

The past and present of ware handling

Hot end ware handling has always been a challenge. Here, Lance Miller considers ware handling past and present and the technologies Emhart Glass has developed to improve this crucial area.

Ware handling is all about transferring containers that are still hot and fragile from the IS machine to the Lehr. An effective operation can significantly improve the stability of production but only if it operates consistently, without the need for operator adjustments.

The FlexPusher mechanism from Emhart Glass plays the crucial role of transferring containers from the dead plate on to the running conveyor, using two independent servo motors to generate the sweep-out motion. This motion uses all available space on the dead plate and allows for previously unattainable conveyor speeds.

FlexPusher's accuracy determines the placement of containers which, in turn, helps to reduce losses at subsequent production stages. It is supplied as standard on all Emhart Glass machine ranges and is available as a fully integrated component in the FlexIS process control system or as a standalone system. It replaces all previous pneumatic pusher systems and enables the speed and precision required by NIS quad gob production at up to 800 bottles/min.

LOOKING BACK

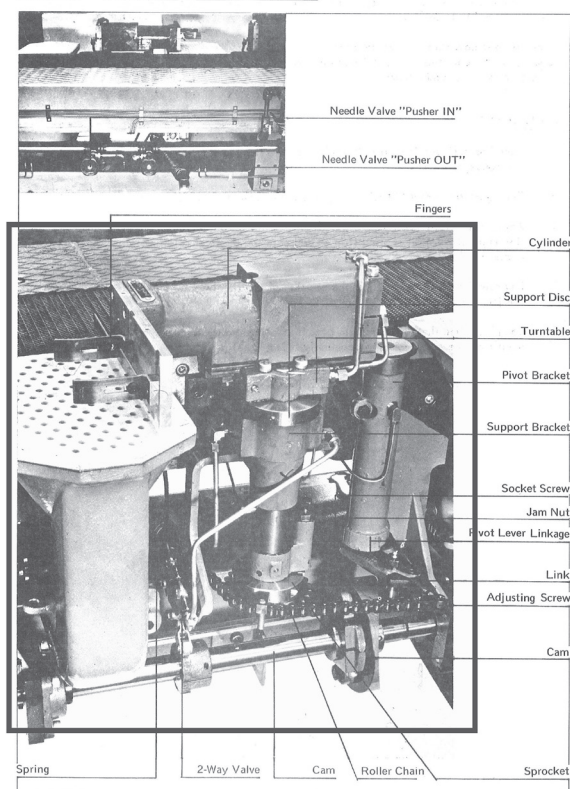
The first ware handling task faced by me was in 1977, on a 6-section 4 1/4in DG machine, equipped with a 90° mechanical pusher that was state-of-the-art in its time. The conveyor pusher camshaft and belt were driven from the feeder drive via

an arrangement of chains, sprockets, shafts and differential gears.

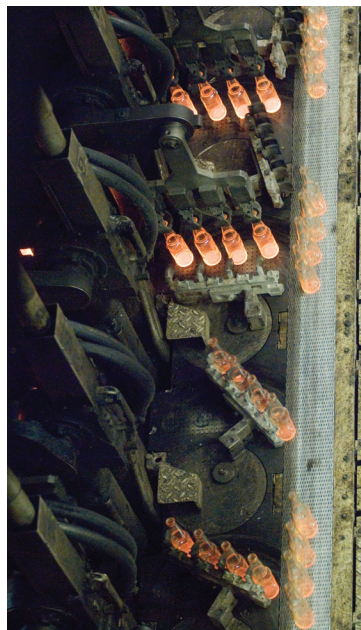
The machine was running at 140 bottles/min. Laughing, my workmates instructed me to realign all mechanical pusher cams. That meant I had to lie on my back on a pallet tray under the conveyor, loosen

F CONVEYOR 8.2

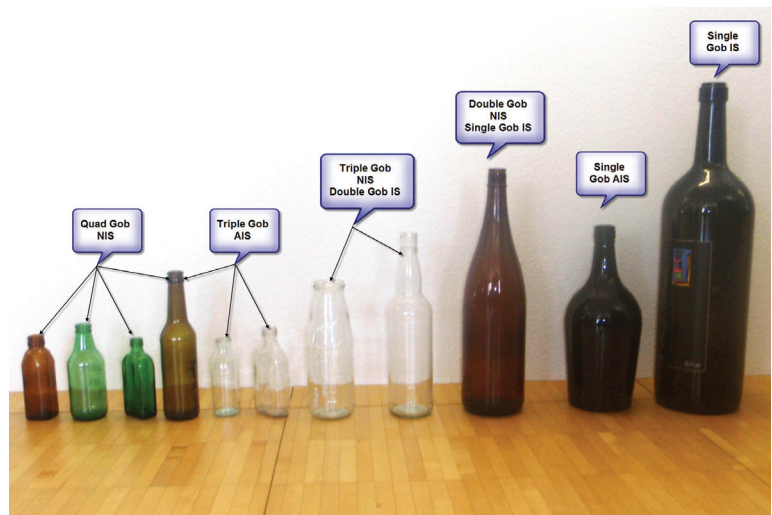
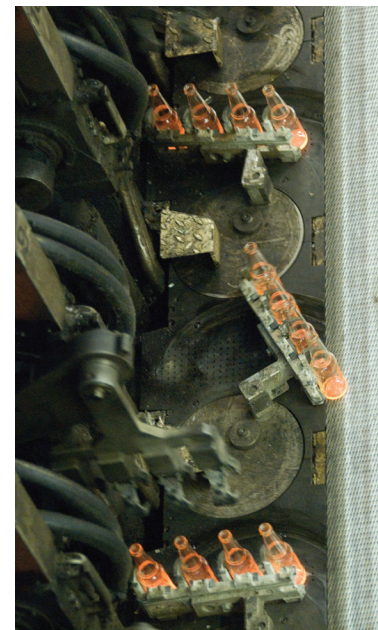
Fig. F.8.1 90° PUSHER MECHANISM - 117-D-34



90° mechanical pusher.



Original FlexPusher motion in quad gob.



FlexPusher ware range.

the cam hubs and turn the shaft to the correct position – as indicated by a cam-setting disk and a pointer at the end of the camshaft. Then, it was simply a question of rotating the cam until the pusher was at 90° and extended over the belt.

Each pusher was adjusted to the firing order (6-section with scoops 1, 4, 2, 5, 3, 6). Imagine my dismay when I checked the spacing with cold bottles just before startup, only to find that the gap for section 1 (between the containers from sections 5 and 4) was too narrow. So another hour was spent tapping the cams this way and that until all the fingers cleared the bottles from other upstream sections. As one of the guys explained, the problem was probably due to incorrect belt speed.

Today's machines, of course, are much larger, with more sections and cavities. Meeting modern ware handling challenges with the old mechanical drives and pusher systems of previous decades would have been impossible. Fortunately, the latest tools available with machines today boast precision control drives, FlexIS Ware Handling Control (WHC) and dual servo motor FlexPusher.

DRIVES, BELTS AND CONTROLS

The servo drives installed in today's Emhart Glass machines incorporate the latest servo-motor technology, with precise software control to ensure the conveyors are moving at exactly the right speed. FlexIS forming control also plays

an important role in matching up speeds. In fact, the tolerance is so fine that matched-link inverted tooth belts are now supplied with all Emhart Glass machines, to take full advantage of the drive system's accuracy. Instead of belts being assembled from miscellaneous short lengths of silent chain belt, as they once were, today's belts are made in their entirety from single batches, delivering better link-to-link tolerance and reducing speed variations.

Flush laser-welded sides and the double rolling pin joint produce an even smoother running, longer lasting belt. More than 2000 successful installations prove the system's flexibility and ease-of-use, as well as customer acceptance.

All belts have clearance between their links and pins, which becomes exaggerated over time – the increase in pitch known as 'belt stretch'. Even the smallest increase in pitch requires the drive to be adjusted accordingly, which is done with the 'belt stretch' factor in the FlexIS WHC.

AUTOMATIC ACCURACY

Ware handling still requires great care and diligence but FlexPusher technology makes getting containers on the belt at high speed a lot less arduous than lying underneath the conveyor, moving cams around! Instead, the operator can simply 'amend' the pusher start parameter in WHC.

The next step forward for FlexPusher will be the automatic

calculation of the pusher start signal by extrapolating the containers' paths and positions. The foundations for this are already in place, with Ware Handling Supervision WHS and FlexRadar systems both providing information on the position of containers on the belt. It is only a matter of time before container positioning is made fully automatic.

FlexPusher also includes a host of other parameters so customers can create their own motion profiles and ensure a smooth transition from dead plate to belt.

SHORT-ARM VERSION

FlexPusher was originally designed for high speed lines but its simple, low maintenance design made it inevitable that it would be used more widely. It is now included as standard on all Emhart Glass machines, from 6-section single gob models to 12-section quad gob machines.

The equipment has adapted well to a range of products and machine centre distances but this versatility requires some compromise in terms of motion. Recently, while looking at ware handling for a high speed line manufacturing flasks, a short-arm version with a different motion was tested, allowing the containers to be rotated on the dead plate so they are parallel to the belt before they are pushed out (see accompanying illustrations for a comparison of the different mechanics).

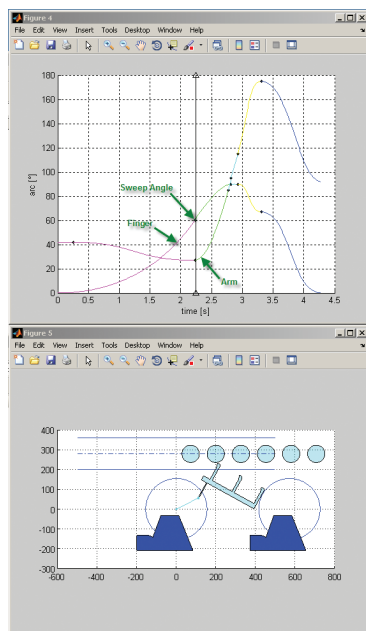
It is planned to introduce this short-arm version for high speed handling of smaller, less stable containers; it is less suitable for large containers since there is insufficient space parallel to the conveyor.

PROBLEM DETECTION

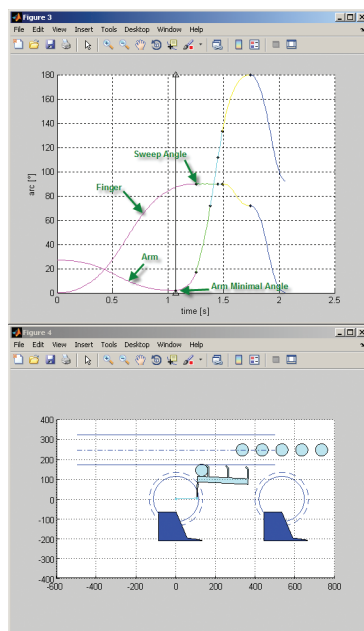
As conveyor speeds rise, it becomes increasingly important to have an automatic operator assistance system. On Emhart Glass machines, this role is performed either by FlexIS WHS or FlexRadar. FlexRadar is able to gauge the distance between groups of bottles with pinpoint accuracy, providing the final opportunity to correct bottle spacing and positioning on the conveyor.

Both systems also offer excellent detection of ware that has fallen down or become stuck. However, until recently, air reject systems lacked the air pressure and valve sizes necessary to reject containers reliably within the short time available. This was the cause of many jam-ups in the reject chute or coating hood. Now, however, a blow-off system has been designed that eliminates this problem.

Getting containers on the belt in the correct position remains a challenge but the tools and controls available from Emhart Glass offer the best possible solution to the most demanding ware handling tasks. Going forward, the company's engineers will continue to develop world class technology to meet the future demands of customers. ■



Original FlexPusher motion.



Short radius motion.

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