KLANN

Anlagentechnik

Core Shooters in Standard Design

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The core quality in the cast shop has a significant influence on the casting quality and therefore on the production costs. Low core strength results in more inspections, increased re-work and a higher rate of off-grade material. The increase of core quality and the reduction of production costs are one of the main criteria for choosing a core shooting machine for the core shop.

The requirements of a modern core shooter can be summarized as following:

- § reproducible high core quality
- § short cycle times
- § fully automated operation
- § high machine reliability
- § solid, bending-resistant design
- § compact and maintenance friendly design

The company Klann Industrieanlagen is offering in their business unit KLANN-Anlagentechnik complete core shops, starting with the sand storage, the sand processing up to the core production as an integrated system. Thereof the core shooters are the “core” equipment.

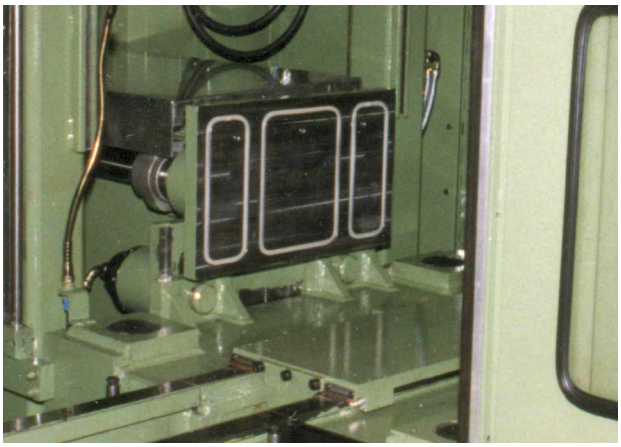
Pic.1: 12 Litre Core Shooter, Type MAP, with gassing unit (red)

The reliability, the operation- and the maintenance-friendly design are based on different details which can be described as follows:

Basic construction:
The absolute bending-resistant basic construction of the machine assures that even with large core boxes the effecting forces during the shooting process are caught. The high clamping forces of the machine, which are produced by the hydraulic system, avoid a short time opening of the core box, during shooting, which would produce burrs on the core. The hydraulic clamping forces of the MAP shooters are above the shooting force for maximum core box dimensions and maximum shooting pressure.

Core sand feed
The prepared core sand flows from the sand feeder, which is used as intermediate storage for the machine, into the sand bin, from which it is shot into the core-box by compressed air. The sand bin and as a part of it the shooting head is moved by means of a hydraulic cylinder sideward, so that after shooting the bin is guided out of the core box range. This MAP specific car design of the sand bin allows the change of the sand bin to the direct connected gassing unit for the cold-box process. Therefore no lowering of the core box and introduction of the gassing unit between the shooting head and the core box is necessary anymore, which lowers the cycle time and the necessary machine depth.
This moving sand bin design avoids also the sand hardening in the shooting bin or head as this unit is pulled out of the range of the core box during the hardening process and therefore the maintenance cycles can be extended..

Core box fixation
To allow a rapid core box change, the core box with vertical separation are fastened in the machine as a standard by vacuum claws. To avoid high compressed air consumption no venturi-type vacuum generator is used for vacuum production, but a pump system. As an option this clamping and stripping device is also automatically height adjustable to assure optimised clamping force attack on different core box heights.
As the necessary positions of the clamping and striping device are taken by length measurement devices and not by limit switches, they can be stored in the PLC system and can be automatically moved in the relevant position after core box change. These features allow minimum set-up times for core box change.



Pic. 2: View on the vacuum clamping and stripping device

The core shooters are available for vertical and/or horizontal core box division.

Hydraulic control
To assure short cycles the KLANN core shooters are equipped with a modern hydraulic drive. A sophisticated soft switching proportional valve control is used, to smoothly open the core boxes in the beginning and to follow up with a fast opening. This procedure avoids core destruction during opening of the clamping device.
The hydraulic tank with pumps and valves is placed separately, easy accessible as a unit outside the machine.

Process control and data storage
The machines are equipped with a Siemens control system type SPS S-7 and a Siemens operation panel. This assures a high availability and a world-wide maintenance service by using standard software. The customer has no black-box solution, but he can adapt or extent the control system by himself, KLANN or third-parties.
The core box's specific parameters are stored in the PLC to assure short core changing times. This includes e. g. the clamping distance, the table lifting height, the clamping jaw height, the shooting pressure, the shooting and venting time (cold-box) and the hardening temperature and time (hot-box). This data storage allows adapting the machine to new core-box requirements immediately and assures reproducible core quality.

Pic.3: Core shooter with vertical divided core box and pin plate

Maintenance- and operating-friendly design
The machine is easily accessible for maintenance or cleaning operations by wide opening doors on the front and back side.
Maintenance features like an integrated maintenance platform for easy access to the sand feeder or a maintenance drawer for the screen of the shooting valve, lower the down-time for cleaning and inspecting operations.

By using a shooting screen cylinder free process, no cleaning of the screen cylinder is necessary.

Machine installation:
The KLANN core shooter is designed to be installed on a minimum flat area. An investment and maintenance intensive hole in the foundation is not necessary, as for core shooters from other sources. The machine arrives assembled and can be put in operation after supply of utilities. No additional parts like housings need to be assembled.

The integration of the housing in the basic design minimizes not only the necessary space requirement of the machine but also the necessary exhaust air volume for it's operation

These design details have shown it's performance and reliability in various applications. They assure a high productivity, high flexibility and low operating costs of the KLANN core shooters.

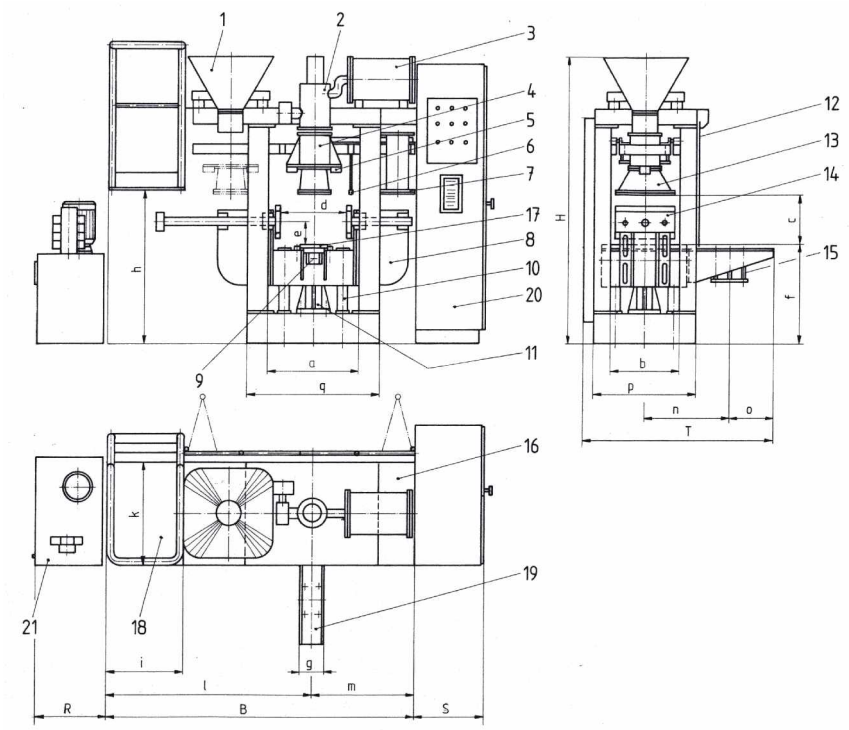
Beside pure Hot-Box, Cold-Box or CO_2-machines machine combinations are also available, which can be used for the other process after change of the tools.

The KLANN core shooter is available with the following auxiliary equipment or features:

- Front and rear pulling device for loosening parts
- Height adjustable clamping and stripping device
- Hydraulic shooting head clamping
- Upper core box pushing device
- Swivable machine table for direct take-out of cores with special core boxes
- Low pressure gassing to lower the gassing time and gas consumption
- Low pressure (vacuum) shooting to increase the shooting power
- Core take-out or handling devices

Also available from **KLANN Anlagentechnik** for cast shops are:

- Turn-key core shops
- Core belters
- Core sand mixers/preparation plants
- Hoist gears for core sand transport
- Binder dosing systems
- Drum and container storage facilities for binders
- Core residue recycling units
- Sand dedusters and cooler
- Silo storage- and dosing systems
- Pneumatic conveyors
- Automation and Control Systems
- Robot handling systems for cores



1 sand feeding chute
2 shooting valve
3 compressed air reservoir
4 Sand bin
5 hydraulic shooting head clamping (optional)
6 sand wiper
7 gassing plate
8 clamping and stripping device (optional with height adjustment)
9 table slider cylinder, integrated in m/c table
10 guide columns
11 m/c table lifting cylinder
12 safety front door
13 shooting head
14 vacuum clamping plates
15 core ejector device
16 m/c housing
17 sliding table
18 maintenance platform
19 m/c table front attachment, swivel arm mounted
20 control cabinet
21 hydraulic unit

m/c type	B	T	H	a	b	c		d		e		f		g	h	i	k	l	m	n	o	p	q	R	S
						min.	max.	min.	max.	min.	max.	min.	max.													
P5/CB/CO_2	2.840	1.555	2.505	650	500	190	550	110	510	100	230	820	1.180	150	1.650	600	890	1.660	1.180	600	350	840	990	640	500
P10/CB/CO_2	2.840	1.555	2.715	650	500	190	550	110	510	100	230	820	1.180	150	1.650	600	890	1.660	1.180	600	350	840	990	640	500
P12/CB/CO_2	2.840	1.555	2.800	650	500	190	550	110	510	100	230	820	1.180	150	1.650	600	890	1.660	1.180	600	350	840	990	640	500
P15/CB/CO_2	3.100	1.740	2.910	1.000	650	295	715	180	740	155	305	855	1.275	270	1.650	600	890	1.800	1.300	750	400	990	1.240	620	500
P25/CB/CO_2	3.140	1.842	3.135	1.000	650	295	715	180	740	155	305	910	1.330	270	1.750	600	990	1.815	1.325	750	400	990	1.240	760	500
P40/CB/CO_2	3.500	2.500	3.500	1.000	1.000	250	750	250	880	200	350	1.100	1.600	400	2.100	600	990	2.050	1.450	1.100	600	1.360	1.360	1.100	500

Pic. 5: Typical dimensions of 5 – 40 Litre Cold-Box/CO_2 standard core shooters (other sizes on request)

	Unit	P5/CB/CO_2	P10/CB/CO_2	P12/CB/CO_2	P15/CB/CO_2	P25/CB/CO_2	P40/CB/CO_2
Shooting volume	dm^3	5	10	12	15	25	40
Sand capacity – feed bin	dm^3	60	60	60	200	200	250
Shooting pressure, adjustable	bar	1 - 6	1 - 6	1 - 6	1 - 6	1 - 6	1 - 6
Compressed air consumption per cycle	dm^3	20	20	20	50	60	80
Average cycle time, without shooting, gassing	Sek.	12	12	12	15	16	20
Table lifting height	mm	360	360	360	420	420	500

Tab.: Technical data of a Cold-Box/CO_2 core shooting machine in standard design

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