

Candy

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SHOW PREVIEW

■ ALL NEW, ON VIEW

PMCA's 59th Production Conference offers something for every segment of the industry. **CandyBusiness** previews the newest products and services on display at this year's Supplier Exhibition.

FOOD FOR THOUGHT

■ JETTING: A NEW LOOK AT DISPENSING TECHNOLOGY FROM NORDSON CORPORATION

A new way to apply chocolate and coatings, jetting technology could offer chocolate makers the potential to achieve new levels of coating and decorating precision.

SPECIAL REPORT

■ TRENDS ABOUND AT ISM

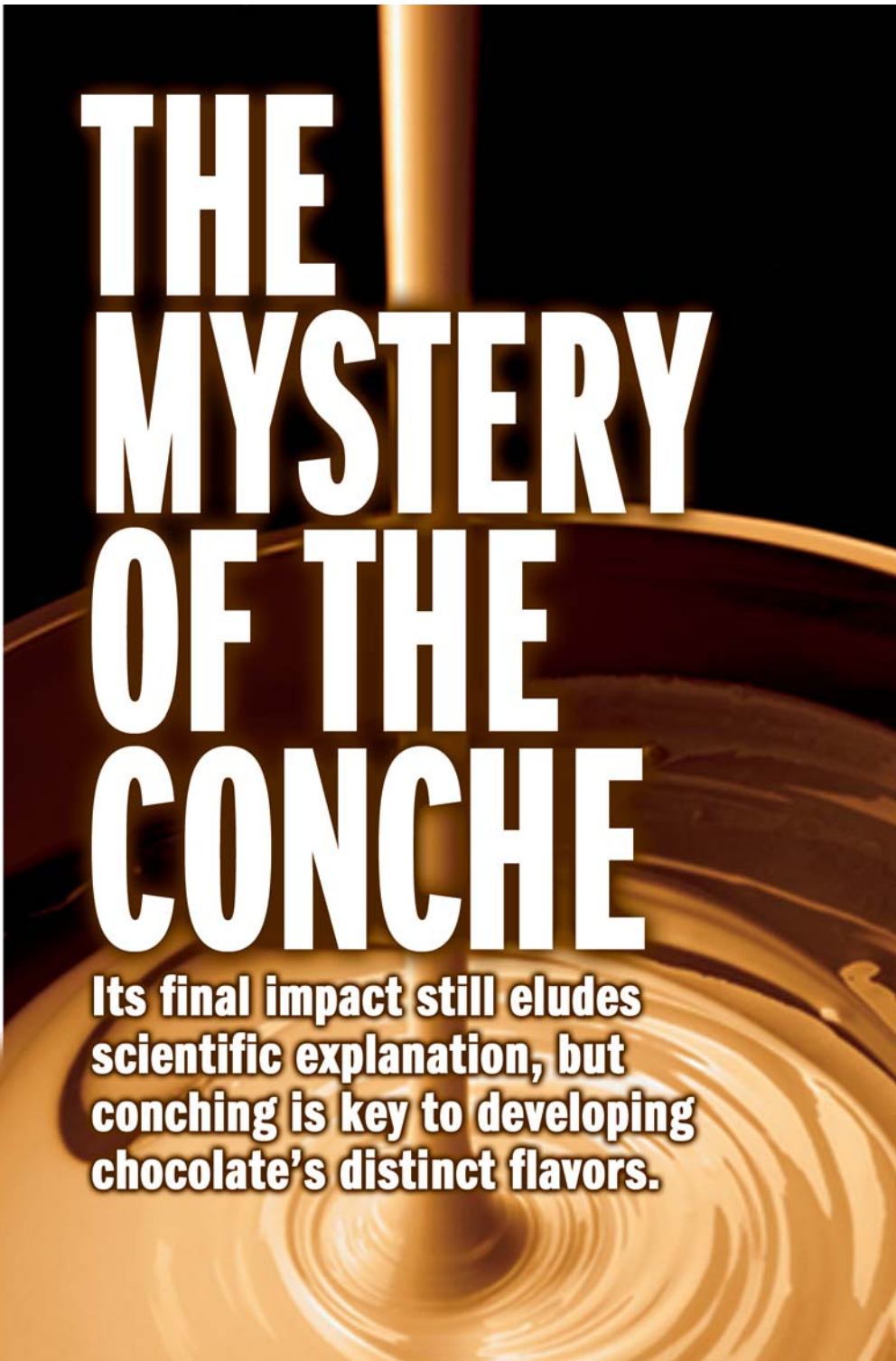
The world's candy makers rolled out their newest items at this year's ISM in Cologne. **CandyBusiness** wraps up the world's largest candy show with an inside look at interesting items from around the globe.

SUPPLIER SPOTLIGHT

■ ONLINE FOCUS GROUPS

One of the industry's leading design firms introduces a new, lower-cost way to evaluate package designs.

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THE MYSTERY OF THE CONCHE

Its final impact still eludes scientific explanation, but conching is key to developing chocolate's distinct flavors.

JETTING: A NEW LOOK AT DISPENSING TECHNOLOGY



Jetting's ability to start and stop dispensing in milliseconds applies coatings with unsurpassed accuracy and precision.

THERE'S A NEW TECHNOLOGY EMERGING that might change the way you coat confectionery products forever. It's called jetting, and just as ink jet technology has revolutionized printing, the jetting of chocolate and other coatings can provide a cost-efficient, flexible and more sophisticated tool for candy manufacturers and product developers.

Consider what the ability to rapidly dispense chocolate or other confectionery coatings with precise control can do for the candy business. Not only could the on-demand dispensing, or jetting, of chocolate improve the quality of traditional enrobing, panning and moulding applications, it could also give candy designers a new and very powerful tool to develop new items, or embellish existing ones. This just might be the dawn of the chocolate jet.

The jetting of chocolate and confectionery coatings is a relatively unknown technique. But recent advances in jetting applicators and their related motion and fluid control systems have positioned precision jetting as an attractive alternative for a number of economic, quality and product design reasons.

Today, most candy manufacturers rely on well-established techniques that have improved only incrementally over time. Moulding, enrobing and panning rely heavily on the viscosity of the chocolate and gravity to do their work. When compared with jetting, these applications are slow and more difficult to control.

That's because the dispensing of chocolate has been limited to low pressures, relatively unsophisticated nozzle designs and reasonably slow dispense cycles. Attempts to spray chocolate using ordinary spray equipment results in excessive overspray that requires costly, time-consuming collection and cleanup. But jetting, which is very different from traditional spraying techniques, is already being used in confectionery production with impressive results.

Two years ago, chocolate jetting technology was applied to the production of an ice cream product in the Far East.

In this application, wafers are coated with a thin film of chocolate to provide an edible moisture barrier that prevents the wafer from softening on contact with the surrounding ice cream. The installation has performed without fail, conveying wafers at high production speeds through the jetting application while coating each wafer quickly and precisely with virtually perfect yield.

THE ADVANTAGES OF JETTING

In our discussions with candy makers, the advantages offered by the high-speed jetting of chocolate fall into two broad categories — the improvement of existing items and the ability to develop entirely new types of products.

For existing items, jetting can allow manufacturers to produce products better, faster and less expensively. The technology offers an alternative to those using such traditional coating techniques as panning, enrobing or moulding on the merits of these improvements alone.

It also offers a new tool for product developers interested in finding innovative approaches to producing unusual new items. Similar to pointillistic works of art made by placing one dot next to another, the advanced motion and fluid pressure control of jetting applicators enables designers to dispense minute dots, ribbons or filaments of different materials with great precision. With jetting, designers could have a new technique for developing decorated products that cannot be accomplished using traditional chocolate technologies.

Aside from the functional advantages for film thickness and placement control, the precision of the jetting applicator system to dispense as little as a single dot of material could enable confectionery designers to develop new products that take advantage of this capability. Jetting allows chocolate to be placed with pinpoint accuracy anywhere on the product surface. For example, multiple jetting nozzles could permit the dispensing of a variety of materials to achieve new designs, and decorative capabilities could also be enhanced to include a wide range of colors, textures and other attributes. Selective gloss appearance, for example, might be achieved by applying different formulations of shellac or carnauba wax.

Since the jetting of chocolate and other coatings is a new concept for the industry, it's likely that a wide range of uses might evolve that aren't yet on the drawing boards.

Will jetting technology find a home in candy making? Guest author Bill Donges details its potential to revolutionize production and product design.



Unlike traditional approaches to dispensing chocolate and other coatings, jetting's on-demand technology can be turned on and off at will.

The Nordson laboratory in Amherst, OH, is available to manufacturers that wish to refine and develop chocolate jetting techniques and processes. The lab permits candy and confectionery manufacturers to view jetting applications.

As the technology enters the confectionery industry, a number of benefits have already been realized and identified. For example, potential process improvements include the more precise and selective placement of chocolate films in a wider range of thicknesses than current enrobing and panning processes allow. With an extensive selection of jetting nozzles capable of delivering a variety of flow rates, pattern widths and delivery pressures, a greater range of film thicknesses might be achieved at constant conveyor speeds which could allow coatings to be built in thinner or thicker layers as desired.

Similarly, jetting technology could dispense precise amounts over a wide range of conveyor speeds. For many enrobed products, such as bars and biscuits, chocolate is frequently the most expensive ingredient. Even small variances in film thickness can cost manufacturers a tidy sum in give-away, and too thin a coating can cause voids and unacceptable product. Jetting could provide a more flexible way to vary coating weights at changing line speeds without waste, while at the same time allowing faster throughput.

Jetting is an "on-demand" technology that can be turned on and off at will, compared to the continuous nature of panning and enrobing coating equipment. In milliseconds, chocolate could be dispensed at preset recipe levels and process changes could be as simple as entering new process control parameters. When compared with

HOW THE TECHNOLOGY WORKS

THE ROAD TO MORE COST-EFFICIENT, higher-quality enrobing and innovative candy decoration was paved by another, very different industry. Printed circuit producers apply a wide range of highly viscous and aggressive materials to tiny electrical components. A variety of surface mount adhesives, solder flux and other conformal coatings need to be applied quickly and very accurately. While the circuit board industry once relied on dipping and spraying techniques for its coating needs, the process is now accomplished by using Nordson Corp. jetting technology.

For example, the Nordson conformal coating system is able to deliver a wide range of 100-percent solids (solvent-free) materials that vary from 30 to 3,500 centipoise in viscosity, in films of 0.25 mils to 20 mils with a 99 percent transfer efficiency. Precise, repeatable and robust enough to dispense aggressive materials, jetting applicators are accepted as the best technology for the job.

From a materials point of view, chocolate coatings are more similar to industrial coatings than might first appear. Chocolate's viscosity range, as well as the 10- to 40-micron particle size range of many confectionery coatings and the temperatures and pressures required for dispensing are similar to most industrial coatings.

In operation, the application patterns of

chocolate jetting applicators are very precise. Each nozzle delivers material with incredible edge definition. As a result, waste (coatings deposited in undesired locations) is negligible. When watching a jetting application, even trained observers see only the product being coated with virtually imperceptible coating going elsewhere. Improvements in yield are dramatic and give-away is dramatically reduced.

Jetting works by dispensing chocolate under pressure through a small opening or orifice in the applicator. Controlling the pressure and varying the shape and size of the opening not only changes how fast the coating is applied, but also alters the appearance of the coating from a single dot to a swirling ribbon of material. But in any configuration, jetting is characterized by high transfer efficiency, precise application patterns, low bounce back and suitability for viscous, thixotropic coatings — in short, the very requirements for confectionery coating operations.

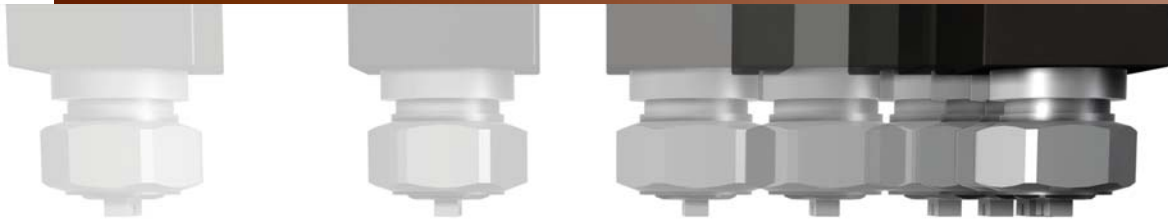
Melted chocolate in a fluid state is applied in a similar fashion to other viscous coating materials. The chocolate is melted in heated reservoirs and pumped at high pressures to the applicator. Essentially, the applicator is a recirculating system, wherein the chocolate is constantly circulated from the reservoir to the applicator. This maintains

proper temper and viscosity of the chocolate so it can be applied at any instant. When triggered, a precise quantity of chocolate is forced through the jetting applicator's nozzle.

Trigger signals are generated electronically and timed to precisely coincide with the location of the product to be coated. The sophisticated sensing and timing circuitry of the control module can be set to account for many of the variables commonly encountered in production, including distance to the piece, material viscosity, pressure, pattern size, nozzle orifice diameter and others.

Advances in the development of more accurate and sophisticated pumps and control systems have revolutionized the use of jetting technology and enabled its use in such demanding applications as chocolate dispensing. New control systems can be programmed to accommodate high-speed coating processes and anticipate the minute adjustments required to deliver materials with unsurpassed accuracy and precision.

This precision in starting and stopping the chocolate flow is so exact that virtually no material is applied to nearby surfaces, including conveyors, other products or even areas of the target product which might remain uncoated or which will be coated with another material.



Changes in line speed could extend jetting's single dot dispensing capabilities to enable enhanced product designs and decorative possibilities.



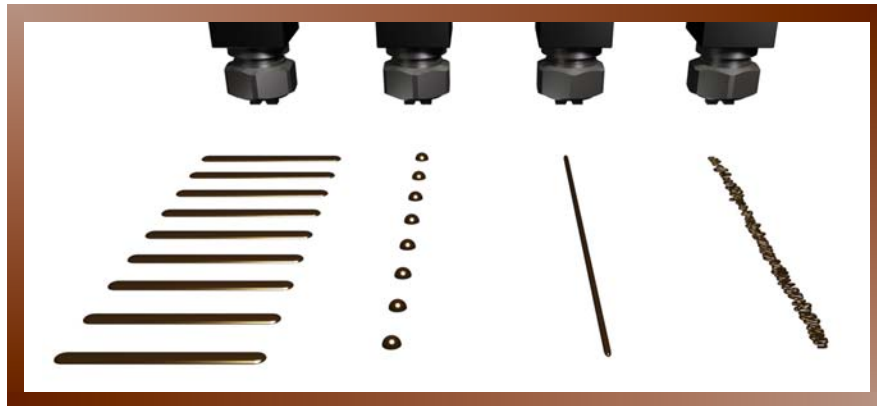
traditional mechanical techniques, candy makers could make adjustments and produce immediate results on the production line.

The technology also offers the potential to decrease the possibility of product contamination by significantly reducing or eliminating the need to reclaim unused chocolate. Although it is common practice to reclaim and reuse excess chocolate, it is clearly prone to contamination from contact with allergens, conveyors and other sources. In addition to the risk of contamination, the large amount of unused material associated with current practices requires extra time, effort and investment to collect, filter and recycle.

In short, the efficiency of jetting could cut the volume of excess chocolate to be recycled while reducing its exposure to potential airborne and surface contaminants.

Jetting also offers the potential to develop faster, simpler approaches to coating moulds. In current processes, precise quantities of chocolate can rarely be applied atop the mould. Instead, they are often overfilled, tilted and wiped with a doctor blade. Jetting could allow moulds to be filled more quickly and with less waste than current filling techniques allow.

Other significant improvements to product quality are also possible. For example, jetting's superior ability to dispense coatings in precise amounts might help solve other important problems, such as those caused by nut oil migration, which



Jetting applicators could enable designers to dispense bands, dots, beads and random bead patterns with great precision.

can adversely affect the hardness of chocolate, its taste and shelf life.

For example, a number of recent studies have shown that oil migration problems can be mitigated by improving the coating process in several ways. Improvements in bloom resistance can be achieved with thicker coatings, or by applying multiple thinner layers of chocolate (double enrobing) and other barrier coatings. Such step-wise film-building capabilities could be accomplished easily with jetting technology.

The advances that have been made in other industries to improve both the accuracy and precision of jetting technology offers a new tool for confectionery manufacturers. Chocolate and other thick, viscous confectionery materials can easily be applied to products with a greater choice of coating thickness and weight, improved uniformity independent of production line

speed and with unsurpassed accuracy. The precision of this technique also opens new doors for designers to add multiple layers, colors, textures and patterns to achieve new appearances and tastes while improving product quality. **CB**

ABOUT THE AUTHOR

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