Tips for high-speed assembly of lateral flow cassettes

Manufacturers constantly struggle with the dilemma of flexibility or high speed when it comes to process automation for lateral flow cassettes. **Kinematic Automation** has nearly 35 years' experience in dealing with these issues and can offer valuable insight.

It is possible to have a flexible platform and still be able to assemble lateral flow cassettes at speeds exceeding 60ppm. It all comes down to planning, the right cassette design and, of course, the right automation equipment. Kinematic was founded in 1980 and, for nearly 35 years, has specialised in process automation for the test strip industry. The company understands all of the intricacies of test strip manufacturing and has a number of standard platforms to support their client partners around the globe. It also offers custom solutions for specialised or unique applications.

Plan ahead

A good outcome generally comes from a good plan. For flexible, high-speed automation to be most successful, it is ideal to have as much commonality between components as possible. While individual test-strip laminations, dimensions and materials can differ significantly, commonality between cassettes is beneficial.

Cassette design is key

Ideally, plastic cassette components should be fed from feeder bowls for maximum efficiency. Thus, for different products, cassettes should all be externally identical, with the only differences being internal features necessary for accommodating different test strip width, length or thickness. Modern assembly machinery can easily accommodate differences in test strip dimensions, by making a few mechanical adjustments and reprogramming a few dimensions. Well-designed equipment should include recipes for quickly changing strip width parameters that can be configured by the customer.

Retention pins and sockets should have generous lead-ins, and should be configured in such a way that half of the pins protrude from one end of the bottom housing, and the opposite end of the top. This allows quick, reliable orientation directly from the feeder bowl. If cassette commonality is not possible, then they should be fed from magazines that are capable of accommodating the differences between the different designs. This will require more attention than feeder bowls, but it is generally preferred over manual placement of cassette components.

The cassette bottom housing must have strip retention features that securely hold each strip after placement. This is essential to reliably pull each strip off the place head when it is placed into the cassette at high speed, and to prevent strips from flying out as the cassette is rapidly transported along the assembly process. These strip retention features should provide a tightly localised 'bite' into opposing edges of the strip in at least two locations along its length.

Kinematic's range of products includes the Matrix 2370 40-ppm flexible cassette assembly system.

Assembly equipment

For a reliable high-speed assembly process, it is essential that the strips be cut quickly, cleanly and without sticking to the shear or pick-and-place head. Kinematic developed a process where strips are sheared and immediately placed directly into the cassette in one smooth and continuous motion. This eliminates the need to cut the strip, pick it up and transport it to the cassette, then place it. It also helps to mitigate the problems of adhesives and electrostatic charges typically associated with these processes.

Adhesives are the bane of the lateral flow industry, being the most frequent cause of misfeeds, jams and downtime. Adhesives stick to cutting heads, guides and tracks – in fact, just about anything they touch – and require frequent cleaning. Minimising aggressive, gummy adhesive in strip design is recommended.

Real-time inspection

No automated process can be considered complete without proper inspection of the finished assembly. For best practice, Kinematic recommends using machine vision to inspect for proper strip placement prior to placing the top housing. This can also include inspection for strip damage or reject marks from upstream processes. The finished assembly should then be checked again after final closure, using fibre optic or laser sensors. ■

Further information
Kinematic Automation
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