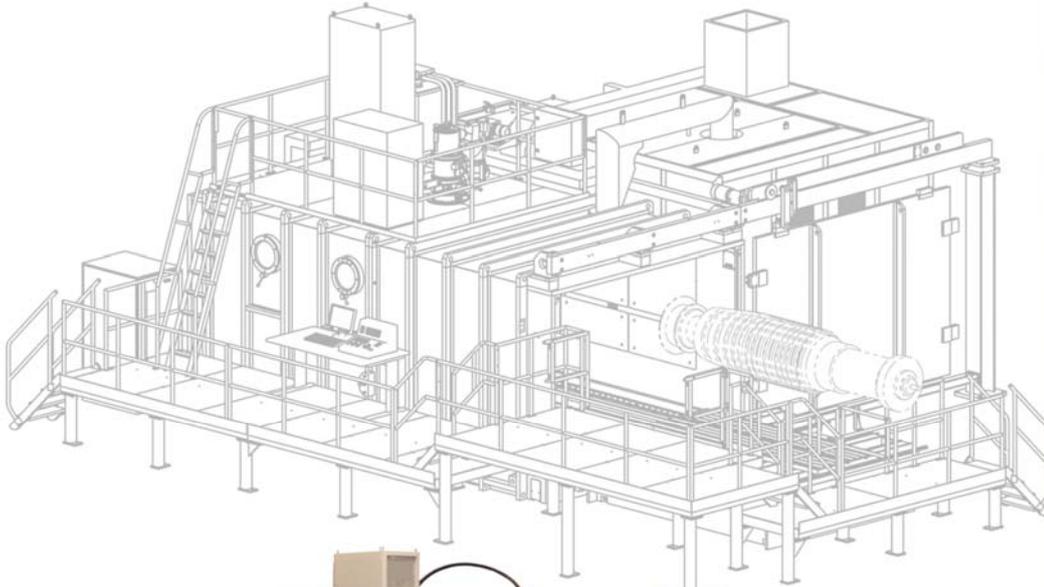


EBOCAM



Electron Beam Welding

Chamber machines as universal processing systems

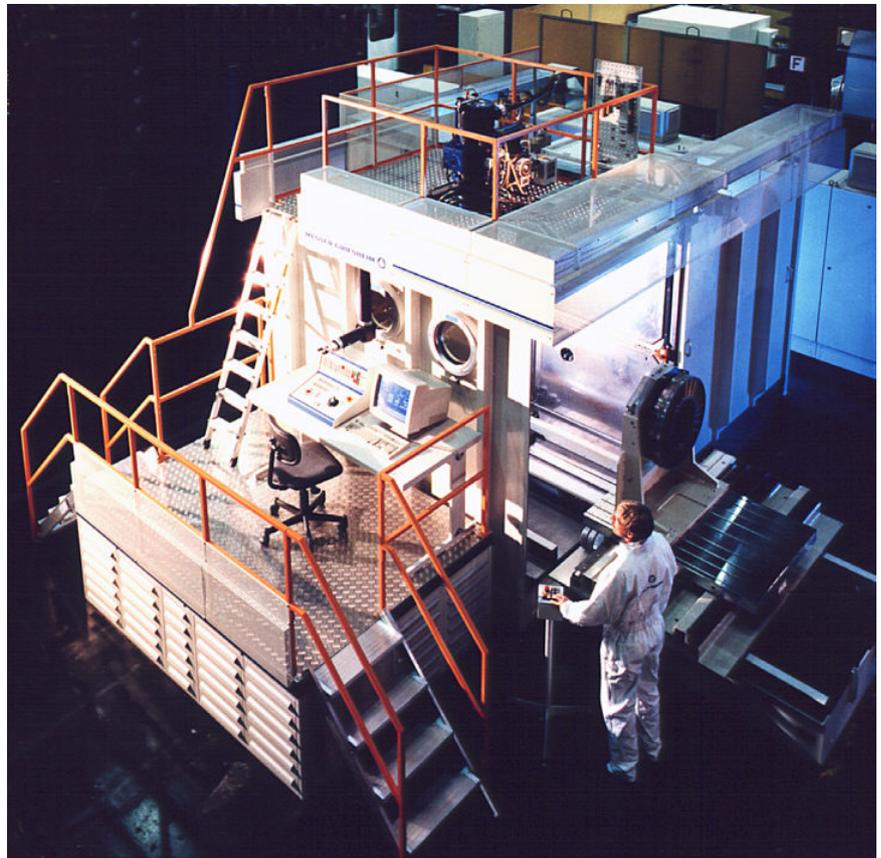
Welding, surface treatment and drilling - EBOCAM[®] stands for complex processing duties

EBOCAM chamber machines are universal machines for electron beam technology. Both, the mechanical and electrical components are made up of a system of modules and can, therefore, be easily adapted to the various processing duties; e. g.: welding of jet engines.

A high operating convenience and the great selection of additional facilities make chamber machines flexible machine tools for complex welding duties.

The EBOCAM system, however, comprises also chamber machines which are used for surface treatment (hardening, surface remelt or alloying techniques). As a special variant chamber machines are used for drilling applications.

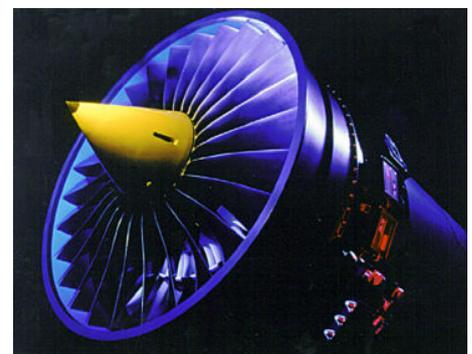
Electron beam technology does not only play an important role for the processing of large-scale workpieces, but can also be used most economically for smaller components, although especially then the use of multiple fixtures, e. g. for simpler welding seam geometry, constitutes the main field of interest.



EB-chamber-type machine K 100 - G 300, special version (P47.10.15i/01)

Fields of application for EBOCAM-machines

- air and space technology
- jet engine manufacturing
- nuclear engineering
- automobile industry
- chemical apparatus engineering
- electrical industry
- fittings industry
- engine building
- measuring applications
- mechanical engineering
- application laboratories (welding technology)
- weldment subcontractors



*Jet engine
(Photograph by BMW Rolls-Royce)*



Chamber machine KS 100 - G 150/300 (47.10.16b/02)

The application of chamber machines in various branches of industry exemplifies the high degree of versatility of the system EBOCAM. In order to provide as many different combinations as possible Steigerwald Strahltechnik created a great number of chamber sizes, generator powers and additional appliances. EBOCAM certainly can be adapted to particular demands of the customer while comprising the same number of positive features.



High-voltage generator (P47.10.13i/14)

Standard versions of EBOCAM machines include chambers with volumes of 0.6 to 20 m³, which can be combined with EB-generators of 5 to 60 kW power alternatively. For smaller chambers with smaller working distance there are low voltage generators with an acceleration voltage of 20 to 60 kV and powers of 5 to 15 kW available, although generally, also high-voltage generators with an acceleration voltage of 60 to 150 kV and between 5 and 60 kW can be used generally.

Basic components of chamber machines

- EB-generator
- vacuum chamber
- manipulating equipment
- control console
- chamber pump station
- high-voltage and electrical supply
- control technique

EBOCAM® - a modular system leads to an optimum solution for the individual user

Precision

The accuracy of positioning as well as the tolerances of the speed of all the movement axes have the precision of machine tools.

Evaluation of the process

All operations in the working chamber as well as the welding quality can be observed either through windows in the wall of the chamber, through the telescope with high magnification or by an additional TV-system (option).

Parameter control

Each of the process parameters and operating parameters will be set, controlled and monitored by electrical and/or electronically devices. The parameters, necessary for the process, will be set, modified and displayed centrally at an operator's panel equipped with a CRT.

By CNC controls (option), which are developed and configured especially for EB application on EBOCAM machines, the range of operation can be extended e. g. by seam tracking systems, teach-in operations, quality securing of the process; in addition the sequence of operation can be fully automatised (human errors are omitted) and the efficiency in quality and in quantity is increased.

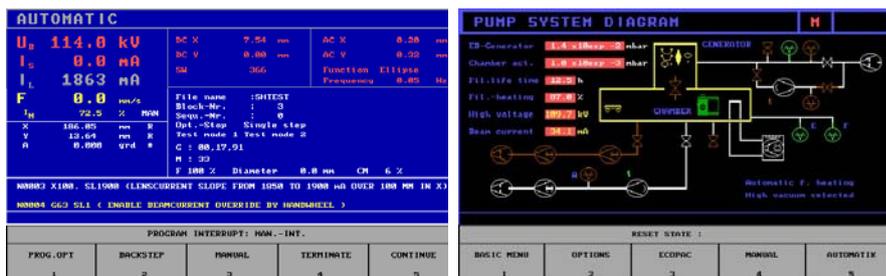
Security of quality

The outstanding repeatability of the electrical and mechanical welding parameters assure a very high quality of the EB process performed by EBOCAM machines.

If the machine is equipped with the corresponding devices, the tolerances of the quality relevant parameters can be controlled, e. g. the actual values of each weld will be recorded on-line and monitored and/or evaluated later on.



Operator's desk at an EBOCAM-chamber type machine (47.10.15r/04A)



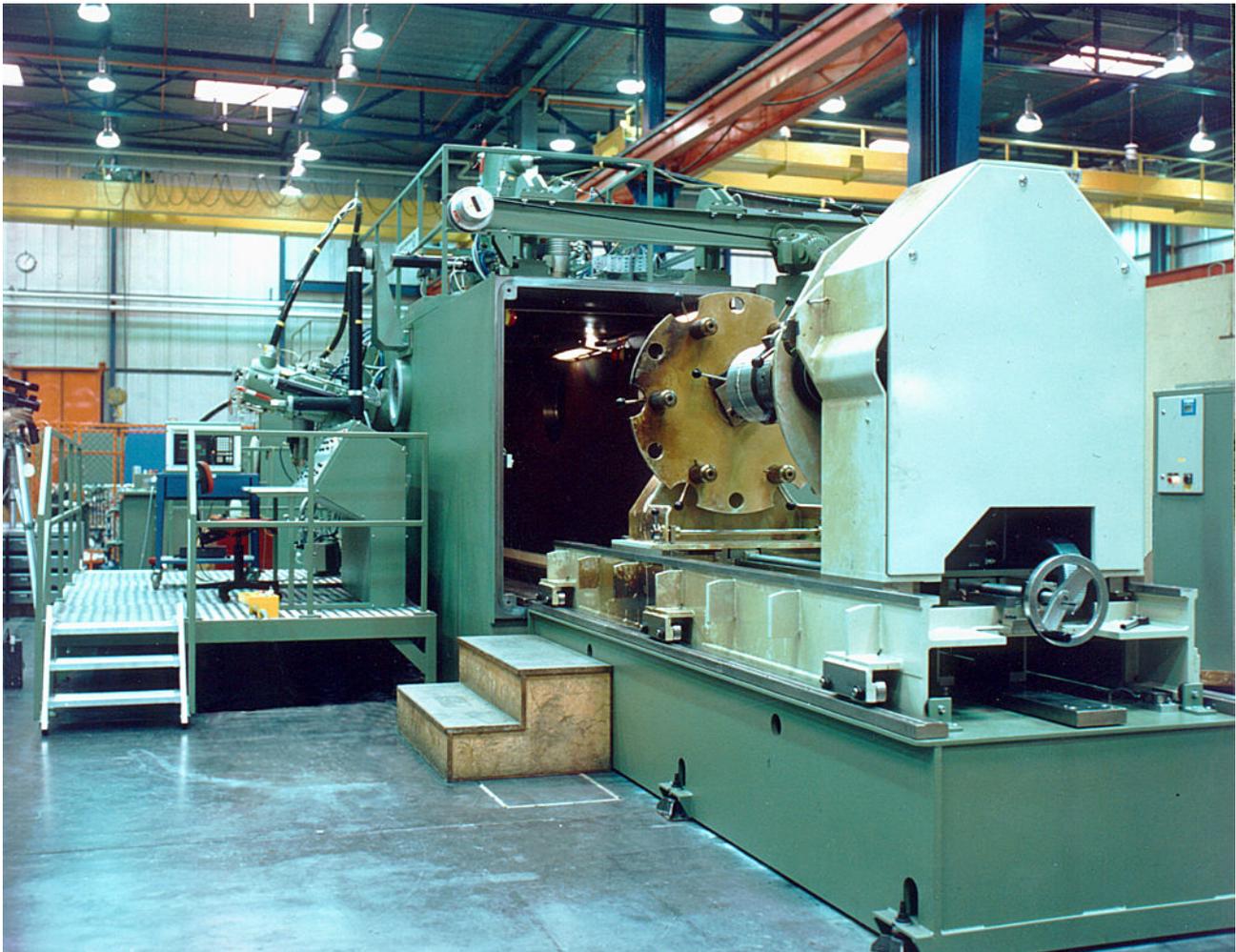
Displays on the screen of an EB-chamber machine

Further advantages of Steigerwald Strahltechnik-machines

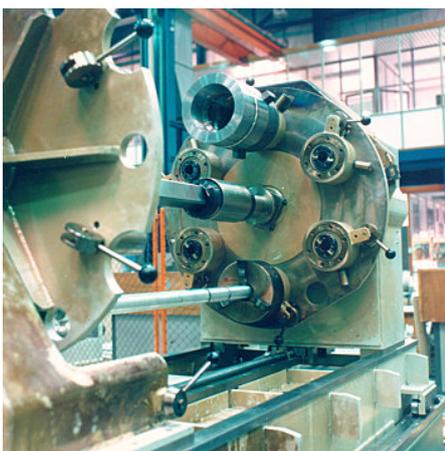
The working distance between EB-generator and workpiece may be up to 1,500 mm according to the type of chamber, while achieving excellent beam quality.

The positioning equipment is moved to the runout platform without being disconnected from the drive and the position measuring installation out of the vacuum chamber, thus permitting easy loading, e. g. with a crane.

According to the welding duty involved soft- or high-vacuum pump stations are available.



Special-design chamber machine KS 110-2 G300, chamber volume 11 m³, power of the generators 30 kW each (47.00.15j)



Rotary device with 6 stations (47.00.15m)

Special versions for extreme workpiece movements, welding duties and workpiece weights

Whenever the requirements cannot be met by standard-size chambers Steigerwald Strahltechnik will supply installations which will especially adapted to the customers' request.

These special requirements do not only involve certain chamber sizes but also specific demands concerning work-piece movement and workpiece weights. A special chamber installation with a multiple fixture is just one example of a special-purpose machine.

Absolute safety for operating personnel and machine

All logical functions comprise an optimum protection system with the corresponding facilities against maloperation, damage or malfunction. A microprocessor links commands and signals.

One particular factor that has been taken account of is the protection against x-ray constructive measures. For that reason the operation of these installations is not subject to special conditions.

A list of optional appliance for every type of application

Add-on optionals for extended application

By means of rotary devices circumferential and circular welds can be processed while the rotational axis may both, the horizontal or vertical.

Tilting devices enable the rotary device to be moved to every angular position between the vertical and the horizontal. Through shifting devices or additional EB-generator positions the working range can be extended in x-, y- and z-direction.

In this case each generator position may be exchanged for the window position and vice versa.

Horizontal generator positions are especially required for welding very thick materials and extend the range of application.

CNC-process controls for nearly any number of mechanical and electrical axes improve the quality of application and the economics of EB-installations.

It is only due to the CNC-control system that complicated and complex welding duties can be performed.

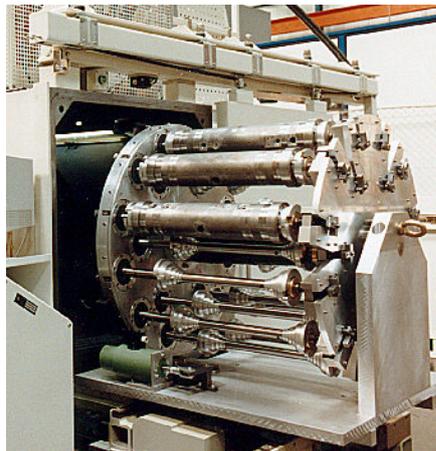
Seam tracking systems offset work and tooling tolerances and ensure that the beam is positioned on the welding joint.



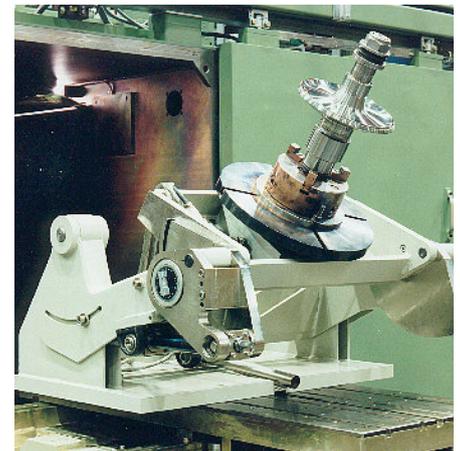
5-axes workpiece manipulator (47.00.15b)



Wire feeder (internal) DZF 2 (P 47.10.15e/30)



Multi spindle rotary device (P47.10.13a/4)



4-axis manipulator (P47.10.14a/7)

Function generators provide another possibility of influencing the welding bath optionally.

By means of especially designed, CNC-controlled wire feeding devices very complicated duties for resurfacing and alloying duties can be performed.

High-vacuum pump stations with oil diffusion or cryogenic pumps allow EB-technology to be applied even in the case of materials which are very difficult to be processed.

Multiple fixtures are typical means for increasing the profitability of chamber machines - in particular for smaller work-pieces.

Technical Data

(Other chamber dimensions and devices upon request)

Chambers

Type		K 08	K 15	K 30	K 60	K 100/1	K 100/2	K 175	K 200	
Chamber dimensions										
Volume	m ³	0,86	1,5	3,0	6,0	11,3	11,3	17,6	20,6	
Clearance length	X mm	1.200	1.340	1.600	3.200	2.700	2.700	2.600	4.300	
Clearance width	Y mm	750	900	1.250	1.250	2.000	2.000	2.600	2.000	
Clearance height	Z mm	950	1.250	1.500	1.500	2.100	2.100	2.600	2.400	
Coordinate table										
Clamping plate	X mm	570	640	780	1.580	1.700	1.325	1.275	2.100	
	Y mm	310	420	600	650	1.200	975	1.275	1.000	
Stroke	X mm	570	640	760	1.560	940	1.315	1.265	2.000	
	Y mm	350	420	590	540	740	965	1.265	900	
Height above the table	mm	700	850	1.050	1.050	1.600	1.600	2.000	1.900	
Speed range x and y	mm/s	1-100	1-100	1-100	1-100	1-100	1-100	1-100	1-100	
Max. admissible load	daN	400	1.000	1.200	1.500	3.000	3.000	3.000	5.500	
Vacuum installation (Standard Pump Stations)										
Approx. pump down time (cde)										
	up to 2×10^{-2} mbar	min	2	4	5	7	7	7	8	7
	up to 7×10^{-4} mbar with Polycold	min	3	7	7	8	12	12	17	18
		min				8	8	13	14	14

Devices

Type		D 350 C	D 600 C	DS 600 C	KIP 610 C	KIP-Z 250 C	KIP 350 H
Faceplate \varnothing	mm	350	600	600	600	600	350
Speed range	min ⁻¹	0,1 - 30	0,1 - 10	0,1 - 10			
Tilting angle	°	--	--	--	0 to 90	-5 to 95	0 to 90°
Tilting speed	°/min	--	--	--	90	90	manually
Vertical stroke	mm	--	--	--	--	250	405
Speed range	mm/s	--	--	--	--	0,5 - 30	manually
Height of centre	mm	300	405	700	610	610 - 860	350
D xxx C with angle brackets KIP xxx at 90°			520 700	900			
Max. workpiece \varnothing	mm				700	1.000	500
Admissible load	daN	450	1.000	2.000	1.500	1.000	450
Admissible radial load	daN	180	1.000	2.000	1.500	1.000	180
Admissible load moment	daNm	11,5	250	1.000	250	250	11,5
Overall dimension (approx.)	X mm	390	718	821	1.036	980	830
	Y mm	475	718	718	1.070	1.810	810
	Z mm	190	200	350	1.265	1.180	700
Weight	daN	90	350	500	950	2.150	290
		Device is prepared for CNC-operation	Device is prepared for CNC-operation	Device is prepared for CNC-operation	Tilting module with D 600. Both devices are prepared for CNC-operation.	Tilting module with D 600. Both devices are prepared for CNC-operation.	Tilting module with D 350

Know how and after-sales support - committed to the customer on an international level

Steigerwald Strahltechnik does not only supply EB-installations but also engages in studies concerning specifically defined user applications. We also make the know-how of our decades of experience in the field of EB-technology available to our customers.

Extensive training of customers' personnel is just as well part of our services as the world-wide supply with spare parts and qualified after-sales support.

EBOCAM-E

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