinhauer Software can be used for processing of unique part identifiers from other E-CAD applications (refer to Integration in E-CAD applications) for documentation purposes. Contactors and other parts can be placed on mounting rails by mouse-click to optimize the filling degree. The BMK interface works bi-directional to prevent double or omitted placement of components in one assembly. All action is visualized on the Windows screen.
- The Steinhauer software can be used shop-floor programmed (Construction planning takes place in the workshop) or in the project office. Even hybrid usage is possible).

## Product-Highlights at a Glance (Continuation)

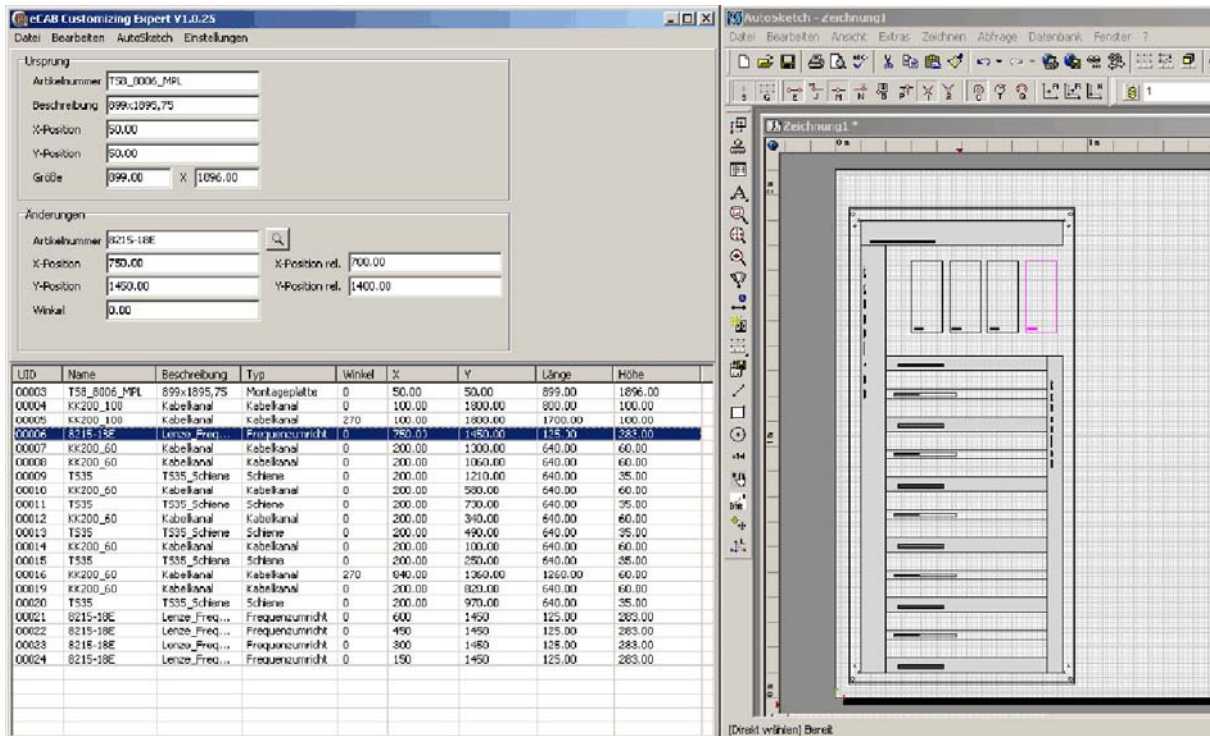
- All of the Steinhauer software is network ready. Only the CAD front-end (AutoSketch) must be installed on the local PC. The libraries and project files can be stored on local PCs or on network drives, for shared use.
- The Steinhauer software (i.e. Postprocessor, E-CAD interfaces and libraries) ships as site license. For multiuser environments only additional AutoSketch licenses must be purchased. (approximately 240,- EUR/license).



eCAB Sketch for easy panel layout and work preparation. Predefined symbols carry the complete hole pattern and allow design of enclosures without entering measures.

## 1b. Steinhauer Layout Software eCAB CE (Customizing Expert)

- Powerful coordinate interface for customization service providers and enclosure manufacturers who have to process customer's drawings without information about the parts used.
- Easy to use by workshop personnel or construction office.
- Direct access to the eCAB Lib parts- and symbols libraries.
- Mixed operation with eCAB Sketch.



## 2. Steinhauer Postprocessor eCAB PP

- The Postprocessor is used as human-machine interface for automatic CNC code generation. It is based upon established software standards (MS Access as database standard, SQL optional, MS Visual Applications as development platform). It is structured in the following main features, all accessible thru a 32 Bit Windows environment:
- CAD import interface. Extensive plausibility checks of the imported construction plans for input errors (i.e. overlapping components, ignored locked fields, scaled components, where scaling is not allowed etc.) to prevent expensive loss through waste.
- Material database. In the material database material-specific machine data, like rate of feed for milling in steel, special steel, aluminum or artificial materials are defined. By means of this database it is possible to machine one project without revision in different material. After import of the eCAB Sketch drawing into the postprocessor the material can be selected and all machine parameters will be adapted automatically.
- Tool database. In the tool database positions of tools in the automatic tool changer magazine and machine specific tool parameters are stored. The tool database ensures the correct production of all projects, even if the position of tools in the tool changer magazine has been changed.
- Component database with geometric data of library parts (where and how will a part be fastened? Is a component scalable, like cable channels or top hat rails? In which raster hole repeating pattern will cable channels and top hat rails be fastened (rapport)). Component data can be imported from an eCAB Sketch drawing.
- Component generator for easy creation/administration of new or existing library parts by the user of the machining center. Copy and modify function for parts. Graphic visualization of newly defined parts. Automatic generation of corresponding eCAB Sketch symbols or ePLAN<sup>®</sup> macros.
- Cutting list generator. Automatic generation of indexed cutting lists for cable ducts, mounting rails or bus bars (total need and single lengths). The output can be printed or processed by the trimming machine eCAB NC-Cut.
- Layout diagram generator: Generation of a true to size layout diagram with hole pattern and numerical references to cable channels and top hat rails.
- PDS/ PPS interface for analysis of tool life and project orientated data (cutting length of milling contours, number of borings per diameter, consumption of cutting to length parts a.s.o.).
- Im-/export interface to and from external E-CAD applications (refer to 4. *E-CAD Applications*).
- Automatic backup of library symbols.
- The Steinhauer Postprocessor ships as site license. There are no additional licensing costs if used on multiple systems.

## Product-Highlights at a Glance (Continuation)

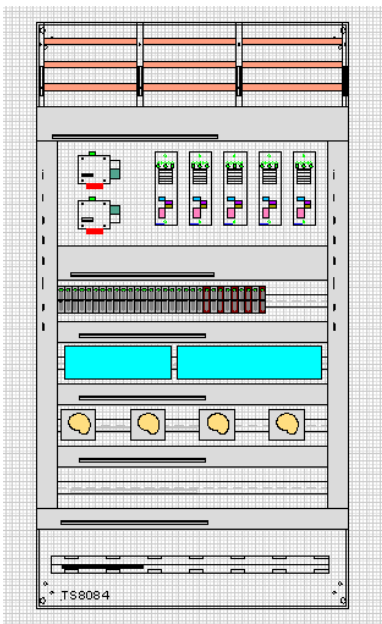
### 3. Alternative Planning- and Design software for native operation.

Instead of AutoSketch the Steinhauer Machining Centres can be used directly with the following E-CAD applications:

- EPLAN® from Version 5.40: The Steinhauer Machining Centres can be used directly from EPLAN® via the EPLAN® interface. EPLAN® macros needed are generated automatically by the Postprocessor. This native operation builds a unique selling point for Steinhauer.
- As an alternative to native EPLAN® integration there is a second way, identical from technical view, but faster due to more powerful CAD functions. The EPLAN® project can be exported through the EPLAN® interface to AutoSketch. By means of real CAD functions provided by AutoSketch the construction planning is done, using the huge component library. The finished project then will be re-exported to EPLAN®, generating all the EPLAN® macros needed automatically. All EPLAN® object information will keep intact.
- EPLAN Cabinet® : Native integration
- Metzner Triathlon-Soft®: Native integration
- H.O.S. EISchrank®: Native integration

### 4. Connection to various e-CAD applications (data import)

- Autodesk AutoCAD®
- Caddy®
- Aucotec ELCAD®
- CAE 33®
- CIM Team DDS-C®, E<sup>3</sup>®, Promis®
- Elpromatic ElproCAD®
- General DXF-Interface
- WS-CAD®
- CadCabel CabinetLayout®



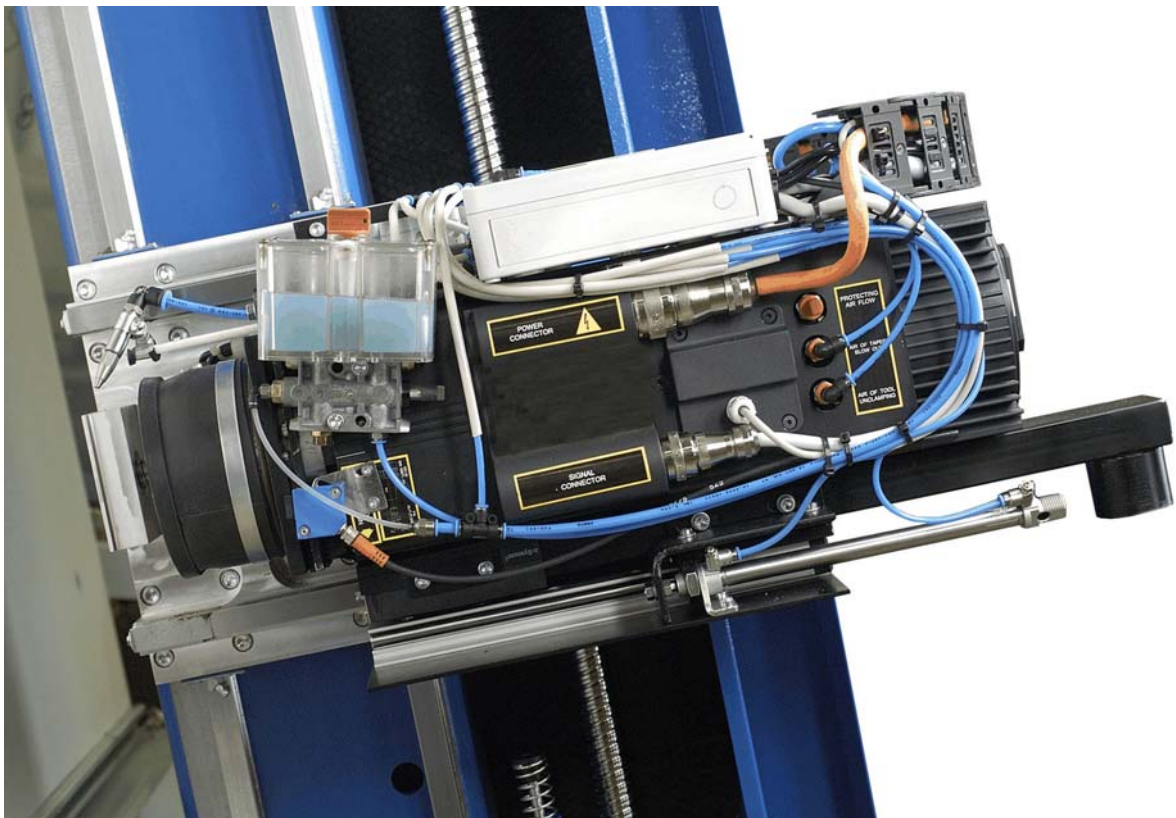
You will find further information about Steinhauer design software on the product CD-ROM under:

*Software Description Machining Centre.pdf*  
and  
*Bidirectional AutoSketch Interface.pdf*

## Product-Highlights at a Glance (Continuation)

### Other

- The Steinhauer AG (formerly Steinhauer GmbH) was established in 1920 as a specialist in the construction of electric machines.
- All machine components (machine construction, CNC-control and software) are designed, implemented and manufactured by Steinhauer. No third-party company is involved in the product.
- The whole production takes place in Germany under exclusive use of high-quality components according to industrial DIN standard. All components are backed up by at least a second source..
- The basic machine construction of Steinhauer's machining centers is unchanged since 1999 and has proven itself at more than 150 customers (as of 12/2007).
- The Steinhauer support hotline is available 365 days a year. It is free of charge during the lifetime of the machine.
- Since 1999 all updates/upgrades of the Steinhauer software and the component libraries is free for all customers.



Picture: A glance under the cover: High-frequency CNC spindle motor with minimum quantity lubricating system

## Technical Data

Machinable workpiece size, front	1,550 x 2,400 mm
Enclosure processing hole size (H x W)	1,600 x 1,050 mm
Machinable enclosure size (H x W x D)	1,600 x 1,000 mm x 1,600 mm
Sheet thickness	2-10 mm
Max. cant-off height	70 mm
X-,Y-,Z-positioning speed (max. / typical)	60 m/min. / 45 m/min.
Repeat accuracy (all axes)	0.04 mm
Tool diameter	1 - 20 mm
CNC High-Frequency Spindle ISO30/DIN69871	5.5 kW/ 18,000 (24,000) min <sup>-1</sup>
Max. milling speed	2,000 mm/min (3 mm steel)
Borers	D1-D20
Threads	M2-M63 <sup>1)</sup>
Number of tools (Standard)	12, optional equipage
Number of tools (max.)	18, optional equipage
CNC Control	4-Axes CNC Beckhoff
Machine dimensions (approx./mm)	W 3,490, D 2,500, H 2,350
Recommended maintenance area rear:	500 mm
Recommended maintenance area left <u>or</u> right	500 mm
Weight of machine (approx.)	2,800 kg
Foundation, statical load	10 kN/m <sup>2</sup>
Grade of concrete	25 N/mm <sup>2</sup>
Power connection	3L-N/PE 400V 50/60 Hz, 32A fuse <sup>2)</sup>
Compressed air	6-8 bar, max. 300 l/min.

1) M16-M63 with circular milling option 2) other voltages and frequencies available

For additional product information about the machining center eCAB WorkCenter please refer to:

<http://www.steinhauer.de>

or

<http://www.ecabinet.de>

(Select "Products" in the menu)

Please refer to our Q&A section for typical questions or contact our sales department.



Picture: Optical personal protection equipment, two each on front and rear security fence.



Picture: Optional Chip Exhaust

## Product options and accessories:

### Description

**Alternative localization** English (Documentation and software)

**Alternative localization** Dutch (Documentation and software, AutoSketch English)

**Toothed rack extension option**, for machining of roof-/base plates of enclosures up to a height of 2000 mm (Requires extended machine feet or a pit in the floor)

**Chip Extraction Option** for automatic removal of milling chippings, approx. 90% chip catch, incl. Kaercher low-noise industrial vacuum (**no retrofit**)

**Terminal box holder** for batch processing of multiple small enclosures. Single row

**Terminal box holder** for batch processing of multiple small enclosures. Tripple row

**Multi Flange Plate** holder Rittal, for batch processing of multiple flange plates

**Multi Flange Plate** holder Häwa, for batch processing of multiple flange plates

**Multi Flange Plate** holder Sarel, for batch processing of multiple flange plates

**Multi Flange Plate** custom built, for batch processing of multiple flange plates of specified measures

**Tool Expansion**, consisting of tool holder plastic, SK-30 steep angle collet, ER32 full metal chuck, locking bolt, software extension, tool of choice

**Engraving Option** for holohedral engraving with height compensation for bent workpieces, incl. SK30 collet, ER32 metal chuck, engraving toolbit, software

**Circular Milling Option** for milling of large threads (M16-M63) in thick-walled material, consisting of tool expansion, circular milling tool w. exchangeable milling blade and software extension

**Circular milling blades** for NPT threads, 5 pieces

**Circular milling blades** for metrical threads, 5 pieces

**Bus-Bar Holder** for mounting of multiple copper bus bars up to a length of 2,400 mm and a thickness of 10 mm, 1 set of 2 holders.

**Industrial terminal Option**, swivel arm at machine frame, w. 17" TFT/DVI display, 19" keyboard w. trackball, replaces standard outfit

**Compressor-Option**, for installation sites without centralized compressed air supply, fitted on machine frame, low noise operation (76 dB (A)),  $L_{WA}$  95 dB, intake 300 l/min, max. 10 bar, 50 ltr pressure tank

**Compressed air hose 10 m** w. air gun and pressure control

**Machine Cover Option**, metal covers for sides and lower front of machine frame

**Magnetic Hand Brush** with quick releaser, for easy removal of ferromagnetic chips

**Magnetic Broom** with quick releaser, for easy removal of ferromagnetic chips

**Custom color painting**, 2 RAL colors of choice

**Additional AutoSketch license**, German

**Additional AutoSketch license**, English

**Onsite installation and training** (D, A, CH, NL, B, LU, F, DK, S, SF, N)  
2 days, all in, incl. travel and accommodation costs

## Terms and Conditions

**Delivery:** According to german VDMA (Verband Deutscher Maschinen- und Anlagenbau e.V.), as of 07/2007  
Ex works, plus packing and shipping costs

Court of jurisdiction for both parties is Aachen/Germany

**Prices:** All prices are net prices, plus VAT and local taxes

**Payment:** please refer to project quotation

**Time of delivery:** 10-12 weeks typical.



Picture.: Tool magazine with upper front side mechanical quick action clamps.

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