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IS machine evolution

Dr Benedikt Felgenhauer and Wilfried Seidensticker present Heye International's latest evolution in IS machine technology.

Heye foresees four major requirements in the IS machine business, beginning with high levels of safety throughout, optimum cleanliness and user-friendliness, all at high quality and speed. Safe and clean designs are factors that belong together, because staff and equipment alike need to be protected. As machine downtimes decrease, the quality of products and profitability increase. Integrated control features mean knowing the condition of equipment constantly. This reduces the number of errors, avoids wasteful troubleshooting and results in less exchange of components. Finally, top quality machines ensure high speeds over periods of many years. It is important to note that Heye was careful to engineer an evolution - not a revolution - to ensure that plants can still use existing mechanisms and variables.

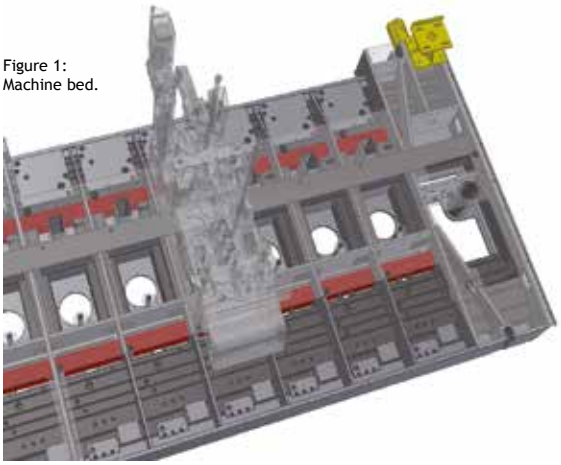

Figure 1: Machine bed.

In the past, the variety of possible options within the machine led to a variety of individually customised solutions. By functional integration, the modular concept of the Heye SpeedLine is a contribution to implementing the most important options in a common structure. Against this background, Heye has developed a machine concept that is well prepared for the future. An excellent example for the functional integration is the machine bed. It is not only the backbone of the machine; all air distributors and tanks are integrated. This also means an optimally prepared bed for retrofitting the Heye Process Control and proportional valves. Let's have a closer look into the different features and technical solutions, to see how the market requirements have been implemented.

SAFETY AND USABILITY

Safety and usability go hand-in-hand. Good usability reduces the risk of potentially dangerous human errors, while high safety for example is a result of the integrated cable channels in the machine bed; the development of integrated cable ways on the blank and blow mould side is very important for increasing numbers of servo- and control electronics. Thus, the cables are protected in an optimum way against mechanical influences and hot glass. Furthermore, fire risks are eliminated.

In addition to providing optimal protection for the cables, the structured cable ways enable cabling during the machine mounting phase in the Heye workshop. For installation at the customer on site and for a subsequent exchange of cables, it is important to have defined interfaces. Another feature is that the machine conveyor is equipped with a rail system so that a movable heat-protected ladder can be moved along the sections. Thereby, the operator can work safely on the blow mould side and the machine can be kept in operation.

Figure 2: By providing a defined distance between air distributor and box, fixed stainless steel piping is simple to install using proportional valves.

CLEAR INTERFACES

One important interface is the connector board in the uprights for connecting the servo and valve block cables. For subsequent installation or a section-wise exchange, Heye has designed cutouts from the bottom of the cable duct into the cellar. This approach makes it possible to lay the cables section-wise into a separate duct underneath the bed.

Defined interfaces for air and water beneath the machine bed allow precise planning of medium supply and quicker installation during commissioning.

USABILITY VIA SIMPLE PROCESS CONTROL

The upright was redesigned due to the increasing amount of servo and control technology. Furthermore, the housing's development was executed in such a way that all components can be accommodated and that a clean design is maintained.

Besides the integration of various control cabinets, the housing also contains a human machine interface (HMI) in order to control all important functions and to make settings. This HMI ensures quick access to the most important information. By the introduction of specially developed >

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monitoring functions, the information covers not only the Heye servo components but also a query and adjustment possibility for operating pressures, optional dead plate monitoring and a central messaging system. Monitoring dedicated valves for such functions as final blow is an important step towards process monitoring, preventive maintenance and job safety. The operator does not need to take a risk when accessing difficult areas in order to control pressure functions. Pressure checks can be performed without losses resulting from switching off the section. Not only is it monitored whether the valve works but also how.

All valves are electrically-controlled so that the extensive cascade via the valve block is omitted. To achieve this advance, the structure contains cable ducts that guide the cables to the upright. The adapter plates are prepared for the use of proportional valves.

CLEAN DESIGN

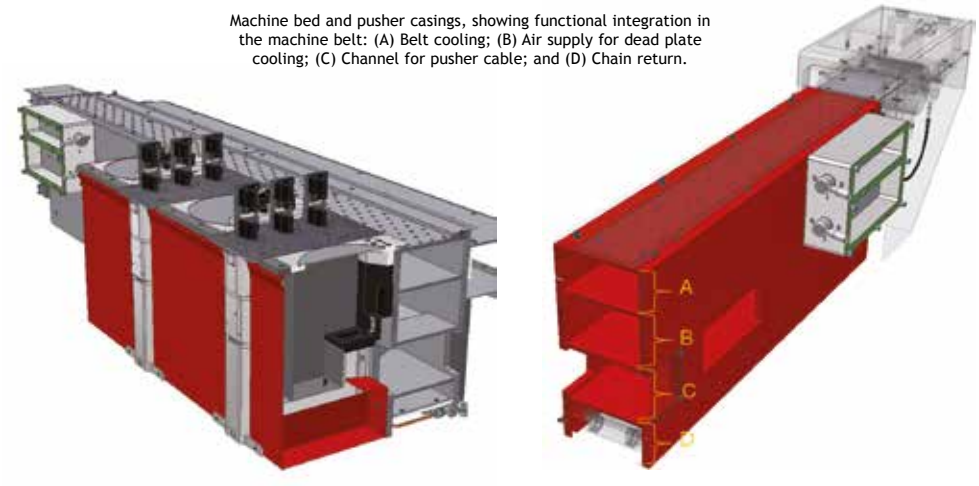
HACCP is the abbreviation for the Hazard Analysis and Critical Control Points concept and is required by all major fillers. This is a preventive system that ensures both food and consumer safety. In addition to good article quality, a clean design also means that the equipment can be cleaned in an optimal way. This reduces the time needed for repair and maintenance. Cleanliness increases the life-time of equipment. For the latest design, the individual air distributors of the cross structure were grouped together. Thus, a clear and clean design results that is not only easy to clean but also offers the operator a clear view through the entire machine from blank to blow side. Using flange plates, process air can be fed directly into the beam via the upright. Thereby, external piping is no longer needed.

The clean design continues on the blank side. By arranging the injectors above the valve block, the air pipes are no longer crossed by the injector rack and its pipework underneath the block. Furthermore, the latest generation of injectors is compactly arranged in the operator's field of vision. Additionally, rapid interchangeability and precisely pre-adjusted capacity ensures a good match with the lubrication point size.

Also in the area of the machine, conveyor functions were integrated on a large scale. Conveyor cooling, cable ways and dead plate cooling are now installed in the conveyor body, whereby the cables are optimally protected and guided the shortest possible way.

For better cleaning and to provide protection against dirt and heat, the pushers are surrounded by casings. Furthermore, they offer the option of active pusher cooling by the machine conveyor body via the cable channel. By directly positioning the pusher socket at the machine conveyor in front of each section, the pusher can be easily exchanged, as it is possible to remove the plug to raise the unit with the cable tail.

Machine bed and pusher casings, showing functional integration in the machine belt: (A) Belt cooling; (B) Air supply for dead plate cooling; (C) Channel for pusher cable; and (D) Chain return.



The dead plate position for each cavity can optionally be monitored by an infrared sensor beneath the dead plate over the whole cycle run of a section. If the heat radiation is abnormal or does not exist at a certain time, a glass handling or moulding failure has occurred. In that situation, the following gobs for this section will be rejected. This minimises downtime and avoids wasteful maintenance.

In addition to the bed, manifolds and conveyor, the scoop beam is an additional example for the functional integration employed. Both hollow profiles are used to guide compressed and blast air. In between, the cable duct is embedded.

There are modules for scoop cooling and pneumatics on the profiles. The modules are optimally protected against environmental influences by easy-to-remove hoods, although they are still easy to reach by flaps.

HIGH SPEED

Increasing production speeds also demand the optimisation of flow paths. For this reason - when carrying out the design of the latest bed – the flow paths were kept very short and straight. In addition, exhaust air for plunger cooling and valve blocks is guided directly into the atmosphere. Thus, it has been possible to reduce the flow resistance and increase the cooling efficiency of the plunger. By omitting the exhaust air manifold, back pressure into the valve block has been eliminated as there are no further interactions. A straight design, combined with high quality for all parts and mechanisms means high speed production of high quality containers for many years to come. ■

The Heye SpeedLine machine concept.

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