Challenges faced in the art of ware handling

Elliott Seymour explains why, at times, ware handling can be so frustrating and why the Sheppee six axis system provides an optimum solution for high speed production lines.

Triflex lehr loaders as part of a six axis controlled system.

Sheppee offers both two and three axis lehr loader designs. The 2 + 3 and 3 + 3 systems are two and three axis stackers respectively, each with integrated drives to control the full aspect of ware handling (machine conveyor, transfer and cross conveyor). When Sheppee controls the cross conveyor, transfer and machine conveyor, ware handling synchronisation is under complete control.

Experience with high speed handling confirms that usual synchronisation tolerances are simply not good enough to achieve optimum performance from the system. A good example involves sweeping out at the machine conveyor, where the bottles are never truly put onto the IS machine conveyor exactly where they are supposed to be. They drift by about ±5mm as an effect of momentum from the wipers and the lead bottle moves naturally away from the sweep out pocket as it makes contact with the delivery conveyor.

BELT STRETCH

Another key issue involves the IS machine conveyor and the belt stretch effect. With the Sheppee system, there is a check procedure to ensure the belt surface speed is exactly as it should be and is part of the set up procedure.

In almost all cases of poor ware transfer, it has been found that the belt itself is running too fast and delivering containers to the transfer pockets at an inconsistent rate. For example, it is not unusual to see the belt moving 25mm per cycle more than it should. The common way of rectifying this problem in a factory is to adjust the sweep out to even out the spacing and achieve the best compromise of containers delivered into the pockets of the transfer. In this instance, the bottles would be carried at an accuracy of ±12.5mm. Combining the inaccuracy of the sweep out and the belt together means the bottles can be ±17mm out of synchronisation, before any transfer inaccuracies are examined.

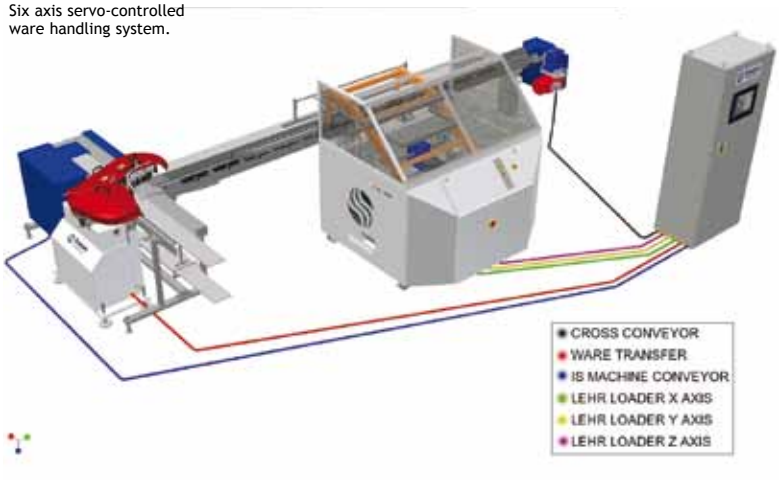
Sheppee transfer units are known to fluctuate in speed when controlled by competitors' drive systems. If the drive software has not been written to soften the speed reference, customers have experienced instantaneous speed corrections of 3.6mm when looking at the position of transfer fingers in relation to the bottles. This gives a total error of approximately ± 20mm.

TOTAL SOLUTION

Investigations confirm that ware handling at high speed needs to be reconsidered and for this reason, Sheppee has developed a total ware handling control system. This system will only experience a ware handling inaccuracy of approximately ± 7mm, most of which is attributed to how much positional control is achieved with the sweep outs.

When considering how this

Six axis servo-controlled ware handling system.



affects ware handling efficiency, at speeds of around 400 bottles per minute (bpm), the HST 6000 transfer unit has a 'catching gap' for bottles and closes up the spacing as it moves containers from the IS machine conveyor to the cross conveyor. Sheppee has seen the HST work poorly at 300 bpm due to inaccurate setup but it works well at 700 bpm with a perfect set up!

The VFT 1000 transfer unit has been designed to run at speeds in excess of 1000 bpm. Work undertaken within the last two years has shown how important it is to have full control on a ware handling system. By doing this, optimum accuracy is provided, as any inaccuracy at high speed translates into a momentum force on the container, which may lead to the container being damaged or become fallen ware.

Sheppee's two axis stacker is capable of running at 12 cycles per minute. The bottles per minute of the machine is important but not necessarily as important as some may first think. There are two major factors to consider here. The first is how wide the lehr is and how many across it will be stacking. When operating at 300 bpm, with a container diameter of 60mm and load into lehr at 30 across, the stacker will be running at 10 cycles per minute. Sheppee's two axis stacker is comfortable at these cycle rates.

The second factor is the linear speed at which the containers travel on the cross conveyor. If the speed is increased to 500 bpm with a diameter of 60mm and the number stacked into the lehr is increased to 50 across, the stacker would still be operating at 10 cycles. The two axis stacker will not work at these speeds because the distance and control are insufficient to decelerate from 40m/min. In comparison, Sheppee's three axis stacker offers greater control as it splits its sideways deceleration over two motors instead of one.

Every one of the scenarios presented above confirms that the science of ware handling is actually quite complicated. It is further complicated by stability and weight of the container which is why sometimes, when unsure about a particular bottle to be made, we sometimes request more information on the full range of bottles and speeds to be made on a particular line.

The other main differences between the two and three axis stackers is that while Sheppee has made the two axis control as simple as possible, the three axis design features computerised job storage settings, with full scientific control over many aspects of the machine.

The three axis stacker is capable of running up to 20 cycles per minute and has so much control it has operated successfully handling unstable perfume containers at a stacker cycle speed of 16 cycles per minute.

With any machine, it is important to know the height, diameter, speed, machine conveyor spacing and whether double, triple or quad gob configuration for each container, enabling Sheppee to recommend the correct system. To date, the six axis system has been installed by three major customer groups, one of which has adopted this equipment package as standard for other plants within the group. ■■

ABOUT THE AUTHOR:
Elliott Seymour is Managing Director of Sheppee International

FURTHER INFORMATION:
Sheppee International Ltd, York, UK.
tel: +44 1904 608999
email: sales@sheppee.com
web: www.sheppee.com