Specialist Automated Machinery for Handling High Volume Pipette Tips and Reaction Vessels

German manufacturer of robotics Waldorf Technik has recognised the importance of automated high volume injection moulding systems, especially pipette tip manufacturing, by developing a dedicated automation machinery concept, Vario Tip. The concept is outlined in detail in a paper which is available from the editor at sam.a@rapidnews.com.

<< Waldorf Technik's Vario Tip automated equipment is specially designed for handling high volume plastic mouldings like those used for pipette tips. >>

The paper recognises key technical challenges faced by manufacturers and outlines how its Vario Tip concept solves these challenges. In particular, it outlines how to achieve high specification quality requirements while ensuring optimum levels of productivity for what it describes as "massive" volumes.

The paper summarises the challenges involved as follows. First, there are the challenges related to the specifications of the part itself with regard to dimensions, straightness and surface defects. Secondly, there are challenges with the handling and packaging which often demands traceability down to the cavity level. There is also a challenge with the operating environment to ensure contamination-free production which then brings with it a battery of GMP standards. Last and certainly not least is the sheer volume associated with modern production concept, having short cycle times and as many as 32, 64 or even more cavities. The sum of all of these factors adds a degree of difficulty which only an efficient and reliable automation system can overcome.

It then goes on to say how its Vario Tip concept, which has been internationally patented, can be used to develop a solution to these challenges. The process begins with getting a definition of the process—in other words, establishing a clear picture of the needs of a new robotics system—understanding the cost of quality, the environment, and productivity and efficiency.

Once this has been framed, the solution can be tapered to a manufacturer's needs. This involves understanding the capabilities and technical specifications of Waldorf's robots. The description, according to the paper, is that this involves "high speed, precision take-out devices to remove parts from the mould with a minimum of encroachment on the mould open time. Extremely dynamic acceleration and deceleration is made possible through the use of lightweight yet stable alloy and composite materials. In many cases, the dynamic motion allows a certain amount of overlap of the mould and robot motion to safely minimise the mould open time."

The paper goes on to say: "The configuration and features of the cell are very much application specific and while many pipette solutions share some common attributes, each system is custom tailored to the customer's needs for product mix, secondary operations, handling and packaging needs and labelling."

It also makes mention of cleanroom compatibility and consideration of the production cell's footprint. Cleanroom compatibility means paying attention to the details which contribute to contamination so that no particulates are expelled into the atmosphere. It also means fully contained use of air or elimination of air usage altogether. Equally important is ensuring low noise emissions to enhance the work area. Most of the high performance drives incorporate water cooled servo motors and linear drives to reduce the radiant heat expelled into the machine room. After all, heat dumped in the cleanroom is only removed with expensive air conditioning and water cooled heat exchangers are much more efficient and operate at a fraction of the cost.

The Vario Tip concept allows for a vision inspection system to check, reject and even replace with like cavity numbers if desired; all before population of the racks so that only top quality parts are placed in the rack for processing.

The concept can be adapted to include the packaging of the rack into the so called "selling unit packages". This may include everything from "bulk pack" to multi-tier racks in a blister pack with customised foil sealing. Waldorf Technik say their technical solutions to these requirements are as many and varied as the customers who use them.

Table 1: Steps for Defining Waldorf Tecknik's Vario Tip Process

Cavity specific handling throughout the process
Production of pipettes with and without filters
Vision inspection of the finished pipettes
Check dimensions, flash black spots, run-out and filter placement
Reject defective parts
Replace with "like cavity" good parts
Placement of pipettes in racks
Variety of racks possible
Maintain cavity integrity
Placement of bar code label or radio frequency identification (RFID) tag
Palletising of racks
Placing in stacks or blister packs
Sealing of selling units
Labelling

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