

STAMPING WELDING AND ASSEMBLING MACHINE
SBTM-300-NC



**MODULAR MANUFACTURING SYSTEM FOR THE PRODUCTION OF
COMPLEX HIGH VOLUME COMPONENTS WITH WELDING AND
ASSEMBLY OPERATIONS**



The „SBTM-300-NC“ Concept

A profitable manufacturing solution for the production of stamped, welded, and assembled components is based on high production speed, high efficiency and short changeover times. Many of these components are made on slide forming machines which are very flexible, but have significant disadvantages due to long changeover times and high regrinding costs due to inadequate press rigidity.

These factors result in the tendency today to run such parts in huge progressive dies, however space within the press for assembly and welding units is extremely limited. We believe that every mm [inch] that is not used for the tool is wasted money, especially with long bed presses. SBT developed a concept to “split” the dies into a pre-stamping and a final blanking tool in two individual presses. This concept allows enough room between the individual dies for additional operations. Additionally the machine must be accessible from all sides to allow for feeding strips into the machine from all directions.

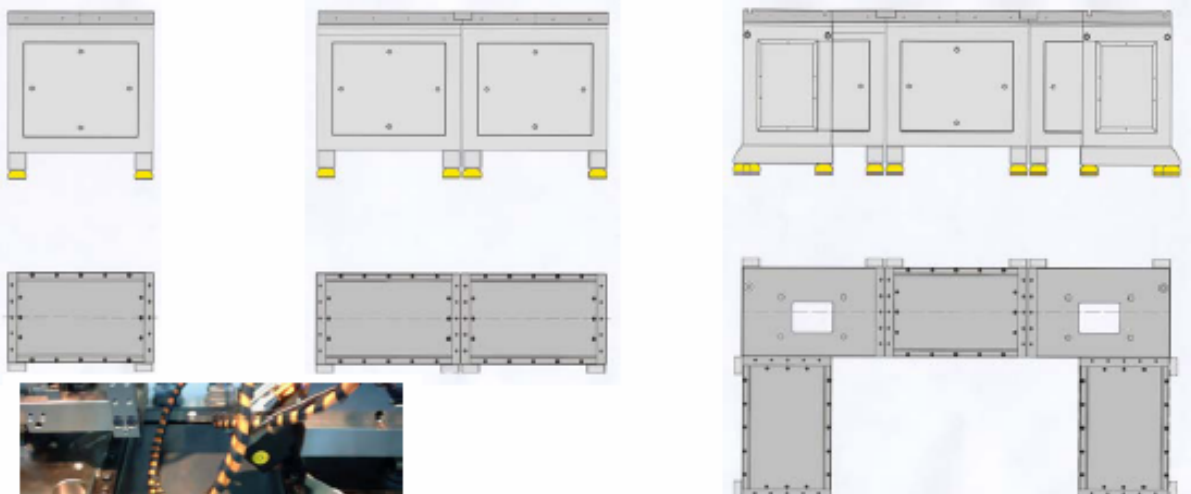
This was the beginning of the “SBTM-300-NC” concept.

Flexibility starts at the bottom line – with the modular machine beds:



The SBTM-300NC machine is only available in one construction size – in your requested size. Depending upon our customers requirements, the machine can be equipped with up to 4 base-modules which are connected in line, or, special applications at 90° to the feeding direction. The base-modules are a welded steel construction filled with polymer concrete for minimum

vibration. If more space is required for future application modules can be added. The illustrations below show some available combinations of base units.



The mounting plates on top of the base modules have either fixed threads for mounting presses or T-slots for infinite adjustment of the modules in feed direction.

High dynamic Servomotor Drives for high speed and operating comfort:

The special feature of the SBTM-300NC machine is the individual servomotor drive for each module. Depending on the required torque, servo drives from 1-12 Nm are used. These servomotors are electronically synchronized to operating as an electronic shaft, with the maximum angle deviation at this application of $\pm 5^\circ$ at a production speed of 1-500 spm.



No.	Designation	Servomotor output	ALL Position	Direction	Ref. Point	Reference Mode
1	Engine 1	ON	0	+	10	ON
2	Engine 2	ON	0	+	10	ON 2
3		ON	0	+	10	ON
4		ON	0	+	10	ON
5		ON	0	+	10	ON
6		ON	0	+	10	ON
7		ON	0	+	10	ON
8		ON	0	+	10	ON
9		ON	0	+	10	ON
10		ON	0	+	10	ON

The selection of servomotors for the individual modules is done directly on the 15" Touch Screen. Here it is also possible to change the rotation direction as well as the reference point.

The selection of the servomotor model is also done on the Screen and the different types can be selected without any programming knowledge because all parameters are already programmed and saved on the PLC.



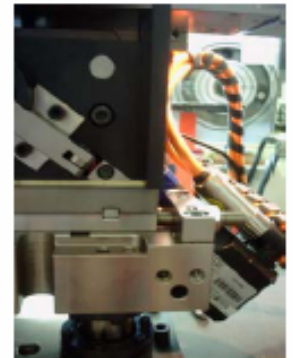
Press module drive



Stamping module drive



Feeding module drive



HSG-600 contact welding module drive

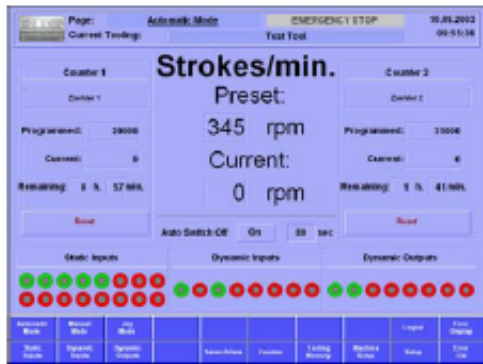
The operation modes of the SBTM-300-NC:

For operation the following modes are available:

- 1) Automatic Mode: for production
- 2) Jog Mode: for setup or operation of the machine during strip-changing or service
- 3) Manual Mode: for exact settings of tooling and accessories during the setup procedure

The selection of the operating mode is done with a selector-switch on the front plate of the control cabinet. On request this switch can be supplied as a lockable key switch.

The Automatic Mode:



Screen in Automatic Mode

The production speed can be selected either directly on the screen or with the "+" "-" buttons on the cabinet. The first two of the five standard individual counters are displayed along with the amount of run-time required to reach the present counter amount at the current production speed. The "Auto Switch-Off" function allows unattended operation of the machine. In the event of a fault or a preset count is reached, the machine is shut down automatically within a programmable time

The Jog-Mode:



Screen in Jog-Mode

In the Jog-Mode, 3 individual speeds of the machine can be selected. While the strip is not completely through a die, the machine can be operated slowly until it exits the die (in between the press modules). A faster speed can then be selected by the switch on the control cabinet. Additionally, 2 to provide for simple changeover of contact materials. The position of the machine is displayed in both analogical and digital formats. The status of all inputs and outputs (active or passive, open or programmed) are displayed.

Jogging the machine is done by depressing both buttons on the operating terminal.

The Manual Mode:



Screen in Manual Mode



Operating Terminal with Jog-Buttons and Electronic Hand-Wheel.

The manual mode is mainly used for making adjustments for the die or at accessories during the setup and testing period. This function provides for easier and quicker setup, especially when compared to power presses which have a min. speed of 100spm. The resolution of the electronic wheel is 1°. With a special (password protected) function it is also possible to operate the machine in reverse for easier tool adjustments at the.

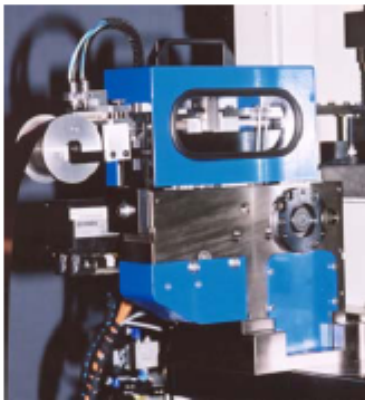
The Modules:

Depending on the complexity of the parts, the machine can be equipped with a variety of different modules. These modules are standardized, but also special modules can be provided on customers request.



The servomotors are connected to the controllers with heavy-duty industrial plugs, and can be easily connected and disconnected by the machine operators without any special training (Plugs must not be disconnected under power)

1) The Feeding Module



The feeding module EZ-80-60 is a cam-operated precision wire and strip feeder with a compact design, high feeding accuracy and smooth material transportation, making it perfect for feeding thin strips for precision components. The feed can be used to push or pull the strip, the function can be changed simply by rotating the cams. For longer feeding length other feeder models can be supplied, including a linear servomotor feed LMZV-100. Programming is done directly on the touch screen of the machine.

Feeding Length:	0-80 [mm] or 0-3,15 [inch]
Feeding Angle:	120°
Strip Width:	2-60 [mm] or 0,8-2,4 [inch]
Strip Thickness:	0,05 –1,5 [mm] or 0,002 - 0,059 [inch]
Maximum cross-section:	30 [mm ²] or 0.05 [inch ²]

2) The Press-Module:



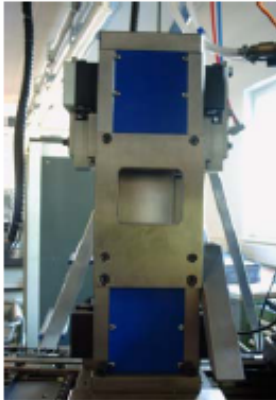
120 kN Press-Module

-) Double-Column monoblock construction made of vibration absorbing grey-cast iron.
-) Eccentric shaft with stroke adjustment and balanced rotating masses running in roller bearings.
-) Ram made of high tensile titanium alloyed cast aluminum, guided in the press frame at 4 points, free of play in anti-friction linear roller bearings on hardened and ground guideways.
-) Sliding door for easy tool maintenance

Technical data:

Press force:	120 or 200 [kN] {US: 14 or 23 [tons] }
Ram adjustment:	40 [mm] or 1,57 [inch]
Stroke adjustment:	8-40 [mm] or 0,31-1,57 [inch]
Ram surface:	225 x 140 [mm] or 8,86 x 5,51 [inch]
Bolster plate:	370 x 440 [mm] or 14,57 x 17,32 [inch]

2) The Stamping-Module:



SBTM-300 Stamping Module

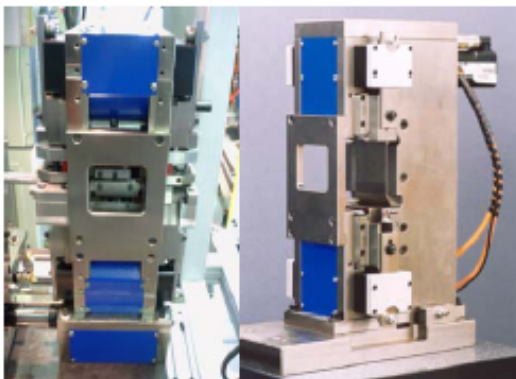


Forming Slide on a Stamping Module

The Stamping Module is equipped with 2 top slides from top with a capacity of 24 kN (2,7 US-tons) each, slide creating a stamping force of 48 kN (5,4 US-tons). The servomotor is directly connected to the drive-shaft of the forming slides.

The forming slides are driven by cam-pairs for the forward and return stroke. The cams define the stroke of the slide which is guided by linear roller bearings for minimum maintenance and wear.

3) The Stamping and Bending Module:



Bending Module with and without tooling

The Stamping and Bending Module is used when additionally bending operations are required. The additional slides from below and from the rear make the tool design simpler and the tools less expensive and easier to maintain.

The servo drive is connected to the module either by a gear box underneath (left picture) or directly to the driving shafts of the slides (illustration right). The shafts can also be also driven by 2 motors for individual strokes and timing.

The Stamping and Bending Module is offered in 2 versions:

- | | |
|--------------------------------|---|
| Stamping and Bending Module 1: | 2 Top forming slides, 24 kN (2,7 US-tons) each slide
2 Bottom forming slides, 24 kN (2,7 US-tons) each slide |
| Stamping and Bending Module 2: | 2 Top forming slides, 24 kN (2,7 US-tons) each slide
2 Bottom forming slides, 24 kN (2,7 US-tons) each slide
2 Rear forming slides, 8 kN (0,9 US-tons) each slide |

3) The Riveting Module:



Riveting Module with Bowl-Feeder

The Riveting Module is used for feeding and assembling of contact rivets or small plastic/metal components to a part which is produced on this machine. A bowl feeder can be attached directly to the riveting module. The rivets or parts are fed by the bowl feeder into the left side tooling where they are positioned to the strip and pre-assembled. In the right side tooling the final staking is done. With this system very strength connections of the rivets to the carrier can be achieved.

Slides on the assembly side: 1 Top Forming Slide 8 kN (0,9 US-tons)
 1 Bottom Forming Slide 8 kN (0,9 US-tons)
 1 Rear Forming Slide 8 kN

Slides at the staking side: 1 Top Forming Slide 24 kN (2,7 US-tons)
 1 Bottom Forming Slide 24 kN (2,7 US-tons)

4) The Assembly Module:



Assembly Module

The Assembling Module is equipped with 6 forming slides, each with a capacity of 8 kN. The slides work from the top, underneath and from rear side of the machine. It is mainly used for quick and precise assembly operations where plastic parts are fed and assembled to metal parts on carrier strips. Metal parts can easily be cut off, formed and assembled to plastic components. These modules are also offered individually for integration in customers existing assembly lines.

5) The HSG-500 Contact Welding Module:



HSG-500 Contact Welding Module with contact welder from the rear

The HSG-500 Contact Welding Module is designed for mounting the type HSG 500 and servomotor drive. With this type of welding unit, round wire contacts as well as profile tape contacts can be welded 90° to the edge of the strip. Various mounting positions at the module make it possible to weld from the top, underneath, rear and front of the machine.

6) The HSG-600 Contact Welding Module:



HSG-600 Contact Welding Module

The HSG-600 Contact Welding Module is designed for mounting the Type HSG 600 contact welders and the servomotor drive. Round wire contacts and profile tape contacts can be welded within any angle of 0-90° to the edge of the strip.

The module is completely symmetrical so if contacts need to be welded from underneath the welders can simply be rotated. The top and bottom electrode units have the same design, and the bottom electrode can be mounted fixed or with a stroke of 5mm. The piloting tool is attached directly attached to the bottom electrode unit for precise contact locations.

6) Special Modules:



Special module with cross-feeder

Special Modules are available on customer's request depending on the application. For example the modules can be equipped with an additional cross-feed for feeding and assembling an additional material in the tool.

It is also possible to attach forming slides at different angles

The Module Changeover:

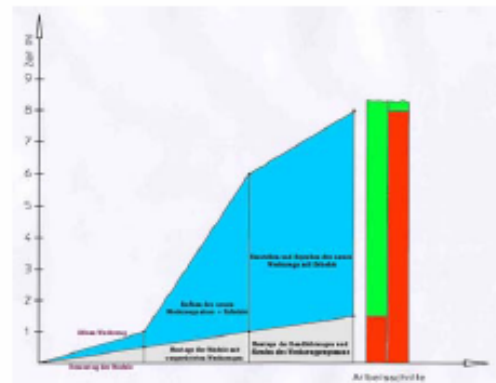
The big advantage of the modular system is that tools can be setup individually off-line on modules while the machine is running production. Tool-trials can be done in the toolroom, and the setup time when the machine is non-productive, can be reduced by 80% compared to other machines.



Module changing cart with a stamping and bending module



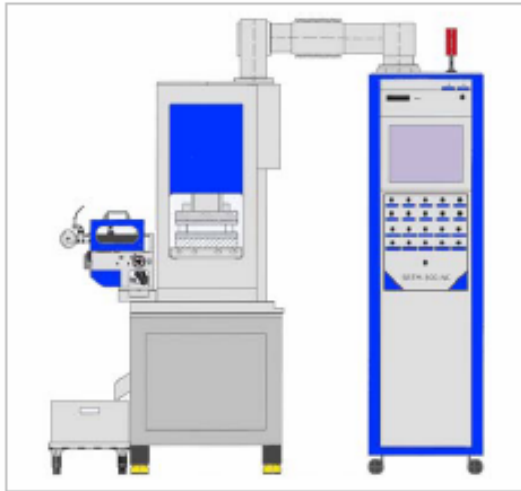
Setup of tools at a module on the work bench in the toolroom



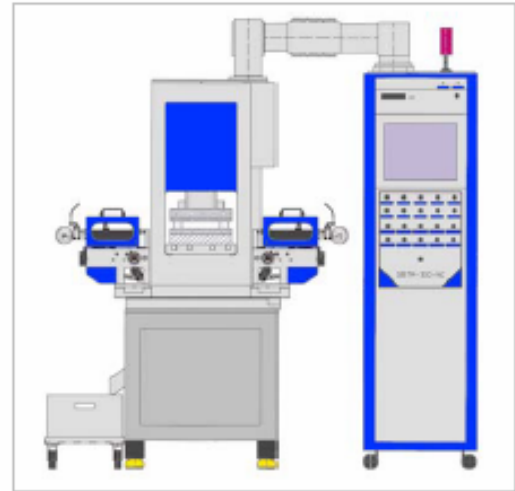
Comparison of the setup times:
SBTM-300-NC: grey
Multifforming Machine: blue

Module Variations on the SBTM-300NC:

Examples with one Base-Module:

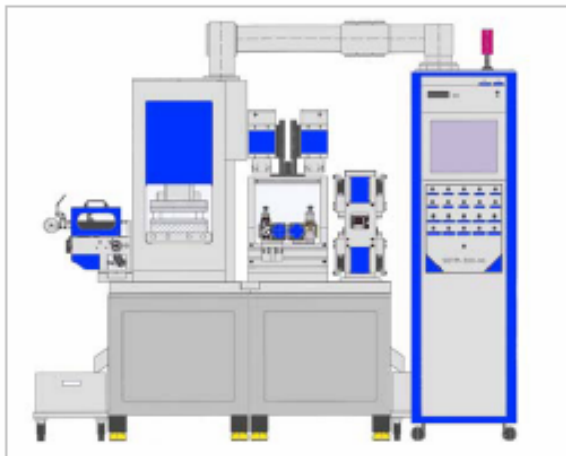


- 1 EZ-80-60 Feeding Module
- 1 120 kN Press Module

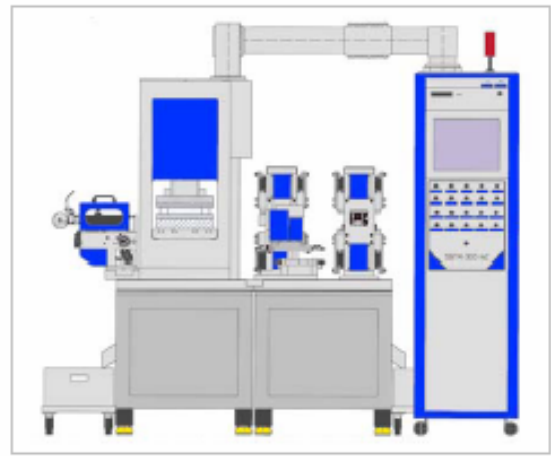


- 2 EZ-80-60 Feeding Modules
- 1 120 kN Press Module

Examples with two Base-Modules:



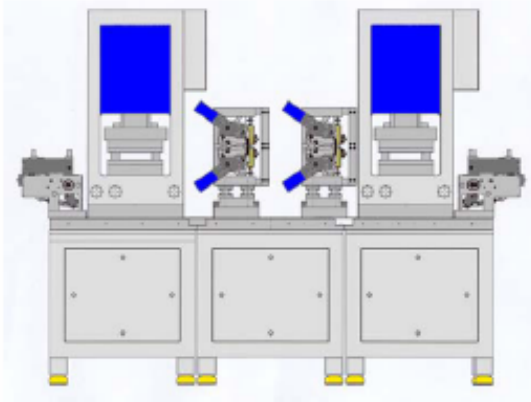
- 1 EZ-80-60 Feeding Module
- 1 120 kN Press Module
- 1 HSG-500 Contact Welding Module XL with two contact welding units
- 1 Stamping and Bending Module



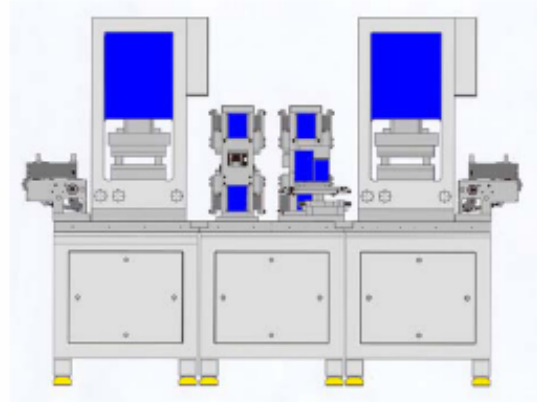
- 1 EZ-80-60 Feeding Module
- 1 120 kN Press Module
- 1 Riveting Module
- 1 Stamping and Bending Module

Module Variations on the SBTM-300NC:

Examples with three Base-Modules:

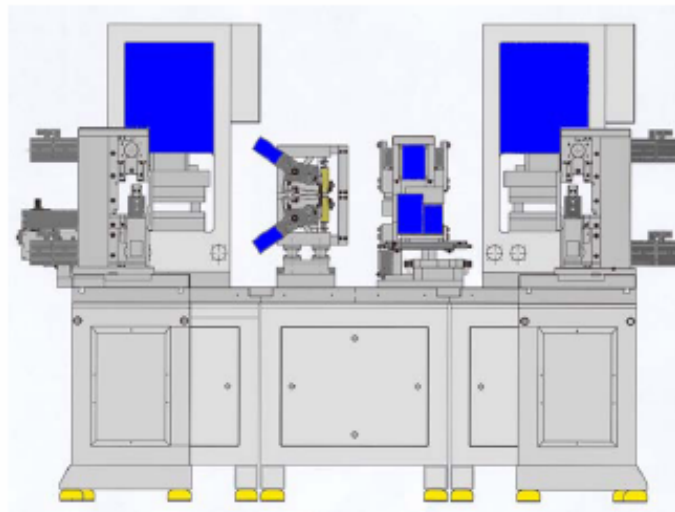


- 2 EZ-80-60 Feeding Modules
- 2 120 kN Press Modules
- 2 HSG-600 Contact Welding Modules



- 2 EZ-80-60 Feeding Modules
- 2 120 kN Press Modules
- 1 Riveting Module
- 1 Stamping and Bending Module

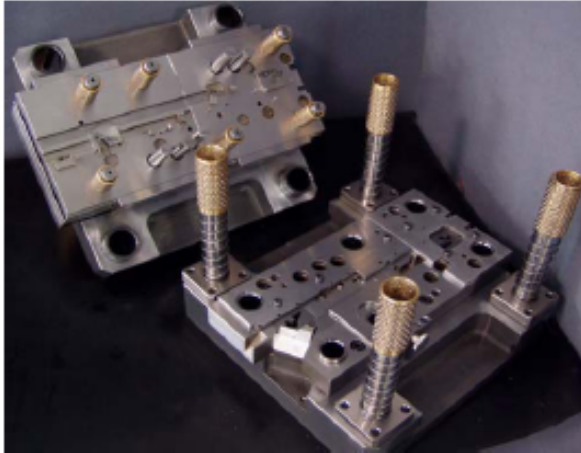
Examples with five Base-Modules (two attached 90° to main feeding direction):



- 3 EZ-80-60 Feeding Modules
- 2 120 kN Press Modules
- 1 HSG-600 Contact Welding Module
- 2 Stamping and Bending Modules
- 1 Riveting Module

The Tooling Sets:

Tooling set for the SBTM-300-NC are usually based on one or more progressive dies located in the press, the stamping and the riveting modules.



Progressive Die for a Press-Module



Progressive Die for a Stamping and Bending Module

All tooling sets at SBT are completely manufactured and tested in house. These tooling sets are made on modern precision tooling machines (AGIE, JUNG, WASINO), carbide cutting elements are standard, on request cutting and bending elements are available with special coatings (for example TiCn, Balzers)

Tooling sets for the SBTM-300-NC are normally easier to maintain when compared to progressive dies for punch presses because a lot more space is available. For customers with their own tool rooms SBT provides all design information free of charge. Standardized tool frames are available from SBT.

A complete set of detailed tool drawings for all operating parts is supplied with the tooling set. SBT also manufactures spare tooling components and can provide customer spare-parts inventory management.

Typical Components made on the SBTM-300-NC:



Product:	<i>Contact Spring</i>
Contact welding units:	2x HSG 600E welded in feeding direction
Production speed:	320 parts/minute



Product:	<i>Fixed Contact</i>
Contact welding units:	1x HSG 600E welded in feeding direction
Production speed:	350 parts/minute



Product:	<i>Snap-Spring</i>
Contact welding units:	2x HSG 600E welded in feeding direction
Production speed:	280 parts/minute



Product:	<i>Contact Spring</i>
Contact welding units:	2x HSG 600E welded 90° to feeding direction
Production speed:	250 parts/minute



Product:	<i>Relay Contact Spring</i>
Rivet Feeding:	2 separate Bowl feeders and hoppers
Production speed:	150 parts/min. (Limit: feeding of tungsten rivet)



Product:	<i>Relay Contact Springs + Assembling</i>
Rivet Feeding:	2 separate Bowl feeders and hoppers
Production speed:	220 parts/minute
Assembly:	50 Relays/min



Product:	<i>Contact Springs</i>
Contact welding units:	2x HSG 600E 1x welded in feeding direction 1x 25° to feeding direction
Production speed:	2x200 strokes/minute = 400 parts/minute both parts are made parallel out of one strip

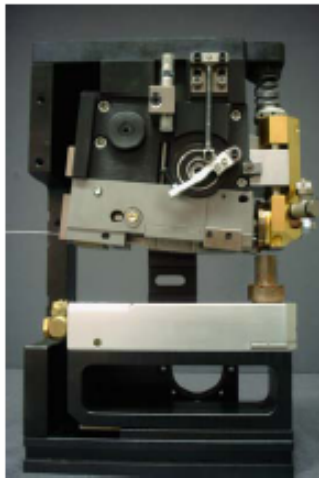


Product:	<i>Fixed Contacts (Right + Left Hand version)</i>
Contact welding units:	2x HSG 600E
Production speed:	2x250 strokes/minute = 500 parts/minute both parts are made parallel out of one strip

Contact Welding Units:

The open space in between the Press-Modules of the SBTM-300-NC is perfect for mounting contact welding units for resistance welding of silver, silver alloyed or gold contacts. This is the big advantage when compared to the limited space available on conventional punch presses and multifforming machines.

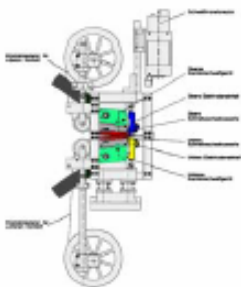
HSG 600E Contact Welding Unit



Utilizing the HSG 600E contact welding unit, contacts can be welded at any angle within 0-90° to the edge of the carrier strip. The unit is equipped with our "Quick Changing Cassette" system which allows changeover times from one welding material to the next within 10-15 minutes. The electrodes close absolutely parallel which is beneficial for a stable welding process. The bottom electrode is completely independent from the welder so it can be made customer specific.



HSG 600ED Double Contact Welding Unit



The patented HSG 600ED contact welding unit is used for welding double contacts in only one station. Both welding materials are fed into the welder parallel above and underneath the strip. The contacts are cut off and then transferred into the electrodes. With this system these kind of contacts can be made absolutely parallel.

HSG 500E Contact Welding Unit



The HSG 500E contact welding unit is used for welding round wire and profile tape contacts 90° to the edge of the carrier strip. This welder is also equipped with our "Quick-Change-Cassette" system. Contacts are transferred with a pusher underneath the electrode after cut off. Turning the welder around 180° make it is possible to weld from underneath, and the servo-drive is rotated with the welder.

For more detailed information's to our welders please ask for our separate brochures

Noise Protection cabinet:

The "FKE SBTM-300-24-Economy" noise protection cabinet is equipped with two sliding doors in front and one sliding door on the rear.

For maximum noise protection, the door seals against rubber stops.

Outside Dimensions: Length: 4.006 mm
 Width: 2.615 mm
 Weight: 2.800 mm

Color: Grey RAL 7034 + dark blue RAL 5005
 (SBT Standard Colors)

Ventilation System.:Van EC40 4M/T with 3975 m³/h



Machine Accessories:

The efficiency of a manufacturing system is dependant upon the quality of the machine accessories. SBT offers these accessories for the SBTM-300-NC machine for maximum output and user-friendly operation including decoilers, respoolers, straighteners, lubrication systems, etc.

Some of these components are made by SBT, others are supplied by our long term partners. The optimization of this equipment and the integration into a "Turn-Key-System" is handled by SBT.

-) Strip Decoilers:



Depending on the strip setup, different kinds of decoilers are available including vertical single coil decoilers or pallet decoilers for larger strips.

Decoilers for welding materials are made by SBT, and strip-welding equipment for a continuous production is also available.

-) Strip Lubrication Systems:



For maximum time between grinding of the tools it is essential to lubricate the strip. Our standard system utilizes 3 sprayers for continuous lubrication. A standard stainless-steel oil tank is equipped with an oil-level sensor.

Machine Accessories (Continuation):

-) Module and Tool Changing cart:



The tool changing cart is used for safe and quick changeover of tooling and modules. Max. load is 700 kg, and is easily raised and lowered utilizing a hydraulic cylinder up to a level of 1250mm (50,2 [inch]).

The tools and modules slide easily on a hardened plate on top of the cart.

-) Vacuum Slug Remover:



The Vacuum Slug Remover SSR contentiously removes the smallest slugs safely out of the dies so that these slugs cannot exit out of the punching dies and cause problems during the manufacturing process. The vacuum is always controlled by a sensor.

The slug remover is mounted on casters so it can be moved easily from one machine to another.

-) Automatic Box Changer:



Using the SBC automatic box-changer, the efficiency of a manufacturing system can additionally be increased.

Operating with the SBTM-300-NC this box changer is directly programmed on the touch screen.

Models for different box sizes are available.

Other available accessories:

-) Strip and wire straighteners
-) NC Tapping units
-) Screw assembling systems
-) Parts conveyors

All these accessories are available for other machine applications.
Please ask for the individual catalogues.