

# MAXIMIZING COMAX'S SWEETNESS

Smart processing strategy makes Comax's success even sweeter

**I** Fast-growing flavor houses like Comax Flavors of Melville, New York provide the essential ingredient that every food brand needs to become a hit on retail shelves. In every category from beverages to dairy, baked goods and snack foods, new flavors with great taste and satisfying mouthfeel drive market success.

This is a high-energy business, and this is evident in the Comax R&D lab and on the plant floor. A world class flavor house must always be out in front of changing consumer tastes, so R&D is intensive. The search for new flavor sources and new technologies to extract, combine and optimize flavors is relentless. And since many clients in a wide array of food categories rely on Comax to deliver the exceptional flavor they need to go to market, processing speed, flexibility and accuracy are all critical.

## High-Tech Processing a Key to Fast Growth

Since 1977, Comax has met this challenge by applying innovative technologies and following a roadmap for equipment purchases that would provide steady improvements in efficiency and quality control while increasing capacity. The results are impressive. With manufacturing operations in North America, Latin America, Europe and Asia, the company is now poised for its next surge in growth.



Portable High Shear Mixers like this one can be moved easily from one vessel to numerous other vessels. With proper positioning of the rotor/stator generator within the vessel, these mixers can efficiently handle batch sizes up to about 1,000 gallons.

"This is an exciting company in the right place at the right time," says Comax President Dr. John L. Cavallo. "Comax has earned a solid reputation for delivering market-ready flavor systems that appeal to consumers and help to build brand equity for its clients."

According to Dr. Cavallo, the success of the company's strategy will rely heavily on having the right combination of high-efficiency equipment on the floor, while a sophisticated automation system will optimize production and ensure excellent product quality that links to creative flavor and product development.

"In a business as competitive as this one, your choice of equipment is truly a strategic decision. To be faster, more responsive and more reliable than your competitors, you need equipment – for extraction, distillation, blending and mixing, for example – that is ideal for the markets you are targeting."

## Matching Blenders to Batch Size and Density

At Comax, the company's close attention to strategic equipment selection is especially clear in the blenders and mixers it uses. At each stage in the company's growth, it acquired equipment that served distinct production goals as well as higher-level business goals.

"We use ribbon blenders to mix many of our flavor concentrates," says Comax VP Operations Joe Piazza. "As the company grew, the production team recognized that with order sizes ranging from 500 pounds to more than 20,000 pounds we could improve process efficiency with a combination of equipment scaled to accommodate specific batch sizes, material densities, and production runs.

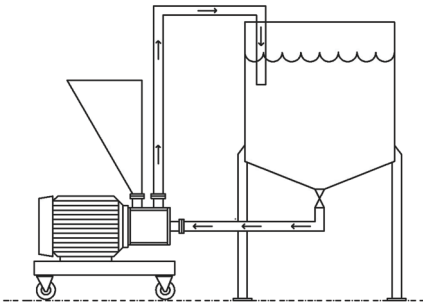
"Meanwhile, the management team set priorities geared to bring more and more process functions in-house. As the company became more vertically integrated, we gained great control over quality and consistency, while we lowered costs and sharpened our competitive edge."

The search for the right blenders brought Marion Cunningham, the company's recently retired general manager in charge of operations, to Charles Ross & Son Company of Hauppauge, New York.

"I've been in the flavor manufacturing business for 42 years," says Cunningham, "and I'd seen Ross equipment virtually everywhere I worked. I did a lot of competitive research, and after I discovered that there was very little difference in cost between a used ribbon blender and a new sanitary unit from Ross, we got down to the specifics of design and sizing to optimize for our most important batch sizes. In all



Immersed in a mix vessel, the four-bladed rotor turns at high speed within a stationary stator. As the blades of the rotor pass each opening in the stator, particles and droplets are drawn into the high shear zone and broken apart. Material is expelled radially, as more material is drawn into the rotor/stator generator axially from below. The result in most applications is continuous, vigorous flow and thorough mixing, down to a particle/droplet size in the range of 4-10  $\mu\text{m}$  using this rotor/stator configuration. Using other rotor/stator designs, and by fine-tuning key variables such as rotor/stator tolerances and diameter, smaller particle/droplet sizes can be achieved – down to the sub-micron level.



**A single SLIM system generally serves multiple mix vessels. Batch material flows from the vessel to the mixer where it is subjected to intense shear. It then flows back into the vessel for recirculation, which continues until the target particle/droplet size distribution has been achieved.**

foot blender and an 18 cubic-foot blender. In each case, by matching our blenders to key batch sizes and densities, we improved our equipment utilization and accelerated the changeover process. That enabled us to lower our costs and deliver even faster.

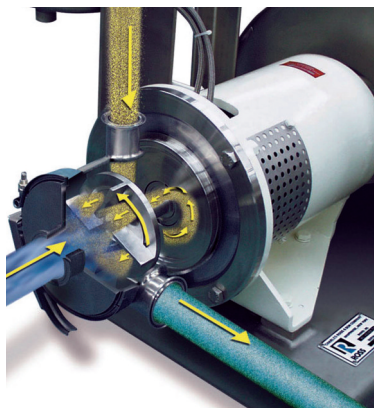
“Finally, with the company growing quickly to keep up with customer demand, we optimized for large batches of 5,000 pounds with a 120 cubic-foot blender,” says Cunningham, “and that’s where we really saw a huge gain. Compared with contracting large batches to an outside processor, we saved thousands of dollars in freight alone with every batch. Even more important, we gained complete control over batch-to-batch quality and consistency.”

### Batch Rotor/Stator Mixing Improves Pre-blending

Liquid pre-blending provided another opportunity for Comax to apply new technology to accelerate processing. For flavor systems that require a pre-blend, Comax had relied on an industry standard – a slow-moving turbine agitator in a mix vessel. With simple, low-energy agitation, the turbine gradually broke down solid agglomerates and prepared the pre-blend for the next step in the process.

“Turbine blending was an acceptable mixing strategy in this industry for many years,” says Piazza, “but in today’s competitive environment it was costing us precious time and constraining our capacity. By switching to a batch high-shear mixer, we shortened our process cycle at this stage, increased capacity, and shortened our turnaround on customer orders.”

Rotor/stator mixing technology presented a high-energy alternative that saves time by generating more vigorous flow and disintegrating agglomerates instantly. Intense mechanical shear crushes large agglomerates as they enter the mixer’s high shear zone (see photo on first page, right); material expelled radially through holes in the mixer’s stator hastens the process by subjecting the batch material to hydraulic shear.



**In the SLIM system, a large volume of powder (shown in yellow) is drawn into the high shear zone, where it is simultaneously combined and mixed with the liquid stream (blue). Agglomerates have no opportunity to form. Particles are broken apart and even hard-to-disperse powders are dispersed instantly in the liquid stream.**

For this application, Ross provided a 10 horsepower sanitary high shear mixer on a rolling hydraulic stand for use in vessels ranging from 50 to 150 gallons. With a variable frequency drive

that allows precise control over tip speed, shear and flow rate, Comax gained additional process flexibility and shortened pre-mix batch times by more than 50 percent.

cases, we were looking for blenders made with Type 316 stainless throughout, engineered and polished for easy maintenance, fast discharge and quick cleaning between batches.

“Our first step was to optimize production for mid-sized batches of 500 pounds or so. That required a 25 cubic-foot blender. Next, we optimized for smaller batches in short, fast runs – which we handled with a 10 cubic-

### Applying Solid/Liquid Injection to Flavor Emulsions and Dispersions

Engineers in virtually all of the process industries must contend with mix components that are notoriously hard to disperse and prone to “dusting” on the plant floor. In the food industry, the worst of these ingredients include many gums, starches, colors and modifiers. Poured into an open vessel, airborne particles are released, which can require lengthy clean-up. Even with vigorous agitation, they float persistently on the surface and resist wetting out. Below the surface of the batch, they form agglomerates that can be extremely hard to disperse. Especially in larger vessels, the wetting-out process can be time-consuming and costly.

After testing in the Ross Test & Development Center, engineers on the Comax team overcame these difficulties with a switch to a specially modified inline rotor/stator mixer called a SLIM (Solid/Liquid Injection Manifold) system. The SLIM delivers powders or liquids directly into the high shear zone of a rotor/stator generator, where they join a liquid stream.

“This was a huge step forward for Comax,” says Piazza. “The gain we achieved in processing speed and capacity enabled us to keep up with rising demand without having to resort to an outside processor.”

In this application, the challenge of dispersing gums, flavors and other ingredients into a liquid stream is magnified by the need to reach a high level of solids loading in the final batch. Because the SLIM system combines and mixes solids and liquids simultaneously, it is able to operate at extremely high feed rates without clogging.

“Our flavor emulsions and dispersions typically involve high solids content – with ingredients like gum Arabic, vanilla powder and citric acid often reaching 25-30 percent by weight. The inline SLIM drove the powder into dispersion easily. Batch times were cut sharply across the board—from 48 hours to eight hours in one case that involved a 5,000-pound batch, and from eight hours to three hours in another.”

The SLIM system is generally equipped to serve multiple vessels. On the Comax production floor, it is easily moved from one vessel to another once the dispersion process has been completed and the SLIM mixer has been flushed.

“Flexibility is a key principle at work in our plant,” says Piazza. “Processing flexibility translates directly into increased capacity, well-managed costs, and fast results for our clients. As we shift from one product to another, we routinely move the SLIM system from our 1,500-gallon vessel to our 2,500-gallon vessel for our larger compounds.”

“An inline mixer like this one can serve a huge vessel as easily as it serves a small one,” says Ross Technical Director Ken Langhorn. “Batch material is simply piped from the vessel, through the mixer, and back into the vessel for recirculation. With multiple passes through the high shear mixer, even a very large batch with high solids content will reach a consistent dispersion – with a narrow particle size distribution.

“The small particle size that is achievable with a rotor/stator mixer is quite important, because many food applications require numerous passes through a downstream homogenizer to complete the product. This is a typical scenario, for example, when preparing flavor emulsions in which gums encapsulate flavor droplets and stabilize the emulsion. Very small and uniform particle sizes – generally in the range of 0.4 – 0.6  $\mu\text{m}$  – are critical for stability, extended shelf life and performance.



**Joe Piazza, VP Operations, is shown initiating the batch process on the SLIM system control panel, while another operator prepares to charge the mixer through the unit’s overhead hopper. The ingredients will be drawn into the high shear chamber and dispersed instantly into a stream of liquid drawn from this 2,500-gallon vessel.**

"In cases like this, the SLIM system can speed up the final stage in the process by reducing the number of passes required through the homogenizer. Since each pass is time-consuming and homogenizers are generally maintenance intensive, this can produce a significant savings in the overall cycle."

### Optimizing the Production Process

For Comax, a new automation system has integrated the company's multi-faceted production, tightened QC (quality control) even further, and produced a substantial "virtual" increase in capacity – without enlarging the footprint of the plant.

"Fast-growing companies like Comax need to squeeze every possible pound of finished product from their operation," says Piazza, who has led the automation effort. "The key to achieving this goal is a robust automation system that gives you total process control, tied to QC in real time.

"Our system also gives us great insight into historical trends related to inventory, material handling, batch requirements and product orders. This has allowed us to flex our inventory when demand requires it, and to re-deploy equipment and raw materials to boost efficiency on the floor.

"Tying the integrated production batching system to QC is really the final, crucial piece in this process. This enables us to trace and track every pour electronically by bin location, lot number, compounder and time. The entire batch life cycle can be measured from creation to shipment, which gives the management team the information they need to react to daily business changes and scrutinize the production process for further improvements.

"Airtight QC and optimized production were really the last pieces that had to fall into place for Comax. We're looking down the runway toward an exciting future as a world class flavor house. Now, we're ready to take off."



## Introducing Comax President John Cavallo



"In the right  
place, at the  
right time..."

Dr. John L. Cavallo recently left Symrise to join the Comax team as President. In his view, this flavor house is positioned perfectly for fast growth in an intensely competitive business.

"We now have all the essential elements in place," says Dr. Cavallo. "We have the right people – with world class experience and resources that enable them to respond quickly to local customers and emerging market needs.

"We also have a big vision for this company, and it's focused squarely on high-growth segments like health and wellness foods, where Comax is already way ahead technologically. In addition to our vast flavor library, we've developed a portfolio of proprietary ingredients and technologies that make 'good for you' foods taste great.

"Our flavor-masking capabilities are superb for suppressing the off-notes and 'tail' of artificial sweeteners and the bitterness of other functional ingredients.

"They can also disguise the strong 'beany' notes that often make soy-based beverages and entrees a turn-off to most consumers. Meanwhile, we have unique flavors that can replicate the taste and mouthfeel of genuine sugar, salt and butter – and turn an ordinary 'good for you' dish into a market winner.

"And finally, we have a production strategy that hinges on applying the right combination of equipment along with sophisticated automation to drive down costs and optimize our quality control. Flexible production tools give us the ability to adapt our operation on the fly, create more value for customers, deliver faster, and drive growth. Our goal is to provide our customers with total product solutions in the most efficient way possible."

**Charles Ross and Son Company**  
800-243-ROSS, [www.mixers.com](http://www.mixers.com)

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