Coated punch tips eliminate sticking, boost production

A major international manufacturer of branded health, hygiene, and home products had long struggled with tabletting a product that contains ibuprofen, a notoriously sticky substance.

The 400-milligram tablets are usually made in four batches per campaign, and the company estimated that waste granulation from rejected tablets cost it $2,400 per campaign. Furthermore, the downtime associated with resolving the sticking problem meant that the tablet press had an overall equipment effectiveness (OEE)—the time required to complete a batch through the number of tablets made per hour—of just 58 percent. That was well short of the company’s minimum standard of 92 percent. Clearly, the operation was underperforming and required attention.

In fact, the company had tried many times to solve the problem, including switching tooling suppliers, said the production manager in charge of the process. The company also tried pumping chilled air into the press, polishing the punches after a set number of batches, and spraying a powder lubricant onto the press. “None of these worked. This has been a problem for many years.”

While switching tooling suppliers seemed like a dead end, later some staff members learned that I Holland of Nottingham, UK, offered punches made of PharmaGrade steel and installed some. The superior steel in those punches reduced sticking, but didn’t eradicate it. I Holland then suggested that the company try its TSAR Predict service—launched in 2014—that quickly matches punch coatings to specific products.

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Before TSAR Predict, when customers asked I Holland for help with a sticking problem, it required a lot of field testing to identify a coating that would stop it. Those tests caused customers to interrupt production to run test punches, which then had to be analyzed. The predictive tool eliminates that work by using data about the formulation to be compressed. The data—comprising six physio-chemical parameters—are often publicly available if the customer provides Chemical Abstract Service (CAS) numbers. It then calculates particle adhesion levels and specifies the coating that will help solve the sticking problem.

In this case, the computer model indicated that the PharmaCote CT coating was best suited for the formulation. It showed that applying a 2- to 4-micron-thick CT coating—a textured chromium nitride—to the punch-tip face would provide the lowest particle adhesion force to the company’s granulation. The coating also has good anti-corrosion and wear-resistant properties.

After receiving the TSAR Predict report, the company ordered a full set of PharmaCote CT-coated tools and installed them on its Fette P2100 press. The results were quick and clear: Sticking disappeared and the cost of waste granulation per campaign decreased to just over $50, saving the company nearly $2,350 over each campaign. In addition, the OEE of the tablet press soared to 94 percent, reducing by half the number of working days required to complete a batch.
The switch was also simple. The company just followed its standard change-control procedures, and the coated punches require no special care. Given the success with its ibuprofen tablets, the company has asked I Holland to generate TSAR Predict reports for all its tabletted products to see whether adding coated punches would improve those manufacturing operations, too.

According to the production manager, “Since the introduction of the coated tooling all of the sticking issues have disappeared. What used to take a week now takes roughly 3.5 days. We are obviously delighted with this as it has enabled us to double the capacity available on that press.”

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