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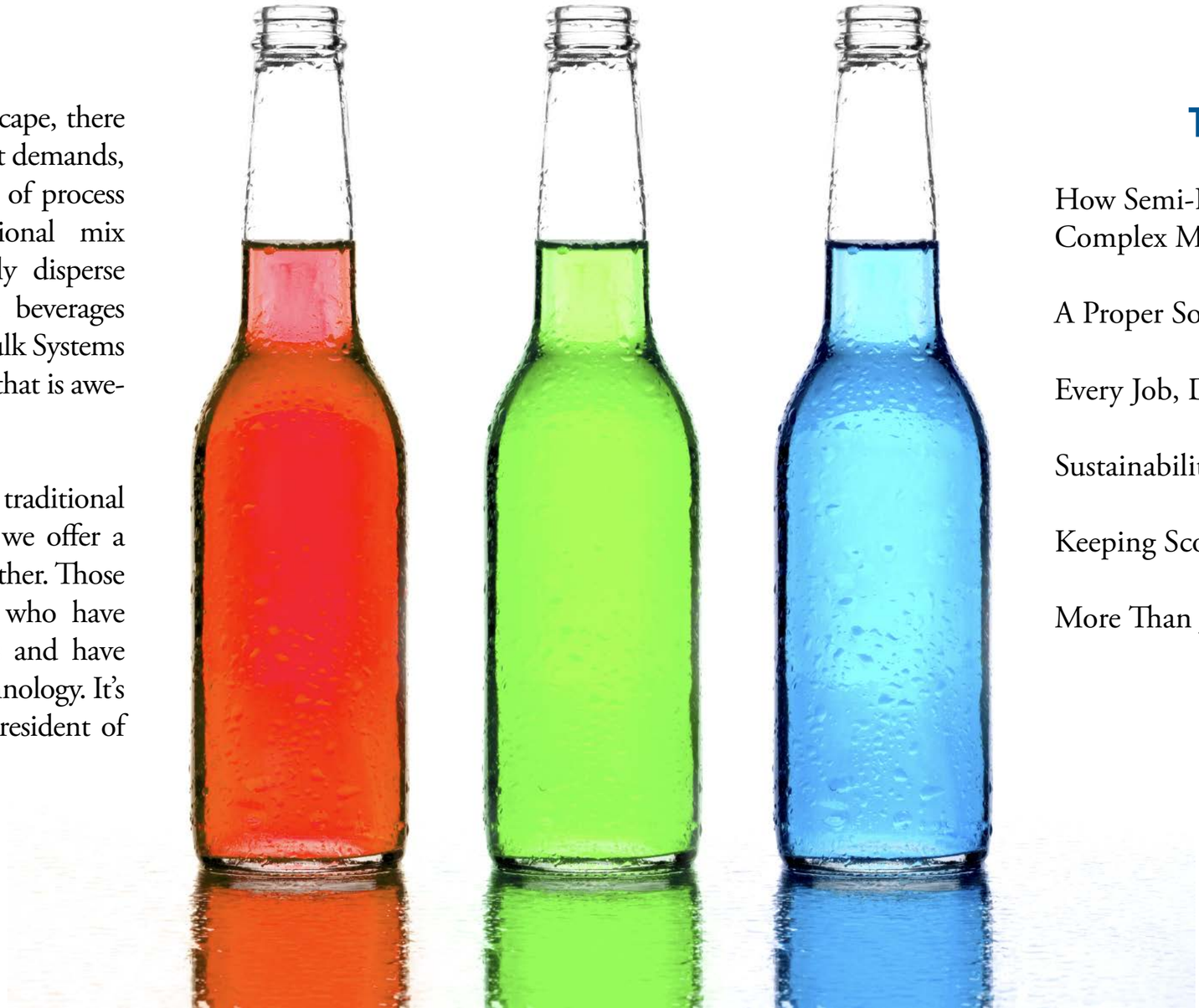
Mix & Match

In today's beverage and dairy landscape, there is a need to create and satisfy market demands, but an inability to execute because of process limitations with mixing. Traditional mix processes are not able to properly disperse many of the new ingredients in beverages today. But, for many years, Semi-Bulk Systems has been manufacturing a solution that is awe-inspiringly efficient and accurate.

"For those who like to do things the traditional way – who are very risk-averse – we offer a different technical approach all together. Those who are visionaries are the ones who have come to us, installed our systems and have really reaped the benefits of our technology. It's game-changing." – Jeff Doherty, president of Semi-Bulk Systems.



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How Semi-Bulk Systems Simplified Complex Mixing Equipment

Surprisingly, there are far too many manufacturers operating today that rely on cumbersome, inefficient and costly machinery to churn out a product. Those who mix complex ingredients – manufacturers of foods, beverages, dairy products, pharmaceuticals, paint or industrial products – are particularly disadvantaged by the limitations of standard industry technology.

As other industries progress, a state of technological complacency has taken hold in the mixing industry today, particularly in the realm of beverage and dairy manufacturing – hampering growth and new product development. The root of the issue is the technicalities and abilities in the mixing process.

Traditional mix processes are not able to properly disperse many of the new ingredients in beverages today. Items such as thickeners, gums, pectin, starches, milk powders-NFDM, protein powders, caseins, lactose and teas are key ingredients for some of the top-selling beverages on the market. However, the technology used to disperse these ingredients doesn't account for product degradation, inefficiencies or sustainability on the manufacturing level. This is unfortunate, as these ingredients give brands the most potential for market innovation.

As explained by Beverage Digest, consumer demand shows an increase in noncarbonated beverages since 2005. Sales of items such as fruit juices, pre-mixed teas, sports drinks and the explosively popular energy-drink segment have increased an average of 5% or more every year for the last decade.

So, what's to be done? Where does one start to answer the current mixing conundrum?

The root of the issue is the technicalities and abilities in the mixing process.

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A Proper Solution

While manufacturers around the globe contend with outdated mixing and dispersing machinery – enduring spotty quality issues and laborious inefficiencies – there hums along one of the best-kept secrets in the mixing industry. Yet there's no real reason for it to be a secret.

In the mid-1970s, Semi-Bulk Systems identified a number of glitches in the realm of dry and wet ingredient mixing and set to work to develop a remedy. Primarily, the issue of dispersion was the main concern. The process calls for breaking down particle agglomerates and efficiently wetting their surface area to produce lump-free slurry.

Considering what worked with other dispersion techniques and what did not, Semi-Bulk Systems developed its dynamic dispersion Vacucam® technology. The system uses a unique, high-powered ejector mixer to achieve a near-perfect vacuum. As the company explains, the Vacucam® system achieves high-speed, instantaneous and complete wetting by bringing together conditioned powder and highly atomized liquid from two separate streams, incorporating particles of liquid with particles of powder. The reactive surface areas of the powder and the liquid are maximized before intimate contact is actually made. The result is consistently uniform, superior wetting without the agglomeration or "fisheye" usually associated with conventional mixing methods. Because the process does not create lumps or fish eye, it does not require the traditional high shear/high energy mixing equipment used in many conventional mixing processes.

The trend today is to use ingredients that include a lot of hard-to-wet powders – protein powders and thickening agents to give a good mouth feel and to give a good suspension. "These types of ingredients are difficult to mix with standard shear-type systems. That's where Semi-Bulk Systems, with our vacuum convey and dispersion system, actually excels," notes Jeff Doherty, president of Semi-Bulk Systems. "With new formulations being introduced, batch-

to-batch consistency is very important as well. The way our system is designed, it offers repeatability, too, because there are no operator adjustments required to run a batch. Thus, every batch ends up being consistent."

With regard to dynamic dispersion, the Vacucam® mixing technology can perform – consistently – where traditional processes have not been successful. It's what the company refers to as "Total Process Performance[sm]."

Developing a solution for the dispersion challenges opened the doors for the development of improved and advanced mixing technology. The result of this is a host of products from Semi-Bulk Systems that remedies most obstacles with regards to mixing. From preserving quality of ingredients to operational efficiencies and cost savings to user safety, Semi-Bulk Systems did the homework and delivered to the global market.

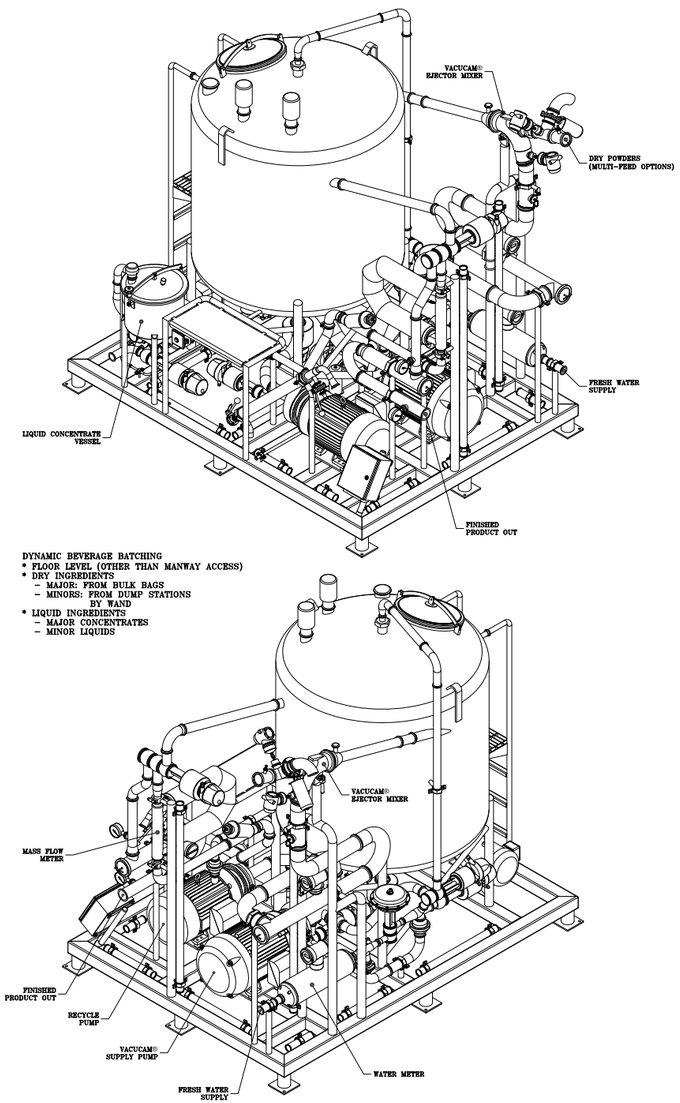
Every Job, Done Right

The Vacucam® technology literally provides the total solution to every contemporary mixing issue for both the wet and dry sides of the process. Thus, Semi-Bulk Systems has worked to make life easier for manufacturers around the globe. Building on the Total Process Performance[sm] solution of the Vacucam® technology, the company has undertaken a project to introduce an all-encompassing mix process to meet and exceed all of the demanding requirements for both beverage and dairy plants around the world.

Where in years past the industry said it couldn't be done, Semi-Bulk Systems developed and perfected the kind of technology that mixes consistent fluidity. The company combined the key requirements for complex mixing – single-pass processing, batch recycling / processing and dynamic continuous steady state processing – into one component. It's sleek, it's efficient, it's revolutionary and it's what's known as the Vacucam® Dynamic Beverage Batching Station (DBBS).

The Vacucam® DBBS technology incorporates all three mixing processes into one modular process skid. With regard to batch recycle, the DBBS is used for minor dry additives

DYNAMIC BEVERAGE BATCHING SKID
SKID SIZE: 112" X 82"



and liquid additives while on the dynamic continuous steady state processing end, the system is used for large volumes of dry ingredients, such as citric acid, sucrose or crystalline fructose. This enables the processing of high volumes of dry ingredients at a high capacity – fed from bulk bags or paper bags.

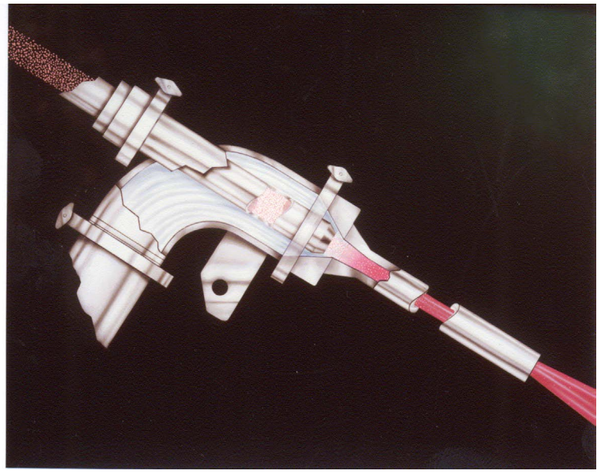
The Vacucam® Sugar Liquefication modular process is a high-capacity, efficient process for converting dry sucrose into sucrose syrup. It provides a Total Solution to provide syrup production for food, dairy and beverage requirements. The DBBS is a particularly versatile process that incorporates the capabilities to handle high capacities of dry sugars as well as other dry and liquid ingredients. It works with noncarbonated drinks as well as dairy products. From energy drinks to ice cream mixes, the system works by forcing pressurized fluid through the Ejector Mixer's unique, patented annular nozzle. As the fluid passes through the nozzle, it becomes finely atomized and creates a high-velocity, hollow jet – a near-perfect vacuum – into which the dry sugar is drawn.

"That is our real feature application – the mixing of thickeners – because we do it in a nonshear fashion that allows the thickener to bloom properly," Doherty notes. "It actually allows customers to use less thickener because we don't shear it out."

This action maximizes the reactive surface areas of the dry sugar or other ingredients and the liquid before contact is actually made between the two substances. Once contact occurs, the result is high-speed, instantaneous and complete wetting and dissolution of the sugar granule into syrup.

"This particular system has made all the difference for our operation," says Matt Clevenstine, of Conestoga, Pa.-based Turkey Hill Dairy. "It's what's got us from the company we were ten years ago to the company we are today. Our output has surpassed even our expectations, which is a nice problem to have."

Whether it's food, beverages, dairy products, pharmaceuticals, paint or industrial products, the Vacucam® mix technology has changed the parameters of the game with regard to accurate and efficient mixing.



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Sustainability at Its Best

A successful business relies on the ability to predict market demands. With regard to the current beverage industry, where non-carbonated drinks made with complex ingredients are flying off the shelves at an exciting rate, manufacturers should be asking: "What's next?"

And, for those companies that want to create or supply the next turn in the beverage industry, Semi-Bulk Systems offers up the answer: "Anything!"

Product development takes time, space and a sizable budget. Regardless of whether a company has these elements, Semi-Bulk Systems and its technologies are ready to provide solutions. According to the company, the Vacucam® technology was specifically designed with the concept of modularity in mind. They're designed to fit onto a modular skidded unit and engineered to efficiently address the mixing requirements and logistics for specific process requirements of multiple industrial applications.

It's a revolutionary mix-and-match portfolio of technology that is ideal for a growing business and industry. But, as Doherty explains, it's not an a-la-carte kind of concept.

"In nearly every instance where our systems are installed, we are helping to process THE ingredient or the key ingredient in their product, without which these manufacturers can't stay in business," he notes. "Therefore, the systems need to be robust and they have to operate. We spend a lot of time thinking about our designs, and we do so as a total solution. We don't sell just the mixer, per se. We want to put our arms around the complete process – it all has to work together."

The prepackaged modular Vacucam® process options grow with a business. The system's modular functionality allows the addition of subprocesses to meet the evolution of requirements for new beverage ingredients – this includes difficult-to-mix elements as well as the capability to handle bulk containers or total bulk supply of ingredients.

For those companies that want to create or supply revolutionary, game-changing manufacturing processes for the food, dairy or beverage industry, Semi-Bulk Systems offers up the answer:

"Anything!"

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Keeping Score

The Semi-Bulk Systems Vacucam® technology was conceived, designed and built to answer any and all processing pitfalls when it comes to complex mixing. Literally starting from the ground up, the machinery is designed to be transportable. It can be shipped anywhere in the world within a standard shipping container, or it can be simply relocated across the manufacturing floor.

While a small size is a benefit, manufacturers are more interested in the functionality of their equipment. And this is where the Vacucam® systems really sing. On the issue of quality, the systems are designed to deliver consistent, even results, every single time. Even difficult to hydrate thickeners, various milk powders or protein powders can be efficiently mixed using the Vacucam® process – most being achieved with ambient or cold conditions.

"We disperse powered ingredients evenly and uniformly with the liquid without making the clumps or agglomerates, and get a complete wetting on the first pass through," Doherty explains. "The energy required to mix the compounds is far less and the results are more repeatable. And, in the case of thickeners, you can use less of the product because it's a more efficient mixture."

What's more, the patented design of the Vacucam® technology has an interesting way of improving a company's bottom line. According to Semi-Bulk Systems, the very nature of the system's mechanics improves the yield of expensive functionalizing ingredients from 10 to 30 percent.

Also a significant point on the ROI discussion is the fact that the technology is uniquely automated. The Vacucam® systems don't employ mechanical conveyors or moving parts. Instead, it's an efficient and durable pump-based operation.

With the direct transfer of the large volumes of major ingredients directly from bulk bags, labor can be greatly reduced and the process is capable of meeting much greater mixing demands. Also, quality and consistency of the mixed item will be maintained. The ingredient addition will be initiated and validated by the operator in a sequence of automated mixing steps.

The automated design of the Vacucam® system also allows for increased user safety. As the company explains, the liquid-mixing stations operate entirely at floor level. There are no loading platforms for workers to contend with.

Vacucam® Beverage Batch Station Matrix:

✔ Included (✔) Option

Beverage Batch Station Modules	BBS 100	DBBS 150	DBBS 250
Module A - Density Meter			✔
Module A.1 - Water Meter	(✔)	(✔)	(✔)
Module B - Minor Liquid Additive - Liquid Dump Funnel w/Spray Ball	(✔)	(✔)	(✔)
Module B.1 - PD Pump for Unloading & Transfer of Drums of Liquid Ingredients		(✔)	✔
Module B.1-1 - Drum Hose Support		(✔)	✔
Module C - Powder Valve Support Column		(✔)	✔
Additional Modules			
Water Supply Heater	(✔)	(✔)	(✔)
Minor Ingredient Hopper	standard	(✔)	(✔)
Bulk Bag Unload Station			
Single Hoist w/Load Cells		(✔)	(✔)
Dual Hoists			(✔)
Batch Control Interface Panel	(✔)	✔	✔

When Semi-Bulk Systems designed the Vacucam® systems, more than just the system's size, automation abilities and operator ergonomics were a focus. The system's environmental impact also played a substantial part in the design.

At the core, the processes can perform with ambient or cold water, thus eliminating the energy needed for heating and cooling, and reducing water consumption. Where many traditional processes require heated water for milk powders and thickeners, the Vacucam® mixing process can achieve its level of Total Process Performance℠ with ambient water. This results in huge energy savings for steam to heat, as well as for chill water for cooling.

Last year, more than half of Semi-Bulk Systems' sales were exported. "Our customers are worldwide, and they take us there as well," Doherty notes. "As the major beverage and dairy manufacturers of the world expand to places like Egypt, Africa, China, Asia, Europe and South America,

there are different needs that have to be considered with regard to the resources available in these locations. Elements such as energy usage and water consumption are a priority for manufacturers, and our systems provide companies with the desired considerations."

Each of Semi-Bulk Systems' systems use significantly less power compared with high-shear mixers, yet produce a higher output capacity. This process analysis is called Process XstreamLining,® which allows the company to provide the Total Solution process for both the dry ingredient handling and mixing requirements.

More Than Just Technicalities

In developing the Vacucam® technology, Semi-Bulk Systems visualized how to better the beverage-mixing process from a mechanical standpoint. However, the company also identified a needed niche in the processing industry – one that is far more advantageous than just offering quality machinery. For Semi-Bulk Systems, the task of developing state-of-the- art technology also includes providing exceptional customer service.

Just as every business is different, every system alignment installed by Semi-Bulk Systems is customized so that the specific needs of the operation are met, while also keeping in consideration the often inflexible budget requirements.

And this is where the relationship starts with Semi-Bulk Systems. As Clevenstine attests, the company is adamant about ensuring that its systems are properly installed and that employees are fully trained to use the technology before "handing over the keys."

And, should a problem arise somewhere along the pathway from setup to success, Semi-Bulk Systems employs its team of support staff to quickly remedy the problem and work with manufacturers to ensure it doesn't persist.

"We've been tremendously impressed with how durable our system is," Clevenstine notes. "It has run, literally without fail, for more than ten years. It's a testament to Semi-Bulk Systems's abilities to supply a great piece of machinery."

Taking into consideration these and many more factors, the argument can be made that Semi-Bulk Systems and its Vacucam® technology are helping to revolutionize the beverage- and complex-mixing industries, one batch at a time.

"The days of coloring and flavoring in a can are over. It's more healthful ingredients now. We're allowing the beverage industry to achieve process results that are very difficult with traditional processes," Doherty adds. "Our primary focus is to make sure the mixing process is accurate and efficient. It's an exciting time in the industry today. I like seeing a client's face at the end of a project installation. I like the "wow" moment when they say 'Holy Cow! That thing is better than we thought.' "

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–Matt Clevenstine
Turkey Hill Dairy
Conestoga, PA

Semi-Bulk Systems is a world-class provider of modular engineered process solutions involving dry ingredient handling and dry/liquid mixing systems for manufacturers of dairy, food, beverage, meat processing, pharmaceutical and industrial products. Learn more about how Semi-Bulk Systems can help you incorporate Process XstreamLining® into your organization's bottom line by visiting www.semi-bulk.com or see us at Process Expo 2013 - BOOTH 5033

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