

Total Solutions from

Semi-Bulk Systems, Inc.



POWDER DELIVERY OPTIONS:

- A. Total bulk from Silo with automated pneumatic convey delivery to the Continuous Steady State feed hopper.**
- B. Semi-Bulk Containers – dedicated returnable/reusable Air-Pallet® container supply w/delivery to in-plant bulk bin storage.**
- C. FIBC supply to bulk bag unload and surge bin feed system feeding the Continuous Steady State Slurry process.**

This Brochure is a Supplement to the Pigment Slurries Brochure which describes the Continuous Steady State Slurry Process fed from bulk. These dry side Process Options would provide the Benefits of Automated Slurry production in countries where total bulk may not be available or in applications which may not be able to justify total bulk deliveries. Please contact your Semi-Bulk Systems representative to review the best option for your production requirements.

For description of Paint Slurry Processes, refer to Pigment Slurries Brochure and for Thickeners, see the Paint Thickener Processes Brochure.



PROCESS XSTREAMLININGSM



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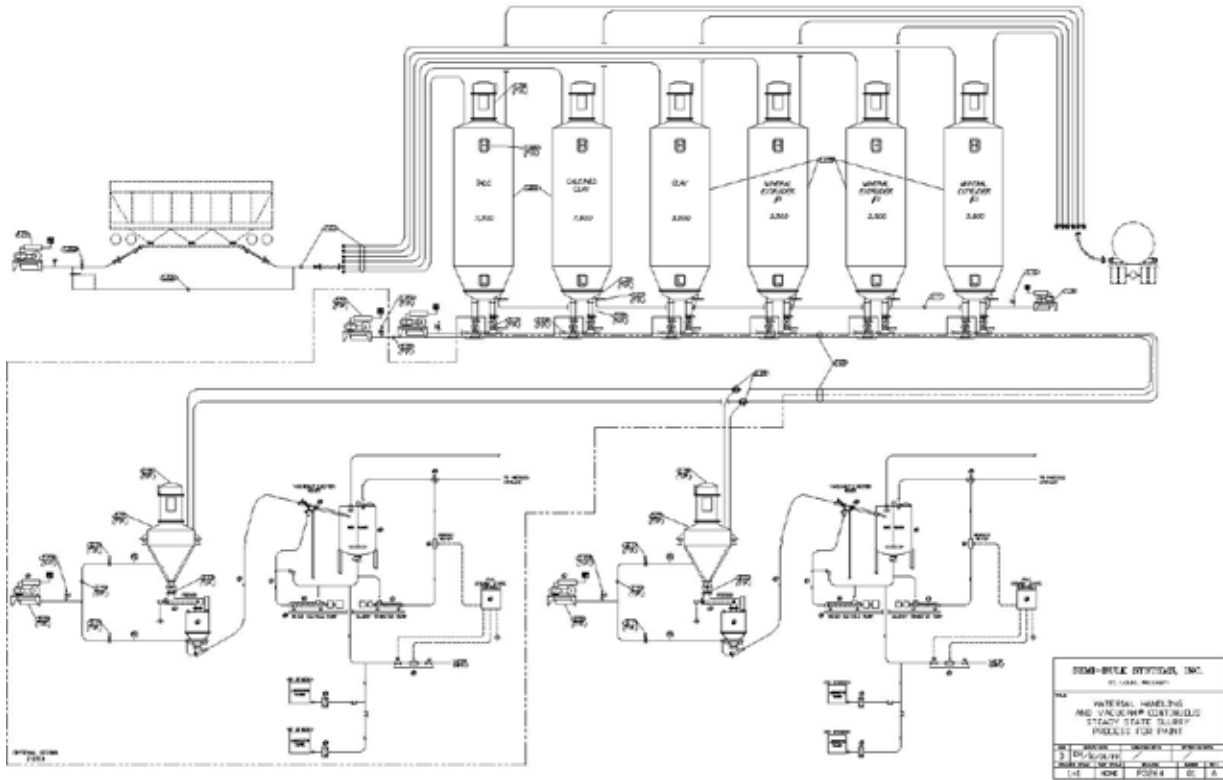
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Powder Delivery Options:

A. Total bulk from Silo with automated pneumatic convey delivery to the Continuous Steady State feed hopper.

This Process Option represents the most efficient powder delivery system for high capacity plant requirements. The detailed description and operator sequence of the Vacucam® Dynamic Continuous State Slurry Process is fully described above illustrating the process being fed directly from bulk silos.

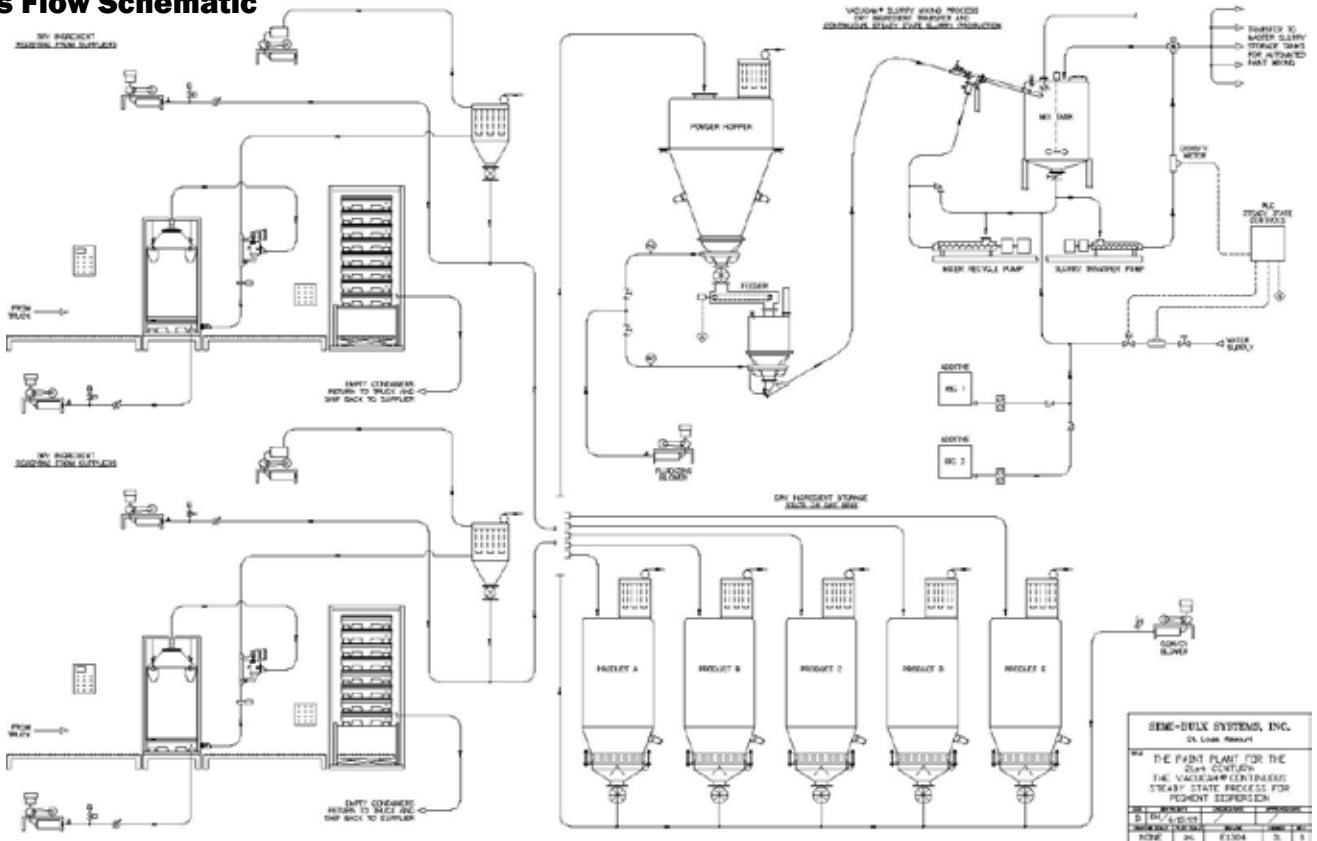
Process Flow Schematic



B. Semi-Bulk Containers – dedicated returnable / reusable Air-Pallet® container supply w/ delivery to in-plant bulk bin storage.

The detailed description and operator sequence of the Vacuam® Dynamic Continuous State Slurry Process is fully described above illustrating the process being fed directly from bulk silos.

Process Flow Schematic



This Process Flow Schematic addresses a number of process elements to provide the most efficient Paint Making Process for the 21st Century.

- It addresses the limitations of the country not having sources of bulk truck or bulk rail delivery for pigment delivery.
- Provides for delivery of pigments in a returnable, reusable semi-bulk container [The Air-Pallet® Container], which will provide the convenience and automation of transferring the pigments to in-plant bulk storage and feed to process. Greatly reduce labor and handling.
- The returnable / reusable container is unloaded upon receipt and does not require warehouse storage. The empty containers are returned to supplier for refill. Eliminates disposal of packaging and reduces landfill issues.
- Pigments are transferred to day bins or silos, which greatly reduces labor; greatly increases automation and delivery of pigments to continuous slurry making.
- The Vacuam® Continuous Steady State Slurry Process provides for high capacity, high quality master slurry production to deliver to automated paint blending producing the lowest manufacturing cost.
- Most efficient process to provide the lowest total ownership costs.
- Lowest Maintenance Costs---minimal moving parts other than pump. Minimum equipment
- Lowest Energy—typically 80+% energy savings vs. high shear conventional batch processes.
- Total Automation—incorporates all individual pigments directly into high solids master slurries.

PROCESS CONSIDERATIONS:

PIGMENT SHIPPING CONTAINER –The Air-Pallet® Container is proposed as the primary method of shipping and receiving pigment at the Paint Plant. It is a returnable and reusable shipping container with a built in fluidizing floor in its molded plastic pallet base. It provides the functional benefits of direct coupling to the pneumatic conveyor system for automated and rapid discharge of the contents. The unloading process is at floor level. Upon emptying, the container is returned to the supplier for refilling. The unloading process is totally enclosed and dust free providing benefits and addressing ergonomics and environmental issues. The use of the returnable container totally eliminates packaging disposal costs and landfill issues.

Air-Pallet® Container Features:

Returnable, reusable, collapsible FIBC for transportation, storage and controlled discharge of powders

- * Dust free loading and unloading
- * Batch controls can be automated
- * Eliminates single use packaging
- * Interfaces with a variety of process options
- * Larger volume for light density products
- * Stacking feet for empties
- * Pallet base designed for rack storage



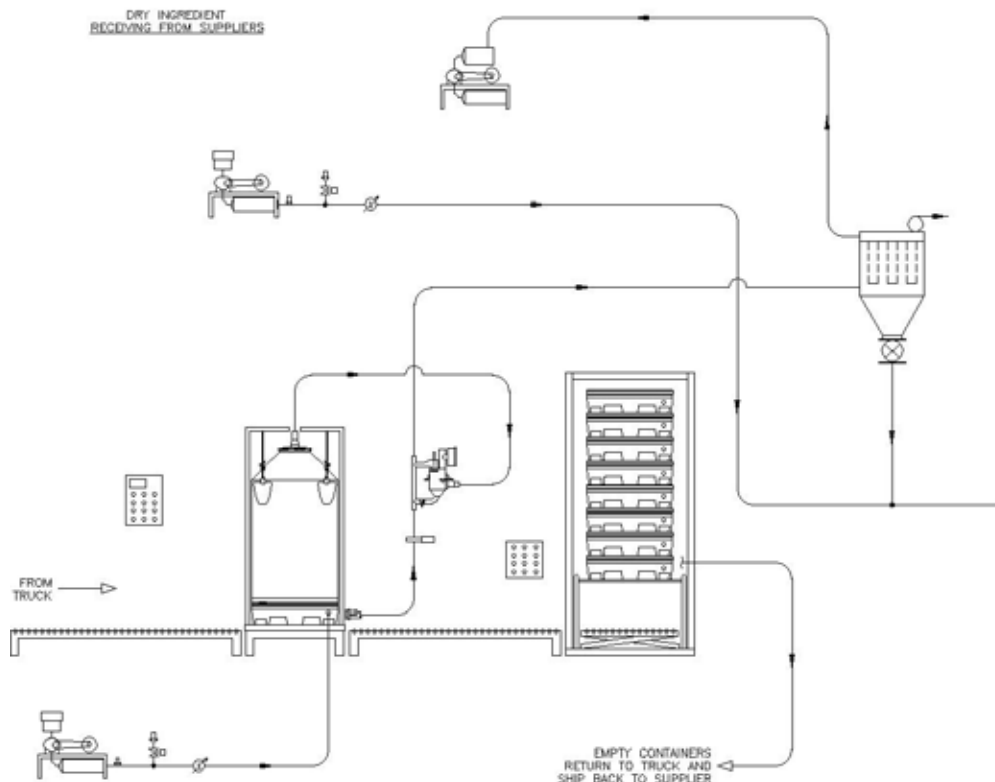
CONTAINER RECEIVING, UNLOAD AND STORAGE:

This process design proposes an efficient method of receiving, unloading and storing the pigments. It is proposed that the containers are received, unloaded from the truck and emptied, and the contents transferred to in-plant day bin or silo storage.

- Warehouse storage capacity would typically not be provided for the major pigments since they are directly emptied and transferred to dry storage and then the empty containers are returned to suppliers for refill.
- The reusable, returnable package eliminates disposal of packaging material and landfill issues.
- The containers are placed on staging roller conveyors feeding the unload station where it is connected and unloaded in a totally dust free and automated process feeding a pneumatic vacuum/pressure conveyor transfer system.
- The empty containers are collapsed and stacked via an automatic stacker for return to the supplier.
- It is proposed that two container unload lines be provided to handle two different pigments at the same time. [3 lines may be preferred to reduce shifts and support truck delivery]
- It is proposed that each pneumatic conveyor is 4" in size and will unload approximately 500#/min as a typical transfer rate; i.e. 4 minutes/2000# container.

Unload and transfer capacity:

- Cycle time = hook-up time + convey time+ unhook time = 1min. + 4 min. + 1 min. = 6 minutes/ container total or approximately 333 #/min. = 20,000#/hr. for one line or approximately 40,000#/hr for two lines or approximately 320,000#/shift. [Approximately 7TL/shift]
- Assuming 5 days/week and 50 weeks/yr., total unload capacity of system w/ 2 lines = 35TL/week or 1750TL/yr [77,000,000#/yr of pigment for one shift unload] [154,000,000#/yr of pigment for two shift unload]
- Based on above estimates, unload options to make capacity may consider the addition of a third unload line, or the use of an additional shift, or running 7days/wk vs. 5 days/wk.

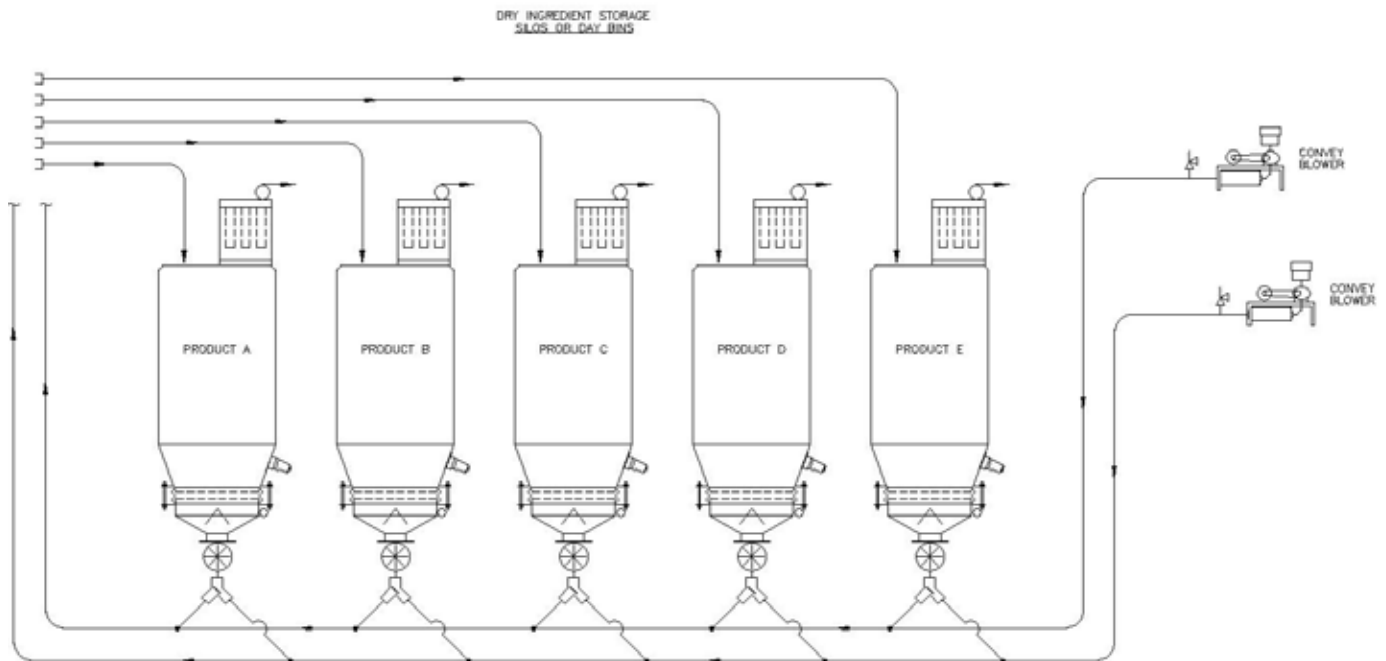


PIGMENT IN-PLANT BULK STORAGE :

Pigment is continually unloaded from the shipping container and transferred to its respective product storage day bin or silo via pneumatic conveyors. It is proposed that two or three lines can be used for unloading at the same time to the respective pigment bin.

The bulk bin or silo storage capability for each major pigment provides many cost benefits:

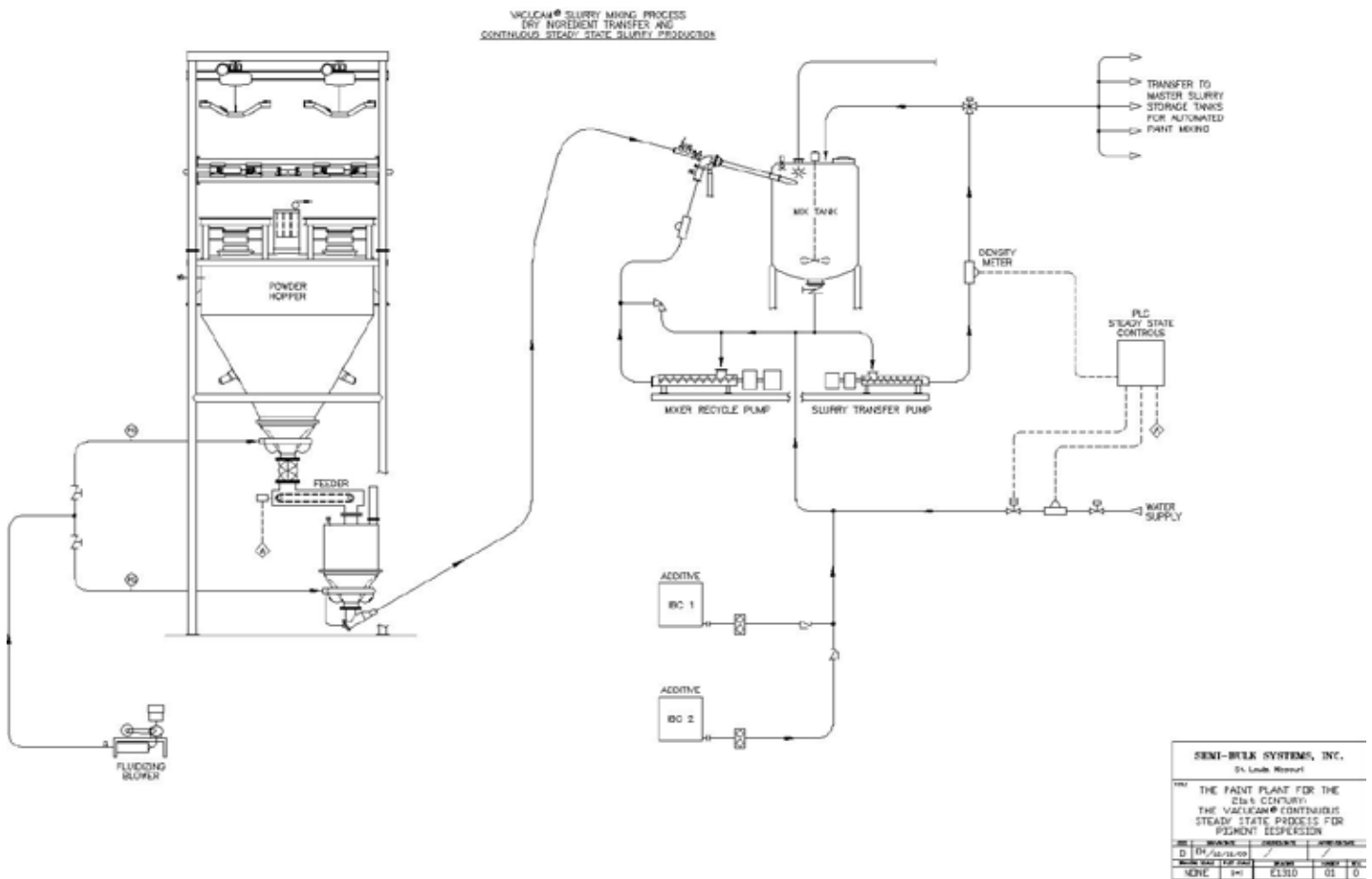
- Eliminates the need for dry storage warehousing and labor associated with warehousing.
- Eliminates manual labor in handling and dumping individual bags of various pigments into a batch process.
- Provides total automation capability for dry ingredient delivery to the totally automated “Continuous Steady State Slurry Process”.
- The size of the day bin or silo to be sized to efficiently address plant consumption vs. delivery schedules.
- A parallel convey header at the discharge of the bins will provide the capability to unload from two bins simultaneously with different pigments delivering product to two Continuous Steady State processes.



C. FIBC supply to bulk bag unload and surge bin feed system feeding the Continuous Steady State Slurry process.

This process represents an option for receiving bulk bags and using warehouse storage to supply the various pigments to a dual bulk bag unload station and surge hopper to maintain supply on a continuous feed basis directly to the In-Line VACUCAM® Dynamic Continuous Steady State Slurry Process. The operation of the slurry process is the same as fully described above.

NOTE: Bulk Bags can also be received and off-loaded directly into in-plant storage bins similar to the Air-Pallet® Containers described in Option B above. This would provide reduced warehouse storage requirements and greater automation capability for delivering pigment to the in-line slurry process.



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Pigment Handling/Dispersion –Continuous Steady State, Batch Steady State or Batch for master batch slurry ingredients or total pigment slurries for paint batch.

**Case study #3402: pigment dispersions
Semi-Bulk Systems Inc. achieves Process XstreamLiningSM
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)

- **Provided production capacity and growth with existing real estate vs. building new facility saving millions of \$\$**
- **Increased plant capacity by 400% while reducing personnel by 30%**
- **Estimated labor savings vs. HSD = \$0.0191/gal. Labor savings @15,000,000 gal/yr production = \$287,086/yr savings.**
- **Capability to make excess sales needs in one shift/5 days vs. inability to meet sales needs in multiple shifts/7 days.**
- **99% batch consistency and elimination of batch adjustments**
- **Generated manufacturing cost savings of \$0.40/ gallon**
- **90% Energy savings for pigment dispersion based on > 15million gallons/yr. Estimated power usage savings vs. HSD is approximately 0.403KWH/gal @ \$0.08/kwh = \$0.0322/gal savings @ 15,000,000 gal/yr paint plant = \$484,132/yr SAVINGS [Energy only]**

These are just some of the Xstream results achieved when using our exclusive Process XstreamLiningSM.

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3-2011 Powder Delivery Options

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