Supplement **bottling** line proves a cure-all

Eliminating the Band-Aid approach to line integration, a single supplier provides an 'incredible' fit-and-finish solution for bottling and labeling nutritional supplements at J.B. Laboratories.

J.B. Laboratories chose a dual-head electronic counter, below, to fill a range of 10 PE bottle sizes with nutritional supplement tablets in a variety of shapes, due to the counter's changeover flexibility.

Anne Marie Mohan, Senior Editor

Like the interconnection of organs in the human body, the equipment comprising a new nutritional supplement bottling line at J.B. Laboratories in Holland, MI, is inextricably linked to provide smooth, seamless operation from bottle unscrambling to labeling. The heart of the new system, an electronic tablet counter, affects, as well as is impacted by, the healthy operation of every other piece of equipment in the line, all of which are joined by an artery of conveyors dotted with sensors.

Providing J.B. Labs with remarkable uptime and rapid changeovers, according to the company's vice president of engineering, Kirk Walter, the line is the offspring of a sole supplier, NJM/CLI. Responding to an increase in sales in late '00, J.B. Labs commissioned NJM/CLI to supply the new tablet packaging line within a 12-week time frame. After having been set up and tested at NJM/CLI's facility in Montreal, the line was delivered to J.B. Labs after only 11 weeks in December '00, and was reassembled at the plant within a week. Says Walter, "Our maintenance staff was very impressed with how the line went back together—everything was labeled. The fit and finish is incredible. NJM/CLI's attention to detail was one of the reasons we chose them to supply the line."

Full tablet, capsule manufacturing capabilities

A contract manufacturer of OTC pharmaceuticals, nutraceuticals, and nutritional and food supplements, J.B. Labs operates a state-of-the-art 140,000-sq-ft facility that offers a full range of capabilities to its nearly 35 customers. In accordance with the U.S. Food and Drug Administration's GMP (Good Manufacturing Practice) regulations, the company's research and development department provides product formulation, pilot production and production scale-up services, working closely with customers to develop formulas that meet their criteria for material interaction, performance, cost and stability profiles.

Granulation and blending services are provided via equipment capable of 5- to 300-cu-ft batches, with a two-story, stainless-steel gravity flow system used to dispense premixed formulas. A range of compression equipment enables both short-run and high-volume production of single- and bi-layer tablets, while two-piece, hard-shell gelatin capsules can be filled by the company on both low-volume and high-speed equipment. J.B. Labs' encapsulation technology includes time-release beads, powders, caplet insertion, and banding, which assures tamper-evident product integrity. The company also offers film and sugar-coating processes to meet customers' requirements for marking, color, taste masking and overall pharmaceutical appearance. Each production stage within the facility is physically segregated under rigid humidity and air quality control, using HEPA air filtration.

Three packaging lines, including the NJM/CLI-supplied line, provide secure, accurate filling of bottles ranging in size from 4- to 1,000-dose capacities, along with services

Continued on page 46

tabletline

Continued from page 44

such as induction sealing, cartoning and application of tamper-evident features. According to Walter, up to one-third of the products manufactured at the facility are packaged in-house. Otherwise, tablets and capsules are supplied in bulk containers for specialized off-site packaging.

Established in 1977, the company has seen steady growth, especially since its move to the current facility six years ago. "It has given us more opportunities with our customer base," says Walter, "and it has made us more efficient."

Single-source line integration

Housed in a 2,300-sq-ft room, the new packaging line was acquired to fill and label nutritional supplement bottles with a variety of tablet sizes and shapes. Ten bottle sizes from 75 to 300 cc—all of which are round, high-density polyethylene containers from distributor Paradigm Packaging—can be accommodated on the line. Bottles are topped with 33-,38- or 45-mm child-resistant closures, also from Paradigm, and are labeled with customer-supplied materials.

Originally installed in a specially constructed room that allowed the line to be laid out in a simple U-shape, the line was moved to a new location after only six months to make room for a fourth packaging line, still in the works at presstime. Notes Mark LaRoche, vice president of sales for NJM/CLI, due to the complex engineering involved in integrating the line, the move required a complete redesign. "We basically had to start the design process over," he says. But, he adds, good record keeping allowed the integrator to quickly recommend needed parts to facilitate the change.

Eight major pieces of equipment comprise the new packaging line. Although there is no electrical connection between the machines, sensors placed before and after each piece of equipment on connecting conveyors act as start and stop switches, synchronizing machine operation.

In selecting equipment and designing the line, one of the guiding factors, notes LaRoche, was ease-of-use and changeover. "It used to be that everybody had outside mechanics, and they would change over the line, and then the operators would come in and run it. Most companies, especially contract packers, are moving to the other format, where the operators set up their own line. Therefore, the line really has to be intuitive; it has to flow."

Bottles are manually dumped into the hopper from a plastic-lined shipper and enter the belt-style unscrambler, where they are inverted, cleaned with an ionized air rinser, and then uprighted.

Electronic counting speeds changeover

On the day of PD's visit to the facility, J.B. Labs was running a 90-count, 120-cc bottle of supplement tablets at approximately 100 bpm—the maximum speed at which the company operates the line. The line begins with an NJM/CLI Model UNISORT 250 automatic unscrambler, designed through a joint collaboration between NJM/CLI and Pace Packaging, that is fed by a 20-cu-ft hopper (upgraded from the standard, 14-cu-ft size). Bottles are manually dumped into the hopper from a plastic-lined shipper and enter the belt-style machine, where they are inverted, cleaned with an ionized air rinser, and then uprighted. The machine provides a speed of up to 100 bpm and allows for 10-min tool-less changeover.

According to LaRoche, NJM/CLI chose Pace to manufacture the unscrambler for its use due to the company's experience designing GMP-compatible equipment. Confirms Walter: "NJM/CLI has a good mindset for pharmaceuticals. The unscrambler provides very clean operation."

Raised-bed, sanitary-style conveyors with adjustable rails that accommodate various bottle sizes carry the bottles from the unscrambler to the line's electronic tablet counter. The single-lane conveyor splits into two lanes before reaching the dual-head filler.

In a departure from more traditional slat-counting equipment for tablet filling, J.B. Labs opted for an electronic counter, the CF-1220D from Netherlands-based Cremer, which is exclusively represented in North America by NJM/CLI. Unlike slat counters, which use slats designed with specifically shaped channels to accommodate each tablet size run on the line, the Cremer uses an electronic eye to distinguish tablet dimensions. This means there are no slats to clean or change between runs.

"With slat counters, you have different slats and funnels for each size; changeover is not good," Walter says. "With the Cremer, the uptime is

incredible. The flexibility and the uptime of this machine have made this a successful project."

In addition, he notes, with slat fillers, tablets can often become stuck in their slats, resulting in short-count containers. Using the Cremer, J.B. Labs has increased its yields, without overfill of product, he says. And, cleaning the equipment is a quick and easy job: "The machine can be stripped down to its bare bones without tools," he says.

During operation, the electronic tablet counter uses scanners, or light beams, to register each tablet, as the product is fed from 12 vibrating channels (per filling head) into a chute. The vibrating motion puts space between the tablets, so that the scanners can measure how long it takes each tablet to move through its beams, which translates into the tablet's dimensions. Once the specified number of tablets has accumulated in the chute, additional tablets are blocked from entering, and the chute drops its load into the bottle waiting below.

The machine is controlled through a proprietary PLC developed by Cremer. A separate Pentium-based industrial PC with a color touchscreen is used by operators to program and store job parameters, such as product length and width, and container diameter. In addition, the PC can be used to gather and retrieve statistical information on machine efficiencies, allowing users to analyze the counter's output, even on a shift-by-shift basis.

Feeding the machine is a bulk tablet elevator with a 10-cu-ft hopper that is controlled using an Allen-Bradley PLC. The system allows an operator to fill the hopper with tablets at a comfortable elevation, then lifts the hopper above the Cremer, dispensing the tablets into the machine, as needed.

During counter operation, tablets are fed from 12 vibrating channels (per filling head), above, into a chute, where light beams register the size and shape of each tablet. Below, capped bottles are induction-sealed and then gather on an accumulation table to await labeling.

Cottoning and capping with ease

From the filler, bottles are merged from two lanes into one and move through an NJM/CLI Model CL-110 cottoner that inserts 16-g rayon into bottles at 100 bpm. According to Walter, advantages of the machine include motorized height adjustment, as opposed to hand-cranking, and a secondary tamp station that "tamps down the cotton, which usually wants to pop back out of the bottle and can interfere with capping." Cotton lengths are programmed on an interface screen, and machine operation is controlled by a Siemens PLC. An inspection and rejection system checks bottles as they exit the machine.

Capping comes next with an NJM/CLI Model Unicap 150 automatic capper running on a Siemens PLC. Caps are fed to the machine through a chute connected to a waterfall-style sorter. As caps travel through the chute, they pass by air jets that blow mis-fed caps back into the hopper. Reliable and simple-to-change over, according to Walter, the sorter's chute can be easily joined to the capper without tools.

The capper uses four sets of tightening discs, and torque control is handled by air clutches, which, says Walter, are longer-lasting and more reliable than friction clutches. Brass changeparts designed by NJM/CLI for each cap size ensure foolproof setup. A cap inspection system and reject station are positioned after the machine to check for things such as skewed caps and missing foil liners.

Immediately following the capper is an Enercon Compak™ induction sealer that seals the cap's inner foil liner to the bottle rim. The machine provides adjustable support for easy setup to a variety of container heights and operates via a dedicated

Continued on page 48

tabletline

Continued from page 47

microprocessor and controller. A strategically placed accumulation table following the induction sealer allows bottles to gather, while operators change rollstock on the upstream labeler.

Labeling with accuracy

In the home stretch, bottles proceed through an RTQ-150 automatic retorquer from NJM/CLI that is based on the same design as the capper. Tightening caps loosened during induction sealing, the retorquer uses a Siemens PLC and is capable of speeds up to 300 bpm.

While NJM/CLI did not supply the next piece of equipment on the line, a Videojet EXCEL® 178i coder from Marconi, the company helped J.B. Labs integrate specialized conveyors into the line to accommodate the machine. The ink-jet coder, which is positioned underneath the line, applies a lot code and expiration date to the bottom of each bottle. The customized conveyor grips containers by their sides, suspending them above the coder.

Coded bottles then advance to an NJM/CLI Model 326 Auto-Colt III pressure-sensitive label applicator. Preprinted wraparound labels, supplied by the customer, each incorporate an identifying bar code that is scanned by a Datalogic scanning system before they are applied to the bottle to ensure an accurate match of label to product.

A p-s label applictor applies wraparound labels to the bottles after matching each label to the product being run by scanning a preprinted bar code on the label.

The scanner is integrated into an Allen-Bradley control system and touchscreen, guided by NJM/CLI-designed software. Says Walter, while the labeler is only running round bottles at present, J.B. Labs purchased the equipment with the capability to label square or oblong bottles, as well, in case the opportunity arises in the future.

After labeling, bottles accumulate on a 10-ftx8-in. Intralox chain packoff conveyor, where they submit to the first human intervention in the line: It is here that operators visually inspect bottles and hand-pack them into 6- and 12-unit RSC shippers. Next, a Belcor BEL 150 semi-automatic case taper, operating at up to 30 cpm, seals the filled cases using a DEKKA stainless-steel tape head. Cases then receive a label from an NJM/CLI Model 400 print-and-apply label applicator equipped with a Zebra print engine.

An unqualified success

Despite initial reservations about working with a single supplier, Walter proclaims the new tablet packaging line an unqualified success. "We didn't realize any disadvantages to working with a single supplier," he says. "It was one place to order parts, and we only had to bring one technician in.

"We thought the combination of hardware and software was a good value, and one that would be hard to duplicate."

More information is available:

Line integration, unscrambler, conveyors, electronic counter, cottoner, cap sorter, capper, retorquer, labeler, print and apply system: **NJM/CLI,** 800/432-2990. Circle No. **311.**
Air filtration system: **HEPA Corp.,** 714/630-5700. Circle No. **312.**
Bottles, caps: **Paradigm Packaging,** 201/507-0900. Circle No. **313.**
Unscrambler: **Pace Packaging,** 800/867-2726.Circle No. **314.**
PLCs: **Allen-Bradley,** 414/382-2000. Circle No. **315.**
PLCs: **Siemens Energy & Automation,** 800/964-4114. Circle No. **316.**
Induction sealer: **Enercon Industries Corp.,** 262/255-6070. Circle No. **317.**
Ink-jet coder: **Marconi Data Systems, Inc.,** 800/654-4663. Circle No. **318.**
Bar-code scanner: **Datalogic, Inc.,** 800/626-3993. Circle No. **319.**
Chain conveyor: **Intralox, Inc.,** 504/733-0463.Circle No. **320.**
Case taper: **Belcor Industries,** 604/270-0811. Circle No. **321.**
Tape head: **Dekka Industries, Inc.,** 604/270-0811. Circle No. **322.**
Print engine: **Zebra Technologies Corp.,** 800/423-0422. Circle No. **323.**