THE NEED FOR SPEED

BY TIMOTHY S. DONAHUE

Genesis, a new high-speed cartomizer-filling machine, may revolutionize e-liquid manufacturing.

A genesis is the beginning of something new. While e-liquid cartomizer filling in the vapor industry isn't necessarily a new concept, high-speed filling has been quite the challenge. Tobacco Technologies, Inc. (TTI) has partnered with Technical Development Corp. (TDC), a subsidiary of International Tobacco Machinery (ITM), and C&C Industries in the creation of a new high-speed filling machine for cartomizers that can produce at 10 times the rate of current industry standards.

The aptly named Genesis can now fill cartomizers at speeds of up to 150 per minute, a vast improvement over current technology that allows for filling rates of only 15–20 cartomizers per minute. "You could probably do more than 150 a minute, but 150 is what we were aiming for, and with the current design, we are not having problems achieving that speed," says George Cassels-Smith, CEO of TTI, adding that the design of first-generation cartomizers did not lend itself well to high-speed filling. The major issue was that e-liquid would often "bubble over" from the polyfill, a nonwoven material inside the cartomizer casing that holds the e-liquid.

The key to correcting the conundrum was finding a proper balance between the filling cycle and the capabilities of the cartomizer, a process that started with switching to a properly designed device. "A poorly constructed cartridge will always leak," says Cassels-Smith. "During experimentation, we did have some slight problems. Unfortunately, the cartomizers were not being produced to uniform specifications. Believe it or not, our pre-injection inspection was rejecting about 30 percent of the cartomizers. To combat this, we did some redesigns of the cartomizers, and as a result our rejection rate is now very low: less than 1 percent."

Jeroen Slobbe, managing director of TDC, says the company began developing Genesis in March 2014. One Genesis improvement is in the way it releases liquid into the cartomizer. The new machine uses a fully automated bottom-up filling process, which means the filling needle releases liquid into the cartomizer during its upswing. The bottom-up fill allows the liquid to enter the cartridge uniformly instead of spraying it directly into one specific spot, which had previously contributed to the bubble-over effect.

Another innovative concept is that Genesis weighs cartomizers both pre- and post-filling in order to ensure that every cartomizer has the precise amount of e-liquid expected, according to Slobbe. "We were asked questions surrounding how we could be sure that every cartridge had the exact amount of liquid desired," he says. "We added scales that give us a pre-weight and post-weight of the cartridge to solve the problem."

Of course, Genesis does more than just weigh and fill e-liquid cartridges: It checks their quality, installs an inner seal and a closing cap, performs a vaping test, rejects faulty units, prints the cartridges and adds labels and soft tips. Genesis also improves current industry standards by being a fully modular machine (think large, high-tech Legos), meaning an e-cigarette manufacturer may choose to include all of the modules and perform all of the mentioned processes, or include only some of the modules and perform only some of the processes. Additionally, it is possible to reposition modules within the machine so as to perform the processes in any order a manufacture desires, according to Slobbe.

The machine can also be reconfigured for size. For example, if a manufacturer wants to produce cartomizers twice the size of their current products, holding twice the amount of liquid, Genesis can accommodate those needs. "If we want to place a silicon tip on the bottom of the cartridge before filling, that's easily accomplished by just moving that component to the beginning stages of the process," says Cassels-Smith.

Photo:TDC

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Genesis also collects data from certain points on the production line where the cartomizers go through a quality-control check. At the end of the process, a serial number is added to each cartomizer. This number enables operators to retrieve information gathered at each step in the production process. The data collection also allows manufacturers and consumers to trace the cartomizer's pedigree, something the U.S. Food and Drug Administration (FDA)—which is currently developing e-cigarette regulations—is said to be very keen on. "With the computer-automated facility we are building, we will also have quality checks for the juice compounding," says Cassels-Smith. That information will be added to the data from filling for a more comprehensive report.

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The data is then stored in a database, and all the data is stitched together, which can then be accessed by using the unique code. "It's not something required by any current regulations, but we want to have these machines as ready as possible for any type of future regulation," says Cassels-Smith. Genesis' modular filling system can also be operated by just one technician, while current systems require an operator at each machine.

The first operational Genesis in the U.S. will be housed on TTI's Maryland campus in a newly constructed 22,000-square-foot, computer-automated, pharmaceutical GMP-grade facility slated for completion in early April. Half of the operation will be dedicated to compounding in certified clean rooms, and the other half will be reserved for ITM, TTI and C&C Industries to grow and fulfill customers' needs.

While TTI waits for construction to be completed, Genesis will begin servicing clients at C&C Industry's plant in Miami, Florida, USA, which has been bottling products for the over-the-counter drug, health and beauty industries in an FDA registered facility. C&C has been servicing the e-liquid industry since 2012. Andy Boutros, president and CEO of C&C, who has more than a decade of experience, says Genesis is one of the most dummy-proof machines he has ever seen. "It makes things look easy," he says. "It is very well-engineered, and every question I had, this machine answers."

Genesis is garnering a lot of interest in the industry, according to Boutros. "It is something like the Field of Dreams; people want to see it before they believe it," he says. "We have people lining up to try their product on it," he says. "Genesis is setting parameters that haven't been seen in this industry yet." V