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>>CASESTUDY

NATOLI'S NP-400 TABLET PRESS

Natoli Engineering Company recently completed a successful Factory Acceptance Test (FAT) with a top-tier cosmetics company. The customer specializes in producing, marketing and selling handmade cosmetics through 240 company- owned retail store and online sales, with manufacturing facilities in six countries. The company also has a line of tableted products in the oral care segment. Ramping up production of these oral care products worldwide, the company was using two BetaPresses, but expansion and creation of a new line of products left them with manufacturing issues.

Initial Evaluation

Initially, tooling options were tried to alleviate tableting issues. It was realized that simple tooling changes would be insufficient in meeting the increasing needs of the customer. The Natoli pre-sales team evaluated the customer's best-case scenario and configured a solution for their unique formulation to increase production, improve tablet quality, and reduce cost.

Familiarity in working with the customer was key to Natoli's success in creating a solution that met our customer's needs.

Evaluating Customer Needs — Compressibility Issues

To begin the process, product formulation samples were received for testing. As part of the customer's brand and commitment to using all-natural ingredients, the customer educated the Natoli team about how formulations were prepared entirely by hand.

The Natoli team then learned about the amount of research and development (R&D) completed by the customer, and committed resources to helping improve the customer's oral care product line.

During the assessment, the compressibility of nine different products was completed using the Hausner Ratio. These assessments found that all nine of the products fell in the poor to extremely poor ranges.

Compressibility Index (per cent)	Flow Characteristics	Hausner Ratio
1-10	Excellent	1.00-1.11
11-15	Good	1.12-1.18
16-20	Fair	1.19-1.25
21-25	Passable	1.26-1.34
26-31	Poor	1.35-1.45
32-37	Very Poor	1.46-1.59
>38	Extremely Poor	>1.60

Research & Development — Press Optimization

Knowing that customization would provide the best final product and fewer manufacturing issues, the **NP-400 Tablet Press** was selected as the press of choice to optimize manufacture of the customer's tablets.

To optimize the NP-400, a compression study was completed using our RD-10A Single Station R&D press. During the compression analysis, a baseline was calculated for production scale-up. Noticing a significant number of customer-supplied sample tablets showed signs of capping, sticking, and weight inconsistencies, attempts were made to recreate the issues.

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For full understanding, we needed to find the effects of different main and pre-compression forces on tablet quality and hardness. The analysis showed that compression forces over 19 kN, recreated the capping and sticking issues. Knowing the customer's growth plans, a multi-tip tooling design was recommended to increase production and reduce cost.

Troubles Implementing Multi-tip Tooling

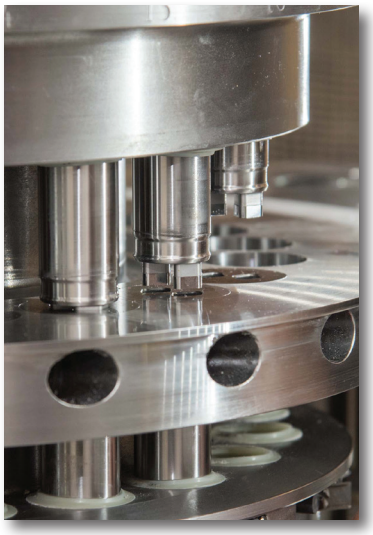
Our initial NP-400 pressrun used 3-tip multi-tip tooling and was successful, but was not the win hoped for. The product would only run in the range of 15 to 20 revolutions per minute producing 59,400 tablets per hour. At these low speeds, the formulation bridged in the hopper transition—product was not consistently flowing through the acrylic feeder tube. There were also concerns about the consistency of the tablets due to filling issues of the dies.

Resolving Issues

First, an optional vibratory hopper probe was installed to overcome the formulation bridging issue.

Then, the feeder was optimized by using a higher-speed motor, redesigning the feeder paddles, and lowering the paddles closer to the dies. These changes increased production speeds and improved the tablet consistency issues.

After implementing the new vibration unit and feeder design changes, the customer's products ran at a rate of over 178,000 tablets an hour during the two-day FAT. In total, nine different products in two tablet designs, consumed 96.4 kg of powder per hour during the test.



Impacting the Customer's Bottom Line

The impact for our customer is significant. Not only was Natoli able to solve several manufacturing through innovative research, design and engineering, the production capabilities have increased approximately threefold. These capabilities will allow the customer to run a single press and potentially house world-wide production in a single facility.

By working with Natoli Engineering, the customer can produce 5,091 bottles of product per hour at a selling price of $9.95. This means the NP-400 Tablet Press increased our customer's revenue potential by $46,395 per hour over their existing BetaPresses.