HYDRA

BOTTLE WASHER

Performance through Understanding

Gebo Cermex

HYDRA

The Hydra bottle washer has been designed for medium-high speed production (from 30,000 bph up to 120,000 bph 500 ml bottles) and particularly for those clients who are better informed and more demanding from the technological point of view.

In the effort of reducing the environmental impact of waste from industrial production, there is an increasingly deeply-felt need to recover empty containers, such as glass or plastic bottles.

The different types of infeed and discharge modules design allow the machine to fit in various bottling lines configurations, and the Hydra models can be supplied with a vast range of options to optimize use, control and maintenance.

Energy saving has become a key problem in industrial plants and from this point of view the Hydra series offer highly competitive performances in terms of reducing water, steam and soda consumptions.

The elimination of any possible thermal shock is assured in the prewashing area where differentiated stages can be implemented, so to adapt to countries with more extreme climates.

WASHING CYCLE

The washing cycle consists of distinct phases, depending from the configuration that best suits the need of the customer. Depending from the machine configuration, all along the path of the bottles, many different stages are realized.

In the most sophisticated machine Version (DH 3), all the following steps are included.

Pre-wash
Right after the infeed area the bottles are turned upside-down so that the liquid residuals and loose dirty particles fall out of the bottles. Residuals are collected and discharged out of the machine separately. A sieve-belt conveyor may be arranged in order to take solid dirt, such as straws, cigarettes, insects out of the machine. This sieve-belt is at the same time a filter for the waste water. Behind the dirt removal area an internal jetting pipe can be located is present so to further remove dirty particles from inside the bottles as early as possible. Bottles are then submerged and filled with warm water. Water remains within the bottles until they are turned upside-down in the following jet section. The water running out returns to the pre-soak through a sieve-belt filter. This is the first occurrence where the bottles are turned upside down and so broken glass and dirt are collected in the lower part of the tank.

An automatic dirt and glass debris removing system is available optionally. The bottles are then pre rinsed with a set of internal sprayers and external showers and moved to the heat recovery submerge bath, where heat is transferred from the cooling zone without any water mixing. The temperature is gradually raised in this zone, exploiting the residual heat of the water received from the rinsing zone.

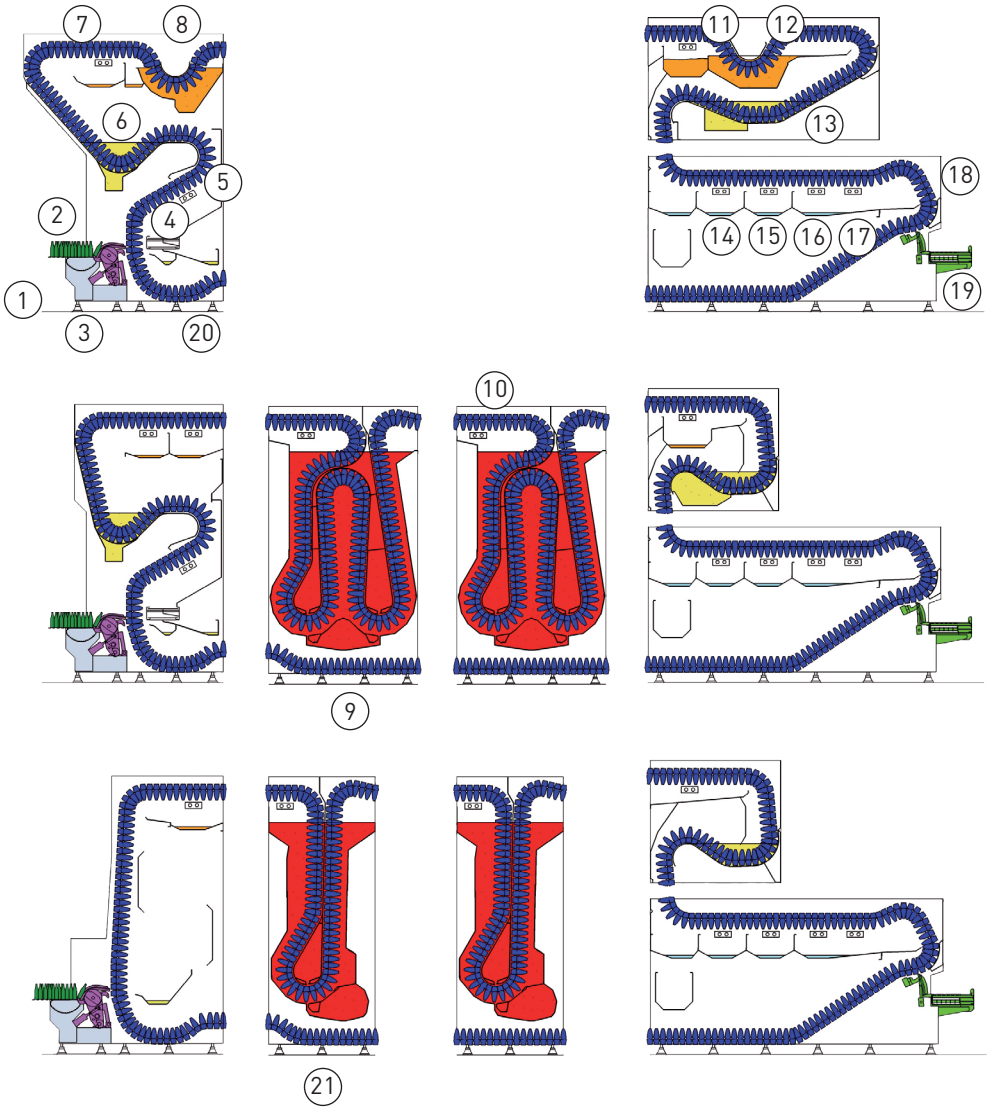
Washing
The bottles are then taken to the actual washing zone which consists of a certain number of identical detergent soaks – the exact number depends on the required treatment time. Bottle washing is in three essential stages: first, the bottle is immersed in the soak, where dirt is chemically attacked by the caustic action of the soda, increased by high temperature; at the second stage, the bottle is emptied to remove the dissolved dirt and the used solution; at the third stage the mechanical action of the internal jet removes the dirt, which had been chemically attacked, so that the remaining dirt comes into direct contact with the detergent solution of the next soak.

Rinsing
The bottles then move on to the rinsing zone, that usually includes an immersion zone and a set of spraying zones. In this zone the temperature is gradually lowered and the detergent solution is removed, both from the bottles and from the carrier beams, through dedicated sets of sprayers.

All the rinsing water is then recovered to the pre-washing zone. Every spraying zone consists of a set of high pressure internal sprays and an external shower.

Before discharging the bottles a final injection with fresh water takes place and, after sufficient drip-off time, the unloading system places the bottle on the conveyor belt.

WASHING CYCLE



1. bottle infeed conveyor
2. bottle accumulation table
3. bottle loading
4. residual liquid collection plate
5. 1st prewash stage
6. 2nd prewash soak stage
7. prewash sprayer
8. heat recovery immersion
9. double top detergent soak
10. caustic spraying
11. heat recovery spraying
12. heat recovery immersion
13. rinse soak
14. 1st rinse spray
15. 2nd rinse spray
16. 3rd rinse spray
17. fresh water spray
18. dripping area
19. bottle discharge
20. automatic tensioning zone
21. single loop detergent soak

LOADING SYSTEM

The conveyor belt of the accumulation table conveys the bottles to the automatic loading system, dividing them into separate rows by means of a set of unscrambler devices.

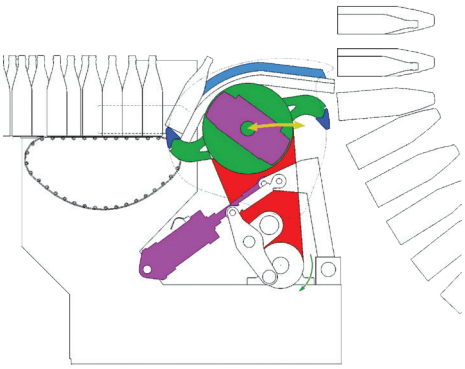
The infeed mechanism takes the bottles from the loading table and moves them over a plastic chute, in nearly horizontal position, into the pockets of the bottle carriers.

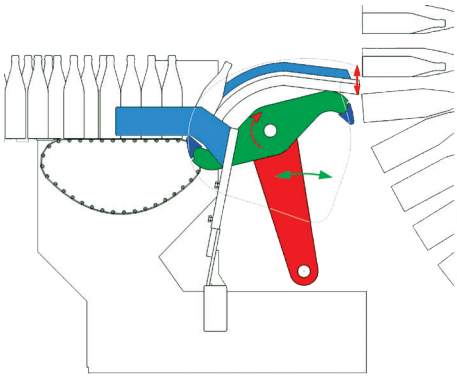
The mechanism consists of pairs of fingers mounted on a rotating and swinging shaft. During the bottle transfer from the chutes into the pockets the chutes move synchronized with the bottle carriers.

The infeed mechanism is able to handle a big range of different bottle sizes without any adjustment.

Only the guiding plates on the loading table have to be changed if the bottle diameters differ too much.

If movement is hindered by obstacles, a pneumatic safety device is activated, stopping the machine.When the safety devices, positioned both on the rotating and on the swinging shafts, are activated, the operator can reset the fingers back in production position or in opposite direction in order to remove crashed bottles. The switch-off force can be adjusted by setting the air pressure on a control valve. Fingers are made of treated steel with wear and protection caps are made of special plastic material. The caps can be easily changed by snapping them off and on.





UNLOADING SYSTEM

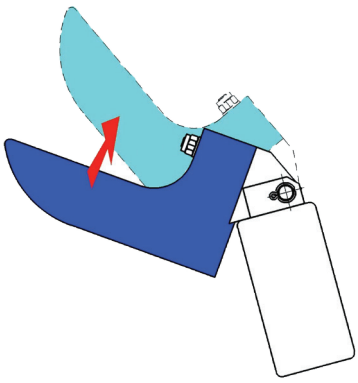
The bottle washer has an unloading system enabling bottles to be transferred from the machine to the bottling line conveyors.

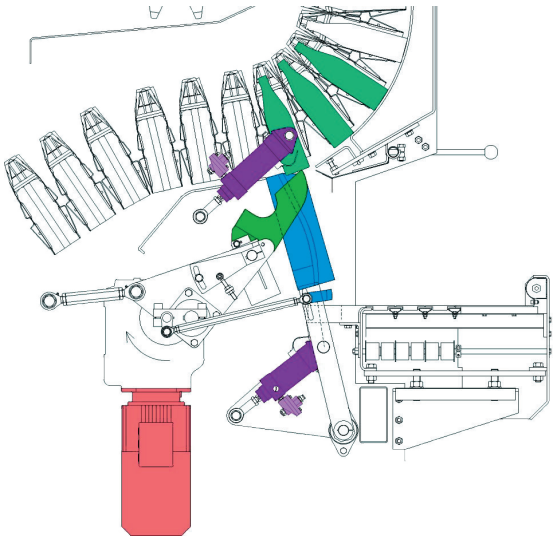
The bottles entering the discharge area are supported by a sliding plate in a nearly upright position. When they leave the front edge of the sliding plate, discharge fingers move underneath their bottoms and lift them a few millimeters in the carrier pockets. The fingers then move down and lower the bottles along chutes onto a plastic supporting plate. The transfer from bottle pockets to the fingers is thus realized in a smooth and quiet way, without any sudden falling. From this position the bottles are pushed by the lower part of the divided chute in upright position on the plastic plate and then, at the next unloading cycle, by the following bottle upon the conveyor belt.

During this final part of the unloading process, the bottles are guided within the prismatic channels of the chutes and so are always properly centered.

In this way a big range of different bottles can be handled reliably without any adjustment or change of the guiding parts. For good access and maintenance all pivots and bearings are located outside the side walls. There are safety devices for the upper and the lower section of the chutes, with adjustable switch-off force to prevent excessive stresses on the mechanism.

Moreover, each single finger can pivot upward, thus allowing to give way in case of obstacles in the path of the fingers themselves. In order to prevent bottles contamination from water dripping, a drip collecting plate is provided. This tray can be easily cleaned by operating a hand lever that permits its releasing and swinging down.





DRIVE SYSTEM

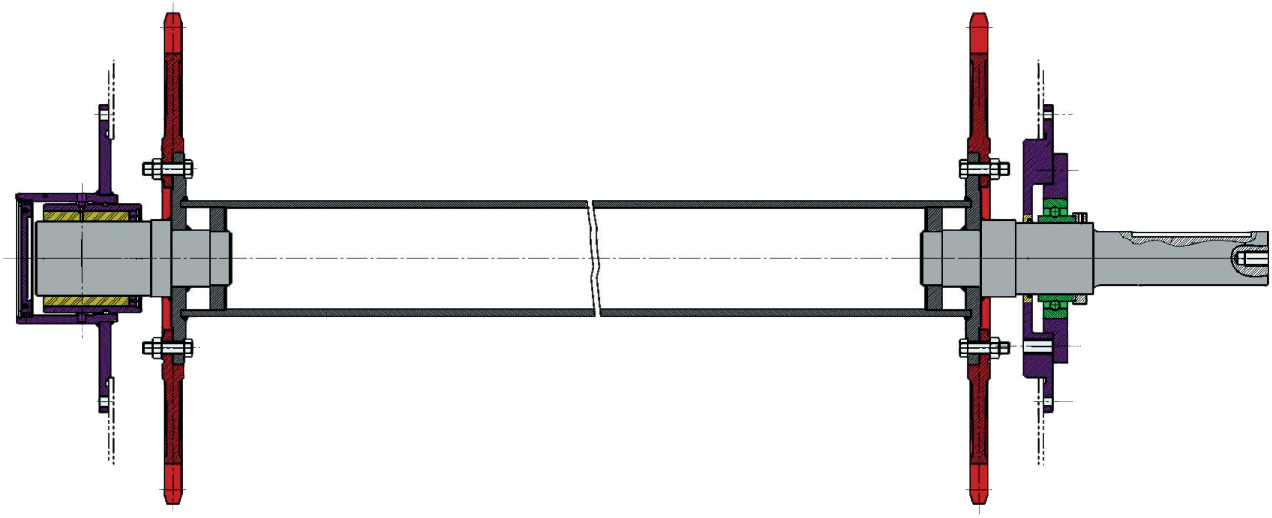
The main shafts with sprockets which move the bottle carrier chain are equipped with gear boxes that are connected with cardan shafts.

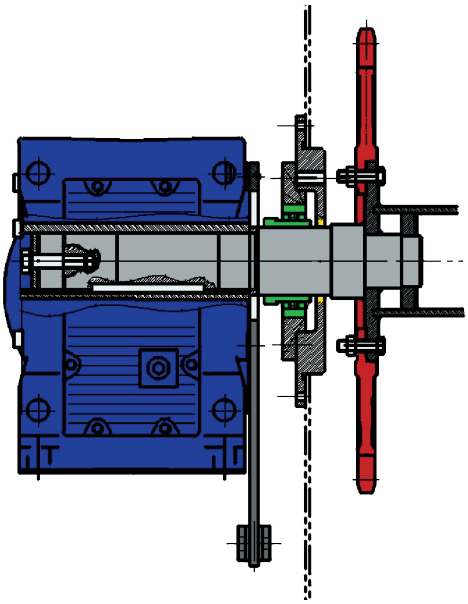
A central motor reducer with brake moves the carrier beams chain: a mechanical safety device and a thermal sensor protect the gearmotor against faults and overloading.

The torque of the motor itself is monitored by the strength of current. In case of an overload, the motor stops immediately.

All screw gearboxes can be supplied with a load cell safety device to protect them against possible overloading. Furthermore, use of load cells enables continuous monitoring of the torques of each gearbox, thus ensuring accurate assessment of power in the main drive system.

Infeed and discharge are driven by an own motor, which are electronically synchronized with the main motor.
The speed control is achieved by a frequency converter enabling continuous speed variation according to line requirements, as well as setting acceleration ramps for starting and deceleration ramps for stopping.





SYNCRO DRIVE SYSTEM

As an alternative to the traditional system, a machine driving system with drive provided by a set of mechanically independent gearmotors can be installed.

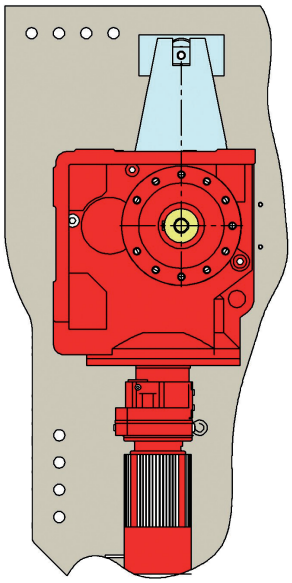
This syncro drive system ensures excellent load distribution on the chain under all types of duty, enables chain tension control in all machine zones, and, when necessary, chain automatic re-tensioning according to a system patented by Gebo.

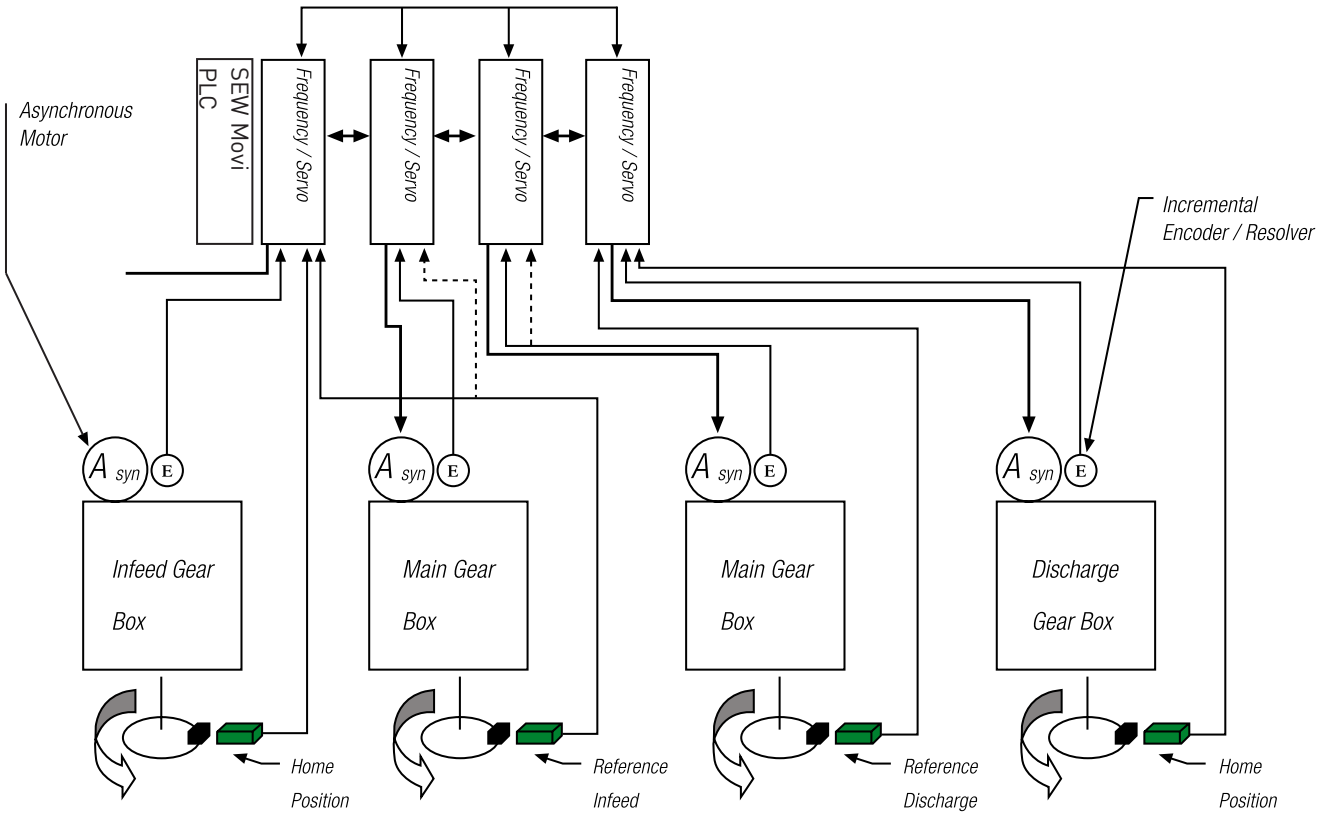
The speed and torque of each gearmotor is controlled by a frequency converter device: the converters dialogue with each other, by means of special software, to ensure that all motors turn at the same speed.

The system has electronic safety devices which stop the machine in case of faults or overloading.

The loading and unloading movements are also generated by 2 independent gearmotors.

The frequency converters dialogue with those of the main shafts so that perfect timing is always assured.





BOTTLE TRANSPORT

As the bottles are conveyed inside the machine, they are housed in mild steel

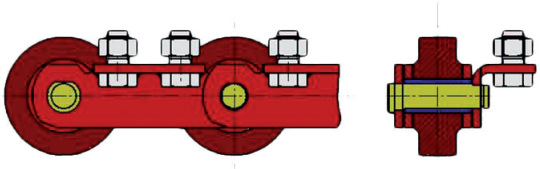
pockets specifically designed to facilitate label removal and enable perfectly centered spraying on the bottle neck. The nose of the pocket is in a type of plastic that resists prolonged contact with caustic solutions at temperatures of up to 85°C.

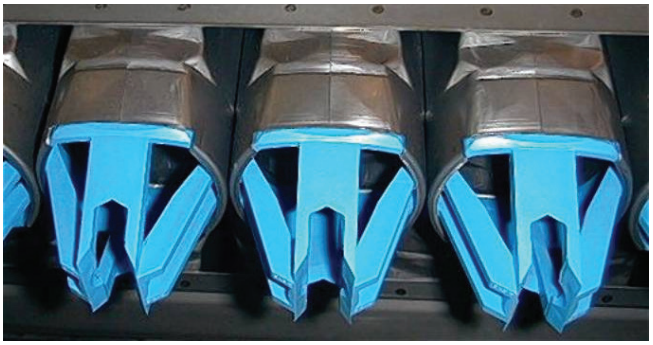
The nose of the pocket is fitted to the beam by pressure only, without any screws or bolts – a restraint tooth secures the nose to the beam.

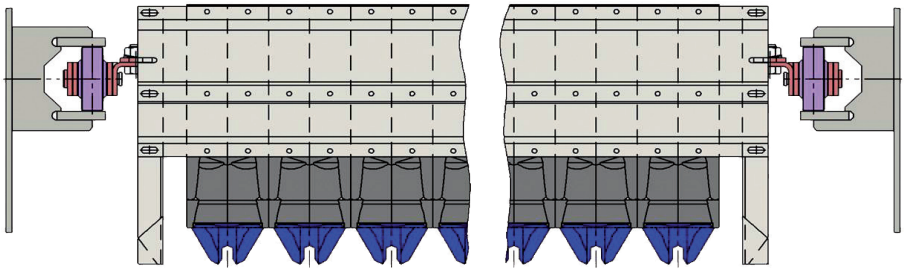
Steel pockets with special profiles are spotwelded into carrier frames, thus obtaining high bending and torsion resistance.

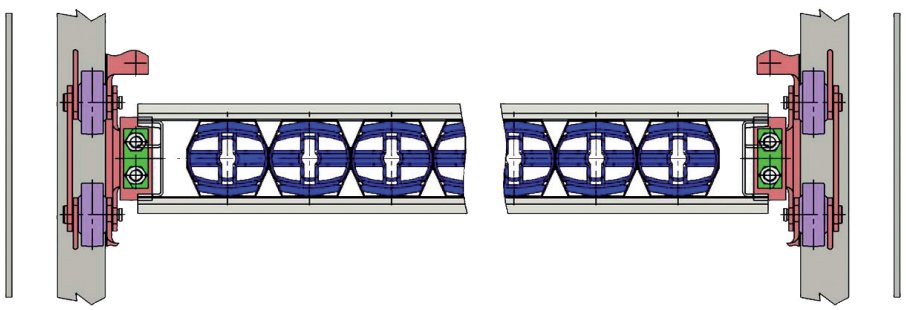
The carrier-beam is secured at its end to the conveying chain, by screws and antiunscrewing plates.
The main chain is constructed using high resistance steels of high surface hardness.

The chain guides are in carbon steel and are equipped with removable elements in the areas most subject to wear.







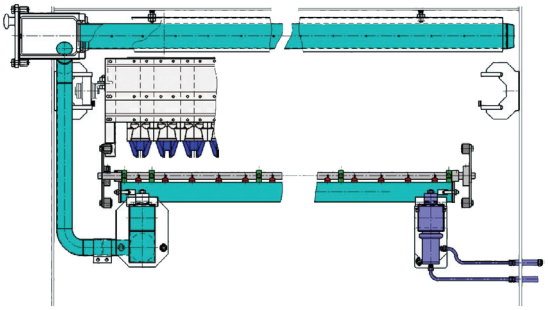


SPRAYING SYSTEM

With the exception of the freshwater one, each jetting zone consists of a pump, internal jetting pipes, external spray pipes, filter and tank. The rotary type sprayers are driven synchronously by the carrier beams by means of a plate mounted the carrier beams themselves.

At a certain distance from the nozzles to the mouth of the bottles the jet stream hits exactly into the bottles and follows their continuous movement due to the rotation effect. Since the shaft is driven by the bottle carriers themselves, a proper centering is always ensured.

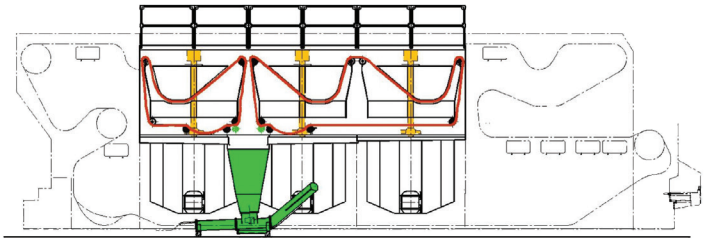
Due to the continuous rotation the flow in the nozzle reverses. In this way, the dirt that may eventually obstruct the entrance of the nozzles is blown out during the next cycle. The jet is switched off when the nozzle is not in contact with the hole in the sealing bush. That means, that bottles are treated only internally. It's possible to provide motorized sieve belt filters in front of each jetting pump. Since there is only little dirt to be discharged, the filter is driven only in short intervals. In this interval, the sieve belt is cleaned by a water spray pipe. It flushes the dirt into a discharge channel.



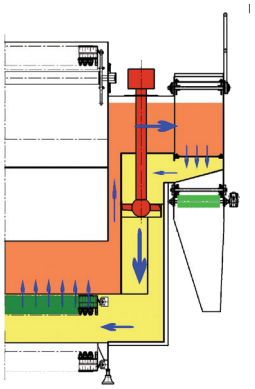
LABEL EXTRACTION

The labels are removed in the first detergent soaks by several label removal units. The enormous flow created by the pump inside the soak passes inside the pockets, removes the label from the bottle, and then takes it outside. The pump with vertical shaft is placed in the return channel between label extractor and tank, where no labels are in the caustic. For good efficiency, the pump is provided with a slow running big diameter propeller.

The flow created by the pump is sufficient to prevent label deposits inside the soaks and to enable labels to be removed without damaging them. The sieve belts are running parallel to the machine, the first one from the infeed side to the next caustic tank, the further ones are interconnected and run in the opposite direction. In this way, labels can be discharged in only one chute and into one label press.



The fall of labels is supported by fast rotating brushes. Between the tanks the sieve belt is guided over the caustic level, so that the caustic of different tanks cannot be mixed.



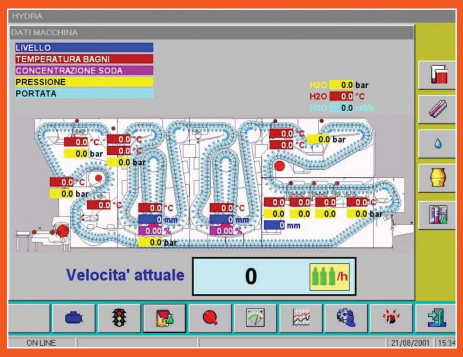
ELECTRICS AND OPERATOR INTERFACE

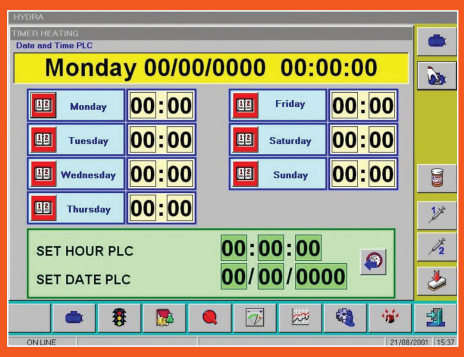
The electrical system is built according to current European laws. All machine functions are controlled by a PLC. All componentry is housed in the main panel, while the machine operation controls are located in the console near the operator's station, at the infeed side.

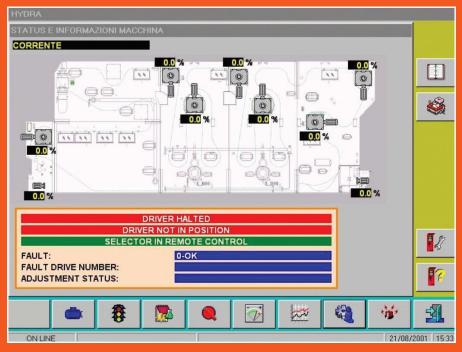
The main operator panel is a PC-based operator interface that permits to visualize all process parameters and failures information. The main advantages of this solution are:

- a friendly operator interface
- a data acquisition system integrated in the interface
- the possibility of remote connection for diagnostics or updating purposes.

A button board is positioned in the unloading area and, in addition to start and stop controls, it also contains signalling from the bottle unloading safety devices. The electrical cables, connecting the panels to users, are routed through channels (either galvanized and painted or in stainless steel) located on the machine roof and sides. All cables and electrical components are properly codified to facilitate identification.







Gebo Cermex works in partnership with Sidel as part of The Sidel Group. Together, we are a leading provider of equipment and services for packaging liquids, foods and personal care products in PET, can, glass and other materials.

With over 37,000 machines installed in more than 190 countries, we have nearly 170 years of proven experience, with a strong focus on advanced systems, line engineering and innovation. Our 5,000+ employees worldwide are passionate about providing complete solutions that fulfil customer needs and boost the performance of their lines, products and businesses.

Delivering this level of performance requires that we continuously understand our customers' challenges and commit to meeting their unique goals. We do this through dialogue, and by understanding the needs of their markets, production and value chains. We complement this by applying our strong technical knowledge and smart-data analytics to support maximum lifetime productivity to its full potential.

We call it *Performance through Understanding.*

gebocermex.com

Performance through Understanding

Gebo Cermex