Replacing the IS machine

Alan Fenton* explains the form and function of a new servo electric-operating machine for the container glass industry, designed to replace IS machines.

The NIS machine permits a wide range of containers from 60-95mm diameter and is available in 8-, 10-, and 12-section configurations, in 6\(\frac{1}{4}\)-inch double gob (DG), 5-inch triple gob (TG) and 95mm Quad Gob (QG). The QG conversion enables production of containers up to 65mm in diameter. The NIS might be capable of handling a 30% increase in production compared to TG operation of the same range of containers. Additional pack ware is possible at the same range of containers.

The container-making process. The interaction of the NIS. Finally, servo technology allows optimisation of the container process. The interaction of the mechanisms can be timed so that collisions are avoided by small margins and ‘dead time’ is minimised. Forming times can be adjusted by changing groups of mechanisms so the process is adjusted — blank time, reheat time, mould time, rather than individual mechanism times.

The FlexIS forming control for the NIS is a modular and therefore expandable system. It can:
- monitor the machine mechanisms’ motions and positions,
- monitor the servo axis temperatures and currents,
- statistically analyse trends and warn the operator of an improper motion characteristic,
- store all actions so that future, planned algorithms can enable the control system to learn and self-correct some process deviations.

Reduced job change work out times

During a job change an IS machine cools down, which affects lubricity of the lubrication, bearing fit and other mechanical interactions. At the end of a job change, the mechanisms of an IS machine have to be adjusted once to start the machine from its cooled condition, and again when it reaches its working condition.

With the NIS, servo mechanisms have motion times assigned so the mechanism maintains itself to achieve that motion time. Therefore, once set, the motion never changes and the job change work out time is reduced.

Reduced ambient noise levels

An IS machine equipped with ‘stack wind cooling’ generates noise levels that require the use of hearing protection. With a fully servo electrically driven machine such as the NIS, which is equipped with blank side and blow side VertiFlow cooling, the noise level is lower because noise from exhausting the pneumatic mechanisms is eliminated and noise from mould equipment impacts is controlled.

Automation

With servo mechanisms motion, time position and power usage are known and are under the control of the machine controller. This allows specific motion profiles to be applied to mechanisms, assignment of positions other than the full stroke of the mechanism, and programming of force applied. Full and efficient use of the glass forming cycle can maximise forming time and minimise dead time.

The NIS and FlexIS suggest the possibility of a fully automated glass plant. For example, in a plant producing containers 24 hours a day with three shifts, one shift can perform all job changes and most maintenance. This means that for the other two shifts, one operator can supervise three or four machines from a central control point because there is little need for the full amount of maintenance staff and there is no mould maintenance.

Automation should remove the operator as much as possible to reduce costs. To achieve this, the process firstly needs reject systems to interrupt the process throughout the forming cycle. For example, a servo gob distributor can interrupt delivery of the gob to any section of the machine. It should also be possible to reject the formed parison before it reaches the blow mould. A defective container should be rejected at the dead plate or before the lehr.

Using video surveillance at the machine, an operator could supervise a number of machines remotely, detecting a fault and interrupting the cycle of a particular section, then sending a technician to correct it.

The above is a simplistic description of an automated glass plant, but with a servo electrically driven machine like the NIS and the FlexIS forming control system, as well as carefully thought out production systems, it could be possible.

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