Case Study: Pre-Filled Syringe Assembly & Labeling

Ensuring Container Integrity During Automated Assembly

Fisher Clinical Services

A Thermo Fisher Scientific Brand

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A global pharmaceutical company was developing a large molecule drug for a gastroenterology indication and wanted to set up an automated process for assembling pre-filled syringes without compromising container integrity.

Working closely with Fisher Clinical Services, the company selected the syringe components then devised eight different configurations that needed to be evaluated for the clinical trial. These options included minimum and maximum fill volumes, two syringe formats – 1 ml and 2.25 ml – and different materials for the plunger rod, stopper, and needle safety device. The company predicted several thousand syringes would be needed monthly.

Once all the technical and engineering runs were completed and the correct components were selected and tested, engineering studies were started to increase the automation rate by using robotics systems. In the course of these studies, engineers from the pharmaceutical company took a conservative position and stated there should be no stopper movement when the plunger rod and stopper were assembled by the machine. Any movement could compromise the sterility of the investigational product, they said. But when Fisher Clinical Services set up the system to meet this requirement it resulted in reject rates that were unacceptable, especially given that each syringe of medication was highly expensive and there was limited supply.

To balance the need for container integrity with the reality of limiting rejects, the engineers evaluated other options that would preserve sterility without being overly restrictive. They decided on an extremely tight yet realistic standard of 1 millimeter of stopper movement. This new level protected sterility and reduced rejects substantially. The same balancing act between acceptable risk and rejects came into play when the engineers determined that the allowable gap between the plunger rod and stopper should be 0.2 millimeter. Engineers also implemented optical character recognition and verification to ensure label printing standards were met consistently.

The fully automated system was ready to begin production but had to be put on hold when defects were found in many of the needle safety devices. Tracing the issue back to a component supplier, Fisher Clinical Services determined that several plastic molds were improperly assembled. A new work process was created to separate hundreds of defective parts by serial number. This quick issue resolution kept the production schedule on track until a new change in the material requirements threatened to delay the trial start date. Switching from a U.S. supplier to one in Eastern Europe required a new round of component and equipment validation that would amount to several weeks of additional work.

Though it was possible to bring in additional shifts and train employees for the validation job, labor laws prevented excessive overtime except in cases of an emergency. The pharmaceutical company received a waiver from this law when its medical officer consulted with the health authority and proposed that the trial was essential to helping patients with an unmet medical need. The flexible workforce of Fisher Clinical Services responded to this need to get the first doses out to clinical sites in more than 30 countries on time.

Early results were positive and the clinical trial began to enroll at a higher rate. Supply needs grew to the point where 10,000 to 15,000 pre-filled syringes were being produced every month. Building on the success of this engineering project, including completion of the initial trial, the company developed 9 additional protocols that use the same automated syringe assembly and labeling service.