

Total Solutions from

# Semi-Bulk Systems, Inc.



## The Paint Plant for the 21st Century

Processes for Mixing of Thickeners  
Incorporate Process XstreamLining<sup>SM</sup>  
in your Paint Plant

### ADDRESSING RAPID AND EFFICIENT HYDRATION OF ALL THICKENERS

The VACUCAM® Ejector Mixer Technology offers major Benefits to the Paint Industry for rapid and very efficient hydration of ALL thickeners.

- Gums, Cellulosics, Polymers, Starches, Stabilizers – Rapid and total hydration of dry functionalizing ingredients.

Semi-Bulk Systems has standardized, modular, skidded processes to easily provide the appropriate solution to meet your plant requirements.

- The VACUCAM® Ejector Mixer MOS [Mixer On a Stand] – is a modular portable Ejector Mixer skidded unit with a build in bag dump hopper, w/ adjustable positioning height of the mixer to discharge into multiple mix tanks. This process is ideally suited for smaller plants handling paper bags of average usages.
- The VACUCAM® EJM 2000 – is a modular skidded unit used for centralized processing of thickeners to be pumped to any number of mix tanks. It is designed to be fed from paper bags or from bulk bags of ingredients. It can rapidly handle and hydrate capacities to accommodate the average paint plant to the largest paint plant.

For description of Paint Slurry Processes, refer to Pigment Slurries Brochure  
and for Powder Handling, see the Powder Options Brochure.



## PROCESS XSTREAMLINING<sup>SM</sup>

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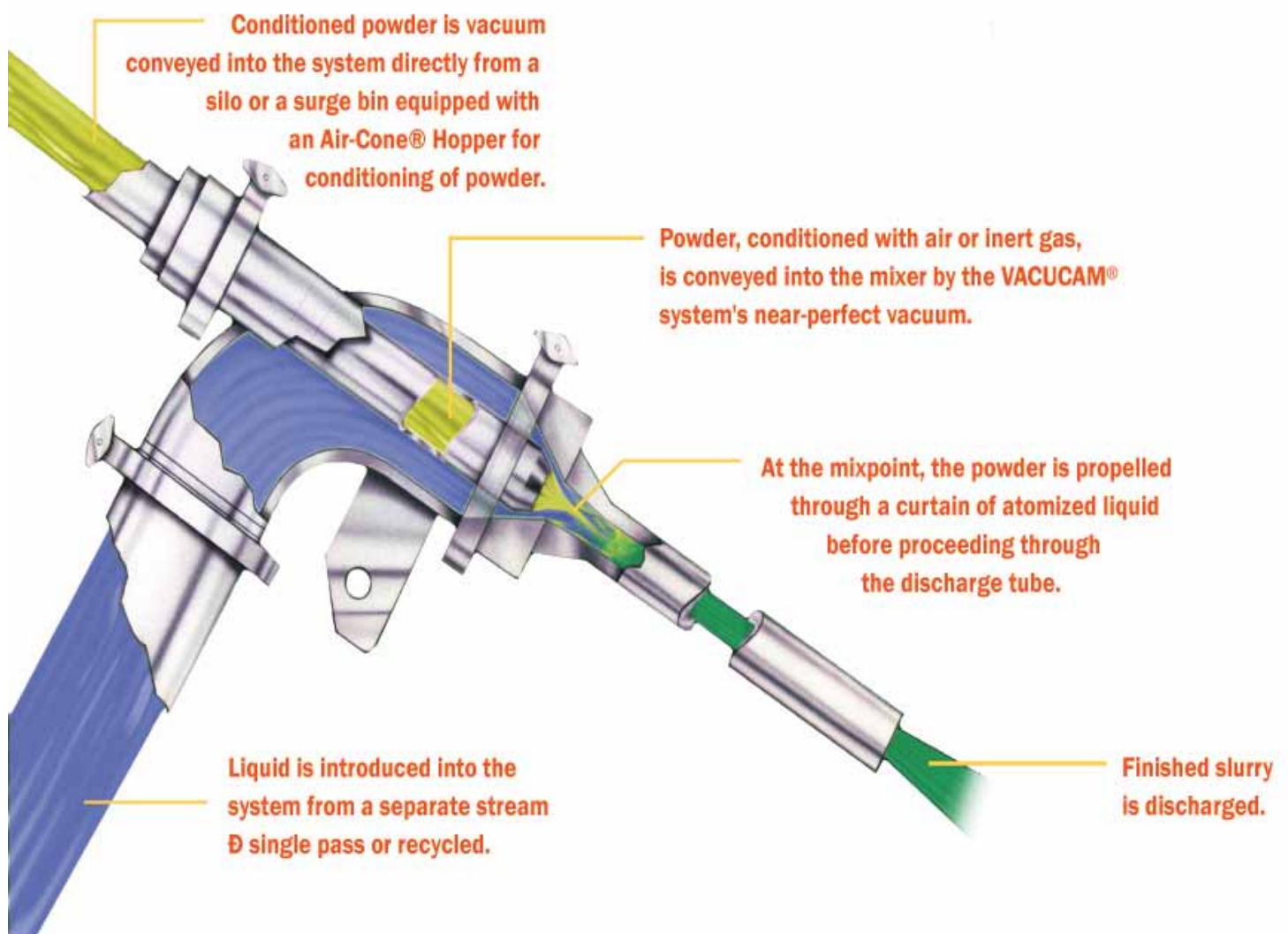
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# VACUCAM® EJECTOR MIXER:

The VACUCAM® Ejector Mixer is the most effective system available for conveying, wetting and dispersing powders into liquids. Here's how it works.

**C**ONDITIONED POWDER IS CONVEYED INTO THE MIXER BY A NEAR-PERFECT vacuum, which is created when pressurized fluid is forced through the Ejector Mixer's unique, patented annular nozzle. The fluid is discharged as a high-velocity, hollow jet into which the powder is drawn.

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 both the powder and the liquid are maximized before intimate contact is actually made. The result is consistently uniform, superior wetting without the agglomeration or "clumping" usually associated with conventional mixing methods.



Semi-Bulk Systems can design and integrate the Vacucam® in-line system to feed finished slurry into multiple locations of your preference, such as storage or mix tanks.



## **Process XstreamLining<sup>sm</sup> starts with the VACUCAM® Ejector Mixer Processes**

**for all powder/liquid mixing requirements....**

Powder and Liquid Mixing systems are utilized in many industries to manufacture totally different end products -- Food, beverage, dairy, pharmaceutical, paint, industrial products, chemicals, etc., etc.

Although the final form of the end product will vary considerably, the issues of mixing the powders and liquids are basically identical regardless of the product application.

### **Thickening Agents, Functionalizing Ingredients and Stabilizers:**

For purposes of this discussion, we will limit the family of dry powder ingredients to those normally referred to as Thickening Agents, Functionalizing Ingredients and Stabilizers. [Guar gums, xanthan gum, methylcellulose, pectin, starches, many polymer thickeners, etc.]. Their use in the product is to achieve a specific “function” – viscosity/thickening body affect, stabilizer for mixture, texture, etc.

These families of products are typically the most challenging to achieve the desired mix results because the process of combining the powder with the liquid requires a control of the rate of powder to available liquid so there is always excess liquid to fully hydrate the surface area of the powder as they are being combined. If the powder is added at a faster rate than it can find liquid for full hydration, it will form lumps with unwetted powder in the center [fish eye]. Once this damage is done, then considerable energy must be added to undo the damage resulting in considerable energy usage and degradation of the product which reduces its performance.

### **Mixing performance is typically discussed in the following terms:**

“Dispersion” –the process of breaking down particle agglomerates to the ultimate particle and efficiently wetting the surface area of the particles to produce lump free slurry [no fisheye in the case of thickeners and/or functionalizing ingredients]. The VACUCAM® Mixing Process achieves the ultimate dispersion with a single pass (no shear) process through the mixer. The VACUCAM® Ejector Mixer generates huge liquid surface area under vacuum and conveys particles of powder, under vacuum, into the high velocity liquid surface to combine particles of powder with particles of liquid for optimum dispersion and hydration. For functionalizing ingredients, including starch, 95% + of the applications do not require a shear process and a single pass process through the Vacucam® Mixer produces the most efficient dispersions. Its efficiency is defined in the properties of the finished product generally allowing 10-30% reduction in ingredient addition to achieve the desired product functionality.

“Shear” - The process of applying considerable energy to slurry to expose the unwetted, undispersed agglomerates to achieve wetting of the ultimate particle. This process typically is required to correct the problem created by the use of an inefficient process to produce a dispersion. Many conventional mechanical processes including high shear dispersers and in-line mechanical shear devices will expend considerable energy and cost to achieve the desired end properties that could be achieved by utilizing more efficient “dispersing” processes. In the process of achieving an acceptable usable slurry, the product’s functional structure is typically damaged by shear thereby reducing its efficiency and requiring an added amount to achieve the desired end product.

In some applications, additional “shear” is required to enhance the slurry properties of the finished slurry. HSD and other in-line shear devices accomplishes shear by bring the “metal” [the blade] through the slurry. The Vacucam® Ejector Mixer (batch recycle) achieves the most efficient shear by bringing the slurry through the metal [the orifice is designed for optimum shear requirements].

“Milling”- The process of applying considerable energy to a slurry to reduce [mill] the particles to a smaller size. When dry products are dry milled to the size of the particular product, a dispersion process or a shear process will be able to achieve wetting and dispersion up to that particle size. If further reduction of the particles is required in a slurry form, a wet milling process [ball mill, sand mill, other mechanical mill equipment] is typically used to further reduce the particle size in the slurry. Wet milling is typically required for appearances [automotive paint finishes, appliance paint finishes, fine printing inks, etc.]

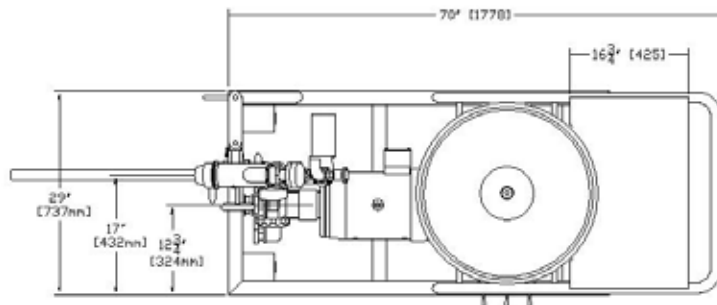
**WET MILLING SHOULD NEVER BE REQUIRED FOR FUNCTIONALIZING INGREDIENTS since they are generally shear sensitive and its functional structure will be damaged.**

# VACUCAM® Ejector Mixer for the Paint Industry

## Incorporate Process XstreamLiningsm in your Paint Plant

The VACUCAM® Slurry Processes for Mixing, hydrating and functionalizing of all Gums, Thickeners and Stabilizers:

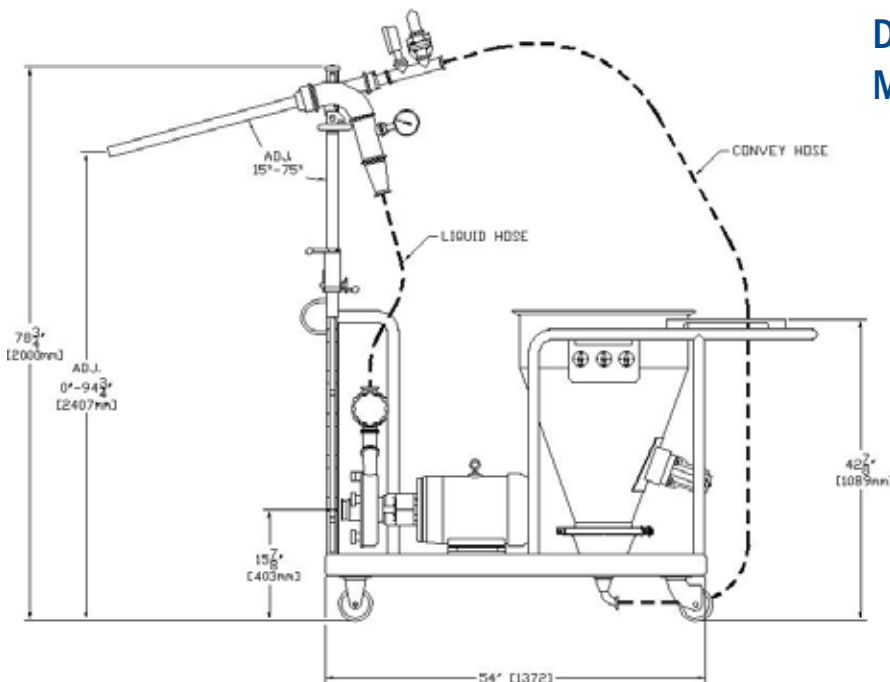
Processes are available to address the logistical requirements of any plant and to provide capacities to meet any production requirements. In most cases, a single system can be configured to provide capacities to meet all plant requirements. Either the Mixer on a Stand [MOS] or the EJM 2000 Systems can incorporate paper bag or bulk bag handling.



TOP VIEW

## MIXER ON A STAND (MOS)

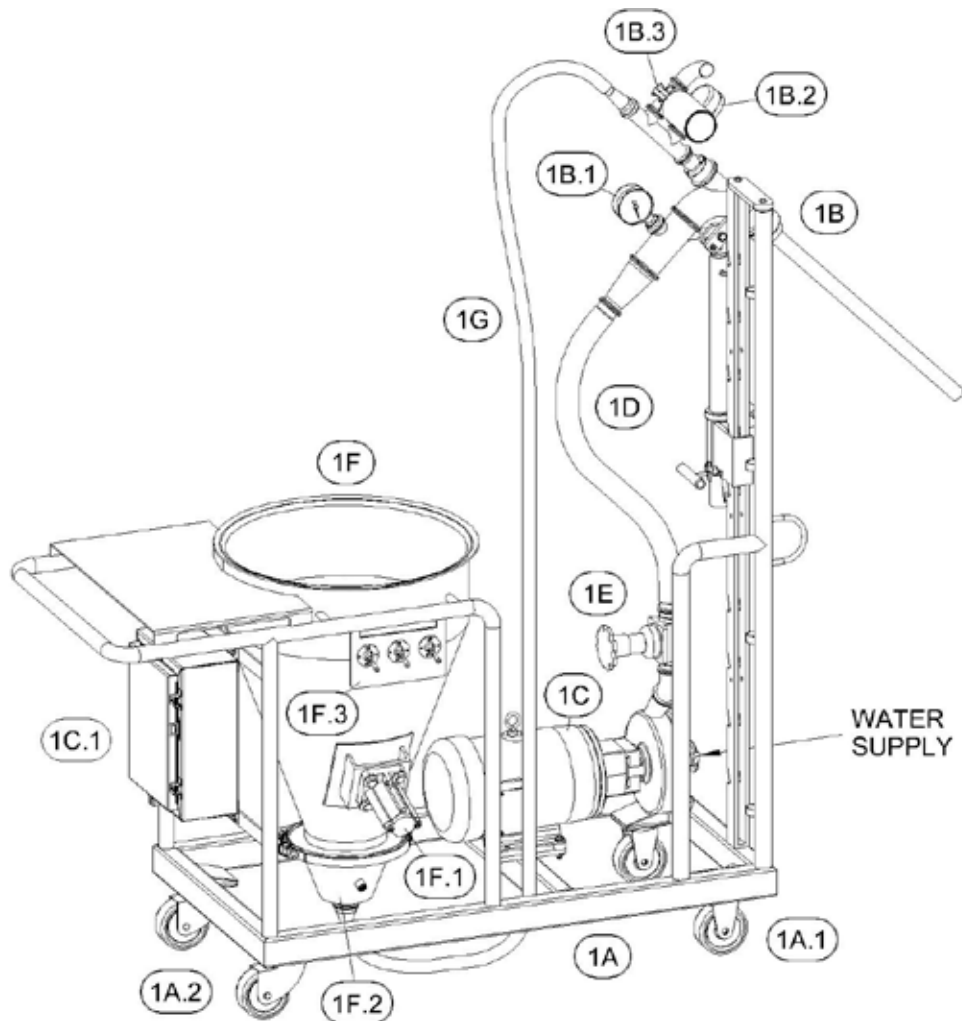
Portable / Adjustable with  
Self-Contained Feed Hopper  
to Rapidly Hydrate Thickeners  
Directly Into Top of Multiple  
Mix Tanks



FRONT VIEW

## Portable/Adjustable MOS—VACUCAM® Ejector Mixer:

Provides processors the ability to single pass (or recycle) fully dispersed and hydrated gums, thickeners, and other powders, directly into existing process vessels. Coupled to a small self-contained ingredient hopper, operators can quickly and easily accommodate a number of vessels of various sizes and heights with one compact easily manageable, cost effective process package. When used to inject shear sensitive hydro colloidal thickeners such as xanthan, guar, locust bean, pectins, cellulotics, starches, etc., processors typically will reduce their usage and increase yield by an average of 30% or more, due to imparting little or no shear while avoiding agglomerates or fisheyes which is common to all mechanical mixing devices. The other major advantages over all other mixing devices is that each delivery once established, will be the same which results in batch to batch consistency. Reduce process time from hours to minutes.



- 1A Portable modular skid w/adjustable mounting support for Ejector Mixer, all 304 S.S. construction
- 1A.1 2 - fixed wheels
- 1A.2 2 - swivel wheels
- 1B Vacucam Ejector Mixer, Model BB100; 75 or 100gpm, 316S.S
- 1B.1 Pressure gauge
- 1B.2 Vacuum gauge
- 1B.3 Vacuum break valve w/pneumatic actuator
- 1C Centrifugal water booster pump or recycle pump per process requirements
- 1C.1 Motor starter per process requirements
- 1D Mixer supply hose
- 1E Pressure throttle valve
- 1F Conical hopper, 2.7 cu.ft. capacity, w/ 70 degree cone angle, 304S.S. construction
- 1F.1 Hopper pneumatic vibrator
- 1F.2 8" Air-Cone pick-up for fluidization; 304 S.S. w/ clamp to hopper.
- 1F.3 Pneumatic filter/regulator assembly w/ manual lever valves for operation of vibrator, fluidization and vacuum break valve

## VACUCAM® EJM 2000:



### VACUCAM® EJM2000 Modular Unit

The VACUCAM® EJM 2000 in-line module offers a state-of-the-art hydro-pneumatic slurry process that is packaged to provide outstanding economy and superior performance compared to typical mechanical mixing processes. It comes complete with operator panel and manual controls, local Vacucam® Ejector Mixer and pressure gauges, AC Variable Frequency Drive controller (for take-away pump), and step-down transformer. Integration with existing distributed control system is easily accomplished for automated operation.

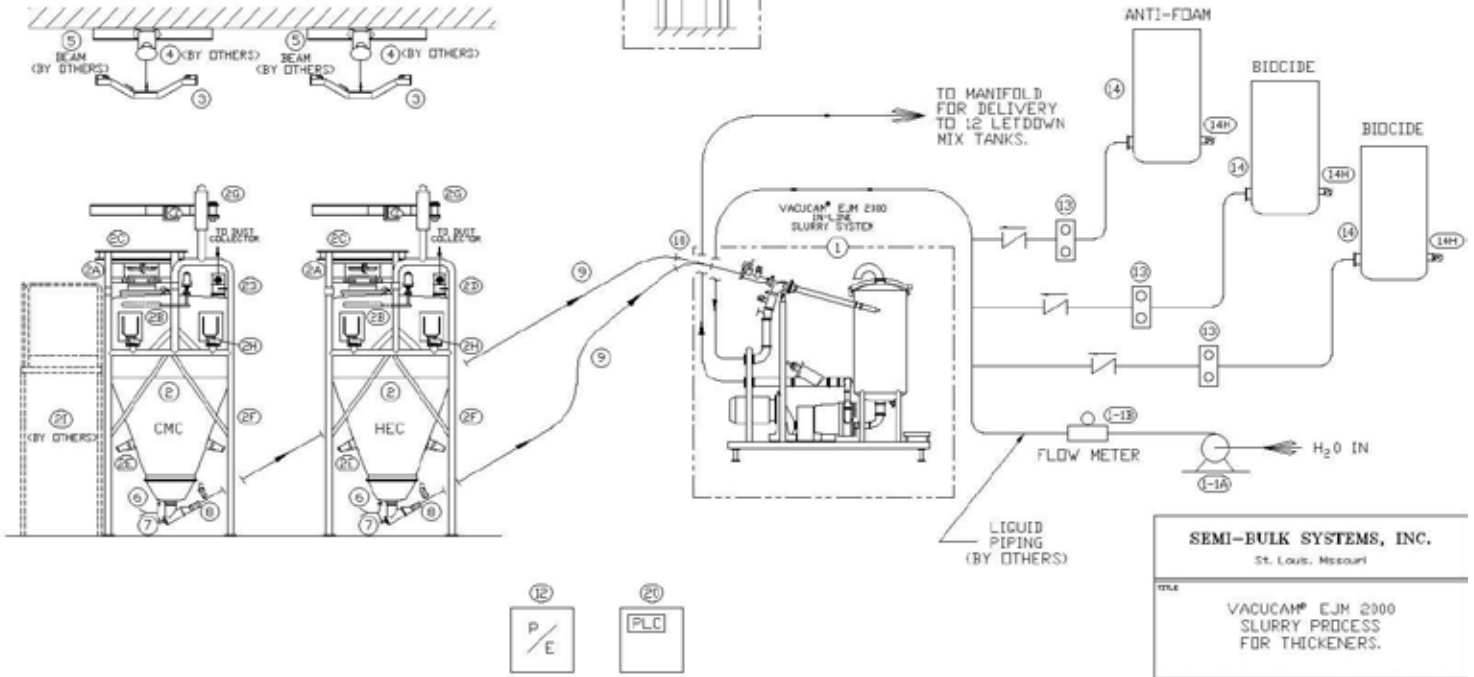
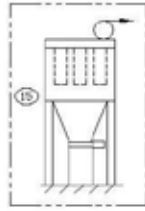
Depending upon requirements, the in-line module is available with either a centrifugal or positive displacement pump. The compact unit can be operated in either single-pass or batch-recycle processes. A liquid supply pump can be included in the system scope. If recirculation is required from multiple process vessels, additional supply pumps may be required.

Standard construction is 316L Stainless Steel for wetted parts and 304 Stainless Steel for non-wetted construction. Available options include casters for portability, vacuum and pressure transmitters, explosion-proof motors and panels.

For lower viscosity pumpable finished slurries, the In-Line VACUCAM® EJM 2000 skidded unit offers a versatile process to accommodate high capacity and/or frequent batch processes serving one or many use points.

The In-Line VACUCAM® EJM 2000 can be installed in a nearby location to be fed directly by bulk bag ingredients or from a paper bag dump hopper. Liquid additives such as anti-foam and biocides can also be injected and mixed through the system. A single slurry unit can be pumped to any number of final mix tanks.

OPTION: DUST COLLECTOR

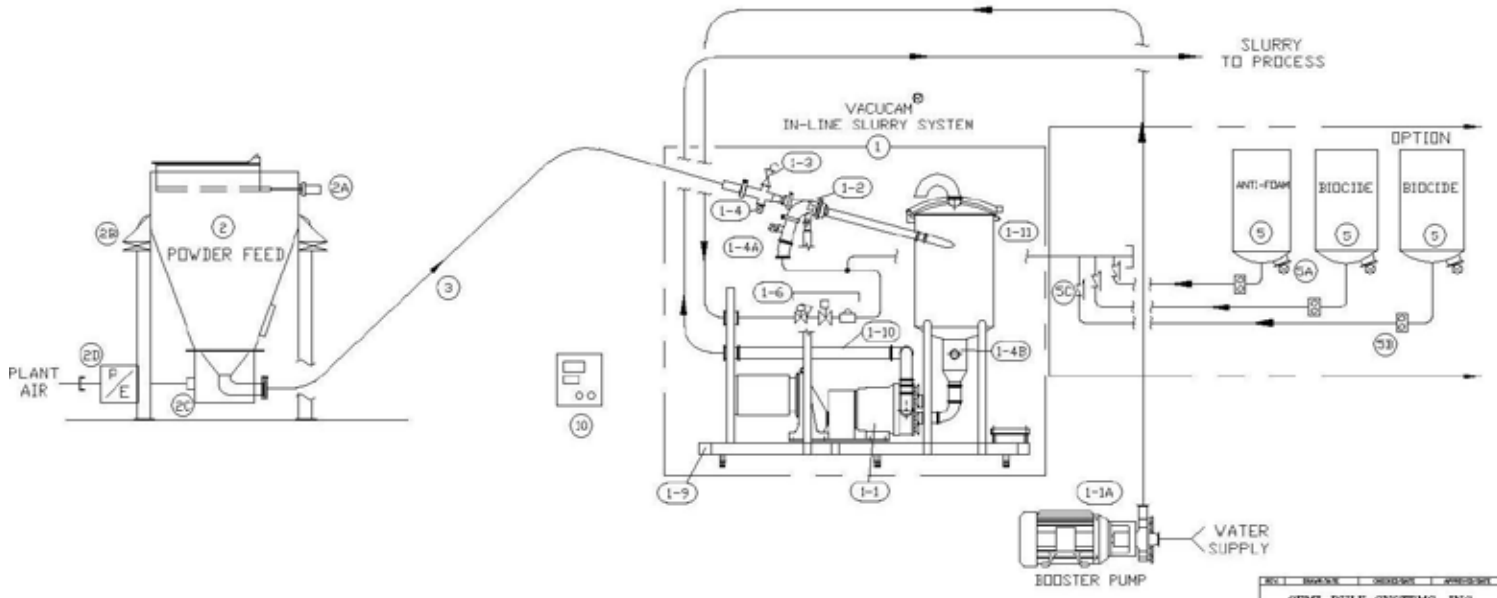


**SEMI-BULK SYSTEMS, INC.**  
St. Louis, Missouri

TITLE  
VACUM® EJM 2000  
SLURRY PROCESS  
FOR THICKENERS.

REV.	ISSUE DATE	DESCRIPTION	APPROVED BY
0	K1/05/18/05		

ISSUE DATE	PLT. SCALE	REV.	NO.	REV.
NONE	1=1	E1274	01	A



**SEMI-BULK SYSTEMS, INC.**  
St. Louis, Missouri

TITLE  
VACUM® IN-LINE  
SLURRY PROCESS  
FOR THICKENERS

REV.	ISSUE DATE	DESCRIPTION	APPROVED BY
0	02/4/24/00		

ISSUE DATE	PLT. SCALE	REV.	NO.	REV.
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# Semi-Bulk Systems, Inc.



## Gums, Thickeners, Stabilizers – Rapid and total hydration of dry functionalizing ingredients

Case study # 3401: functionalizing gums & thickeners

Semi-Bulk Systems Inc. achieves Process XstreamLining<sup>SM</sup>  
For a major Paint Manufacturer

Here are some of the Xstream Results:

(Compared to the dry ingredient handling and dry/liquid mix technology that was previously used)

- **Eliminated process for making 15t batches of thickener stock solutions; eliminate problems w/transfer of thickener stock**
- **Eliminated quality issues w/ storage of stock solutions; greatly increase water availability for upstream processing; rapidly disperse thickener directly into multiple paint mix tanks.**
- **99% batch consistency and eradication of finished batch adjustments.**
- **70% savings in process energy**
- **70% reduction in process time**
- **10-15% savings in thickener usage due to efficiency of process functionalization**
- **ROI recalculated to 3 months from original 12 month estimate**

*These are just some of the Xstream results achieved  
when using our exclusive Process XstreamLining<sup>SM</sup>.*

The products and services described in this brochure are available for purchase from Semi-Bulk Systems, Inc. All such sales shall be subject to the terms and conditions contained in the proposal forms, invoices, shipping tickets and other sales forms and documents of Semi-Bulk Systems, Inc. pertaining to the products and services. These items include various limited warranties and other disclaimers concerning the products and services available for purchase from Semi-Bulk Systems, Inc. Such documents will supersede and replace any and all statements made in this brochure with respect to the products and services.



3-2011 Thickener Process

# PROCESS XSTREAMLINING<sup>SM</sup>



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