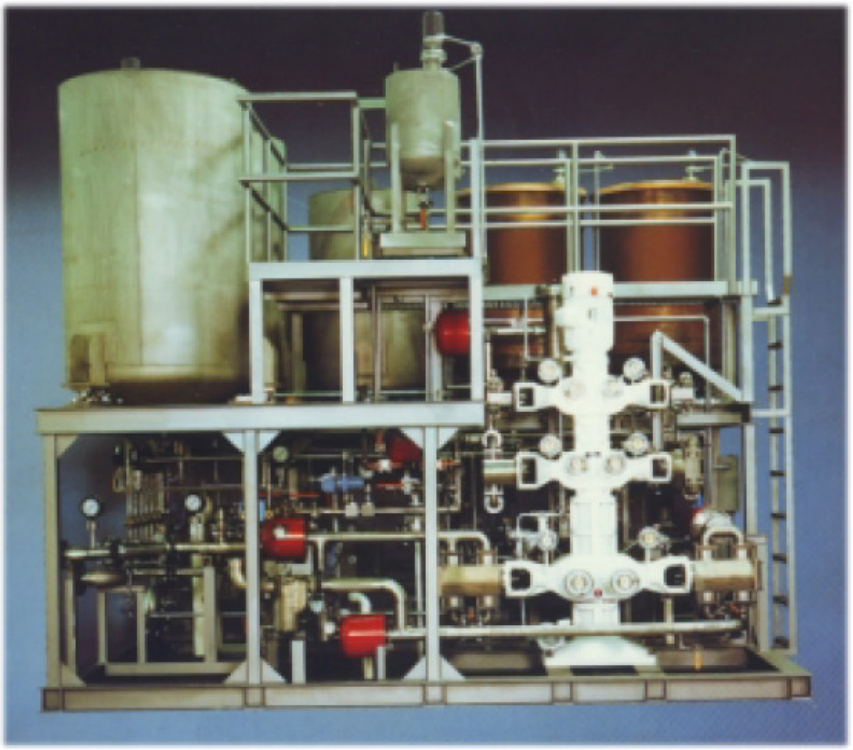
Bran+Luebbe in the Personal Care and Pharmaceutical Industries



BRAN+LUEBBE
An SPX Process Equipment Operation

611 Sugar Creek Road • Delavan, WI 53115

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About Bran+Luebbe Bran+Luebbe, Inc. is an international company with headquarters in Norderstedt, Germany and independent operating companies in France, the United Kingdom, Spain, Italy, Netherlands, Sweden, Singapore, Japan, and the United States.

Bran+Luebbe has specialized in metering and blending of liquids and flowable solids since 1932. Our metering solutions include electronic flow meters (of all kinds), metering pumps, gravimetric, and volumetric control of liquids and flowable solids. Blending solutions include batch mixing, in-line static mixing, dynamic mixing and homogenization.

System automation ranges from purely manual, to PLC with touch screen and menus, to full DCS PC-based plant automation. Our Analyzer product line allows us to provide total product control from raw material receiving, to on-line processing, to QC lab testing.

Our engineering group provides full specification and design capabilities utilizing the latest version of AutoCAD. We can—and have—provided services ranging from feasibility studies to design and project management.

Typical project documentation includes:

- Process flow diagrams, P&IDs, isometrics, plant layout, as well as electrical panel and interconnect drawings.
- Operating manuals containing component parts and maintenance manuals, operation descriptions, loop descriptions, and program logic diagrams.
- Project Management services including vendor specification/purchasing, site coordination of necessary contractors, and updated PERT charts.

We are more than just an engineering firm—we build what we design. Because we are intimately familiar with the costs of building the final system, we can objectively weigh the costs of each design option. By weighing the upfront costs *and* the long term costs of operation, we can maximize the design to achieve your specific goals. And when it comes time to actually build and install your project, there is far less chance of miscommunication between Engineering and Manufacturing because one team handles it all.

We are more than just an equipment supplier—we manage the selection and procurement of all systems components, from the most sophisticated and computerized controls, to the simplest pipe fitting. Our system engineers are encouraged to utilize the best available solution to meet your needs. And this may or may not be a Bran+Luebbe-made component.

We are more than a fabrication house—we integrate the mechanical and electrical components validating proper operation either in-house (on skidded items) prior to shipment, or after final installation (field installed equipment). We take responsibility not only for assembly, but also the design and function of the whole system. Bran+Luebbe Single-source Responsibility to improve your bottom line.

The Bran+Luebbe approach You will find that Bran+Luebbe's approach to Solutions Engineering is first and foremost focused on meeting your business objectives. Unlike others who focus on equipment selection from the start, we strive to develop the best solution first, then match equipment and software to implement that solution.

Bran+Luebbe project engineers begin a project utilizing a process defined as the "1-2-3 Approach". The 1-2-3 Approach not only yields important quantitative and qualitative information about a customer's current process, but provides a blueprint for developing the necessary solution.

One...Evaluate the existing system/process. Bran+Luebbe engineers thoroughly inspect the present application. An intelligent solution to a process problem can only be discovered after understanding the system's strengths and weaknesses.

Two...Identify the problems. After evaluating the existing system, Bran+Luebbe engineers pinpoint the root of existing problems. Understanding what causes the problems, and the adverse effects they have on the finished products, enables us to quickly find the best solution.

Three...Understand customer objectives. Bran+Luebbe works with our customers to meet each goal accurately and efficiently. There is nothing more important than understanding the customer's specific needs and expectations.

No matter what the goal, Bran+Luebbe engineers have the experience and field expertise to successfully eliminate existing problems and meet the objectives of your new or existing system. With our staff and your in-house staff working in partnership, we will deliver a project on time and on budget.

The final result is a cost effective solution that fits your needs day after profitable day.

Batch, continuous, or a hybrid of the two? When you design a product blending process, there is much to consider: Initial cost, product quality, flexibility, space constraints, manpower requirements…the list goes on. The decisions you make will effect your plant for years to come, and they will set—to a large degree—the cost and quality standards possible from the product.

This booklet describes working processes where Bran+Luebbe helped the manufacturer define the optimal blending approach, and was then commissioned to engineer, build, test, and deliver a complete process system. The examples on the next pages represent some of our most successful blending applications. Pure batch and pure continuous approaches are included, but the main focus is on what we have termed a *Continuous Batch Solution.*

Continuous Batch Solution The optimal solution to most blending processes often combines the best of batch and continuous methods. Cost savings have resulted from a continuous batch blending approach for many product applications. For example:

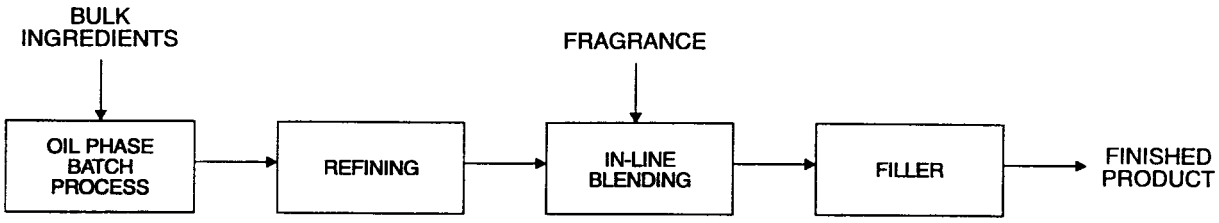
- Families of products that share common ingredients, but have formula specific additives, can be made very economically with a continuous batch process. A common base is made in an existing batch process, and the specific additives are blended in-line at the packaging line.

- Products having a few ingredients which comprise most of the formula, plus many minor ingredients, work best with a continuous batch approach. A pre-mix is made batch-wise with the bulk of the formula blended in a compact, automated, in-line blender.

You know your product and process better than anyone, and you set the performance objectives for a planned blending process investment. Bran+Luebbe's broad industry experience can help you identify the technique that will minimize product cost, yet ensure consistently high quality. Customer objectives and Bran+Luebbe expertise have produced standard-setting processing techniques for many, and can do the same for you.

Please review these case studies and consider Bran+Luebbe's *Continuous Batch Solution* for your next process investment. We are certain you will remember Bran+Luebbe as the single most experienced "engineer-and-build" supplier of continuous batch processing systems available.

Baby Oil

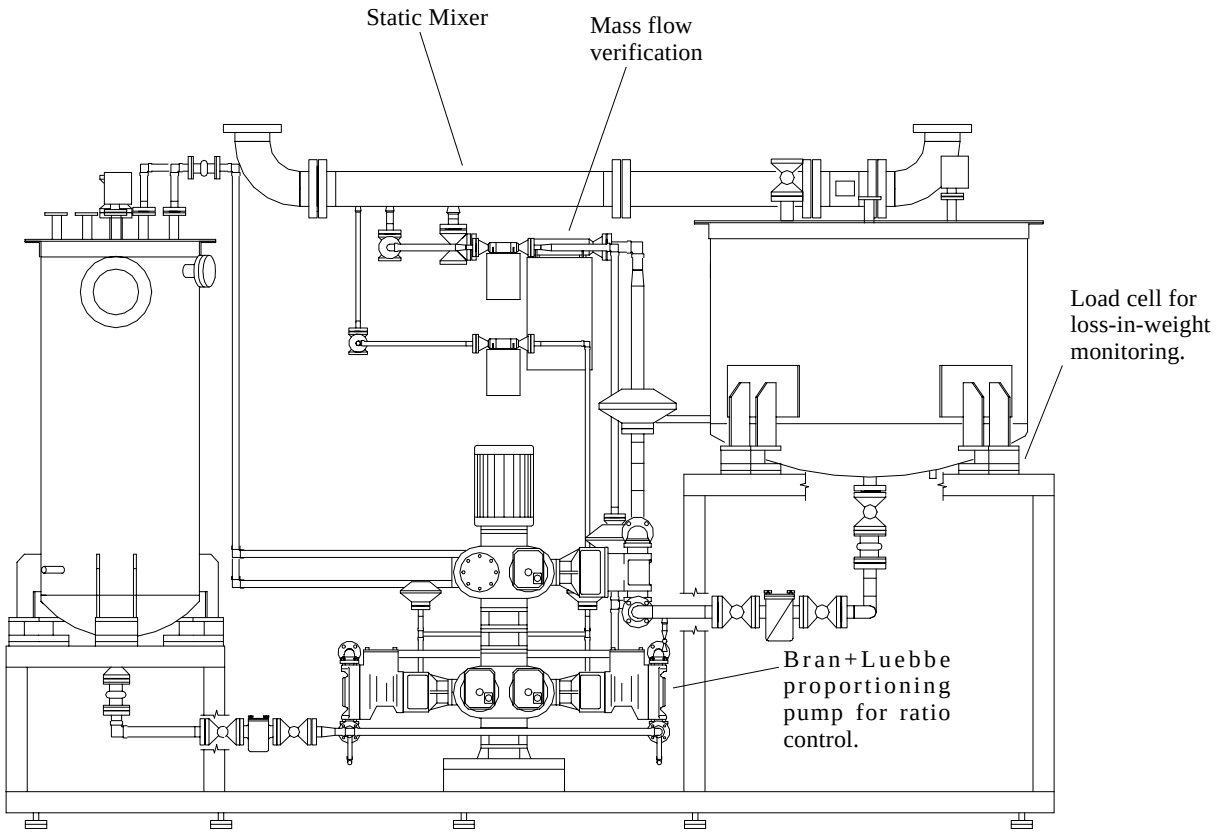


High perfume losses resulted from their inclusion into the batch, from losses inherent in “open system” batching, and from degradation in a heated refining step. A straightforward application of in-line metering and mixing techniques in a compact equipment module cut costs and improved product quality.

Benefits

- Savings in perfume costs and efficacy by delaying addition until high temperature purification steps are complete.
- The compact in-line blender allows it to be located adjacent to the filler, minimizing finished product inventory, and simplifying perfume drum handling.

Liquid Laundry Detergents



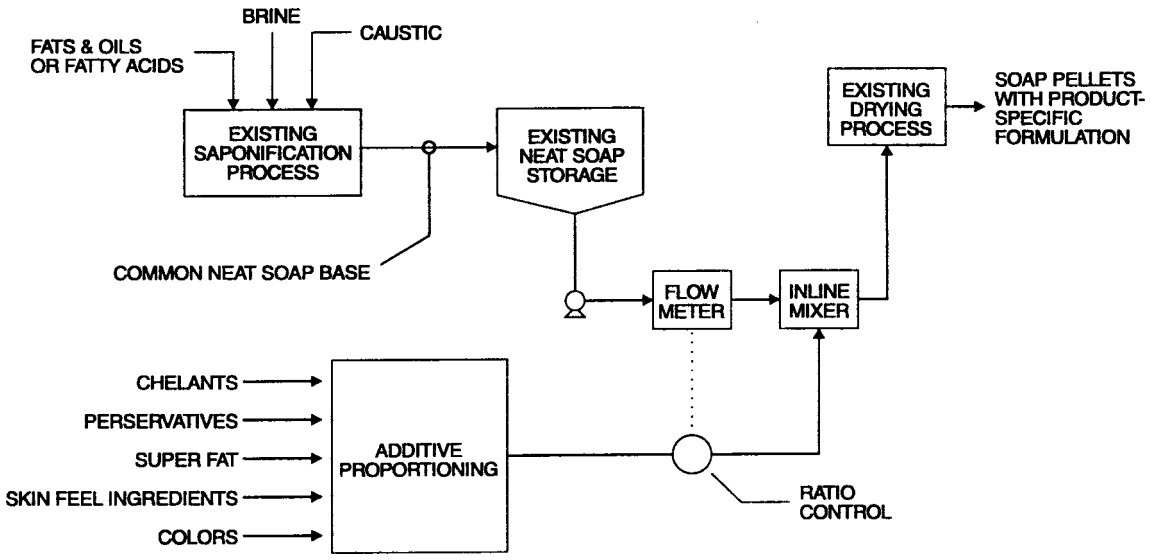
This in-line, liquid ingredient blending system is the last step in an optimum process combining continuous and batch techniques. Its function is to add perfume and other active ingredients to the detergent base directly before the packaging line. It uses metering pumps for steady state accuracy and reliability, loss-in-weight monitoring, and mass flow verification for state-of-the-art quality assurance and inventory management.

Benefits

- Extreme control and assurance of key ingredient levels.
- Local distributed control runs the process with minimal operator attention, and communicates with plant-wide supervisory computers.
- Last minute formulation of finished product reduces inventory, produces only the amount required by the filler, and speeds product changeover.

Liquid Laundry Detergents

Soap Additives



Standard industry saponification processes—batch, continuous, neutral fat, or fatty acid—do not efficiently produce soap bases with differing formulas. As product development continues to define neat soaps with more, and different, additives, adding a compact, in-line blending module to an existing process enables specific additives to be mixed with common base neat soap directly before the dryer. Several designs exist to match the specific duty, and allow for fast, economical modification as product marketing needs evolve.

Benefits

- Minimize capital required for the self-manufacture of specialty soaps from a common neat soap base.
- Process controls improve control of high cost, active ingredients.
- Formula produced on-demand with virtually no work-in-process inventory or changeover scrap between formulas, allowing the existing saponification process to be kept on a single formula.
- Simple flow control loop is used to ratio all additives to the neat soap base.

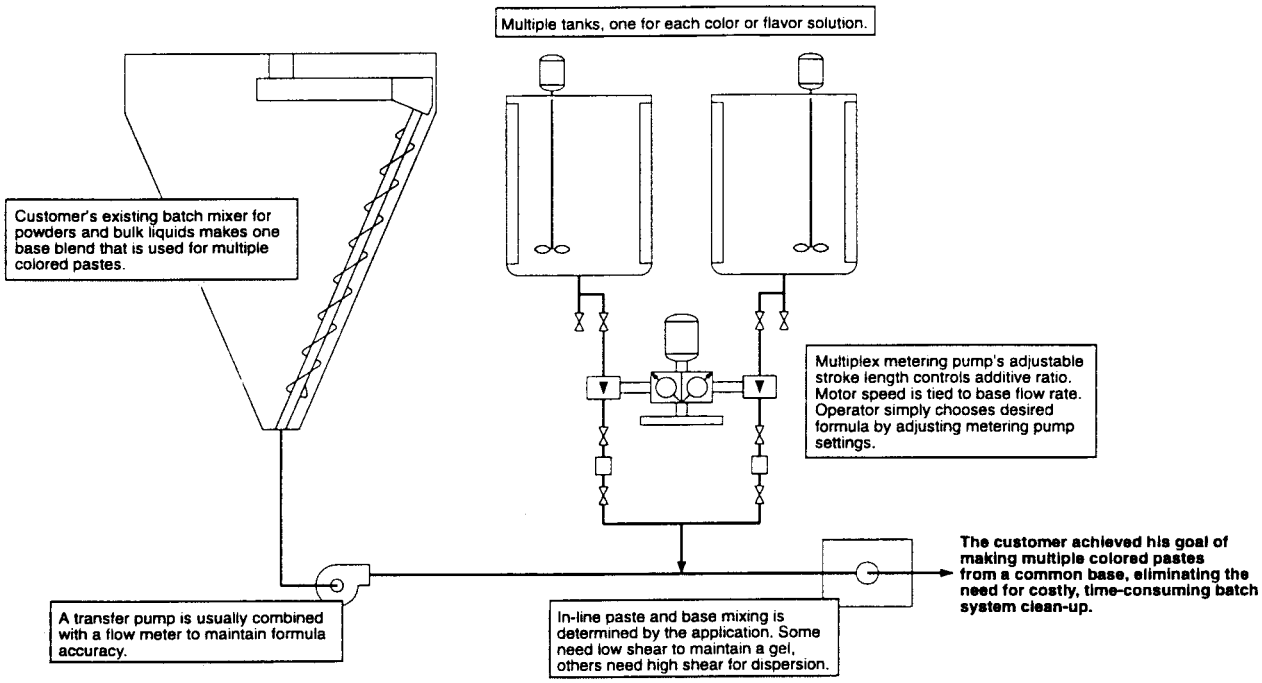
Soap Additives

Electrical control cabinet with ratio and motor controller

High production rates from compact footprint

All stainless steel construction to minimize corrosion

Toothpaste

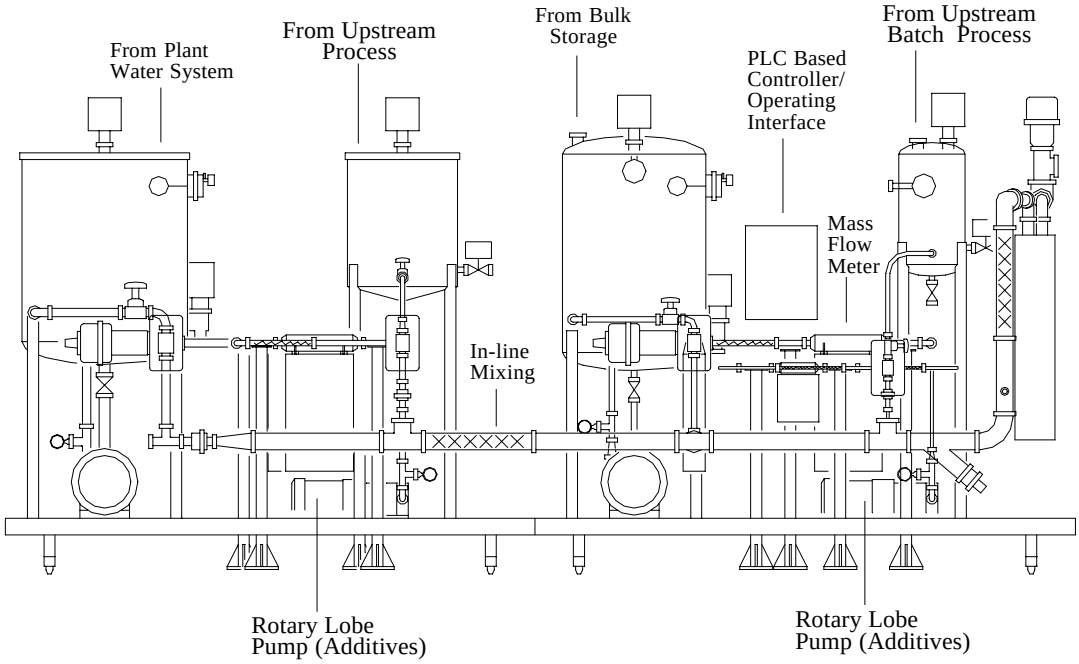


The existing batch mixer and transfer equipment for this customer was inefficient at producing multiple formulas—the wash out scrap was high and nonproductive time between batches was straining capacity needs. The system pictured above removes the liquid additives, which distinguish the family of paste products, from the batch, and adds them downstream in an in-line metering and blending system.

Benefits

- A typical process flow, pictured above, greatly minimized waste and product changeover time, and allowed the batch mixer to be kept on the same formula for the entire product run.
- A sensible degree of automation was applied to the in-line metering blending system in order to run with minimal operator attention and the required level of process assurance.
- Capital cost was substantially less with this hybrid approach to blending, compared to the option of expanding the pure batch process.

Mouthwash

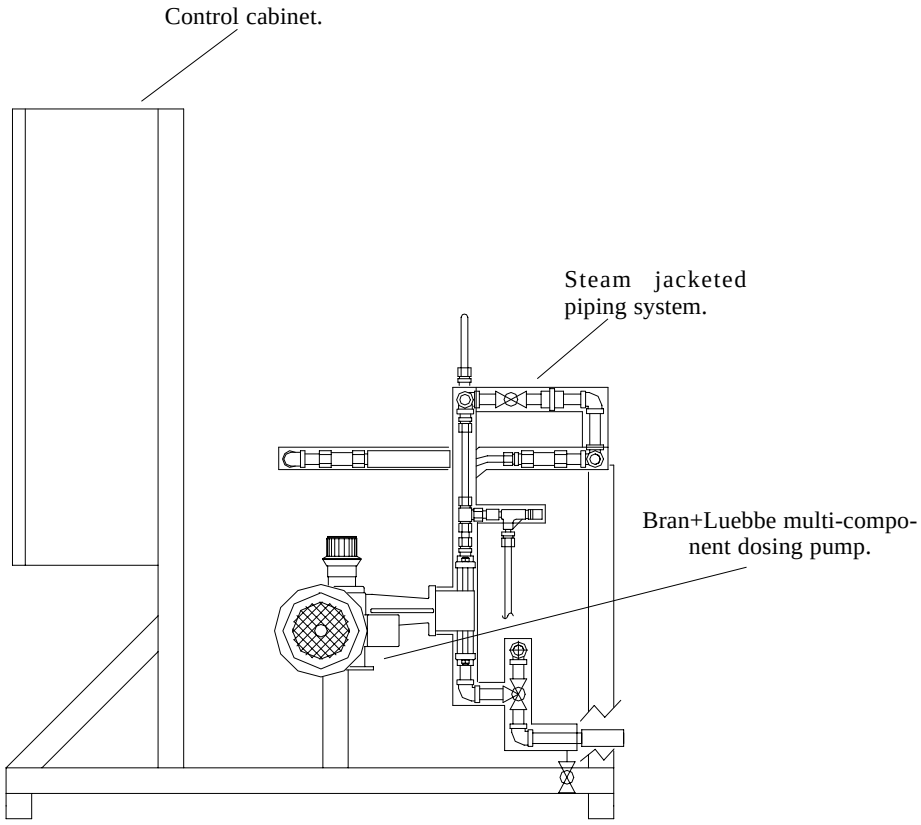


A combination of batch and continuous blending techniques is used to meet the project objectives of high output with tight quality standards, and minimized capital investment. Operator responsibilities were redefined from largely manual batchmaking to process and production control.

Benefits

- Initial cost savings over option of expanding batch process.
- Operators can run and monitor blend process from a remote control room.
- Tight quality standards maintained at higher output for less cost.
- Existing batch process utilized to make a pre-mix rather than the entire formula, giving greater output and reduced labor cost per pound.
- Flow control loops offer the most economical control for high capacity equipment (lowest cost per gallon).

Deodorant, Antiperspirant



During the course of a new product introduction, test market quantities were needed, but capital allowances for the blending process were tight. This simple, yet effective, liquid metering system was built within the very tight scheduling requirements normal to a new product launch program. The basic elements of it were proven along with the product's market testing, and this experience aided the design and construction of the eventual commercial process. Product effectiveness is degraded by long holding times present in batch system.

Benefits

- Validated process technique at pilot scale.
- Provided scale-up data for commercial sized process.
- Used for test market production while commercial process was being designed and built.
- Minimum amount of work in process eliminates waste caused by packaging lind downtime.

Antiperspirants

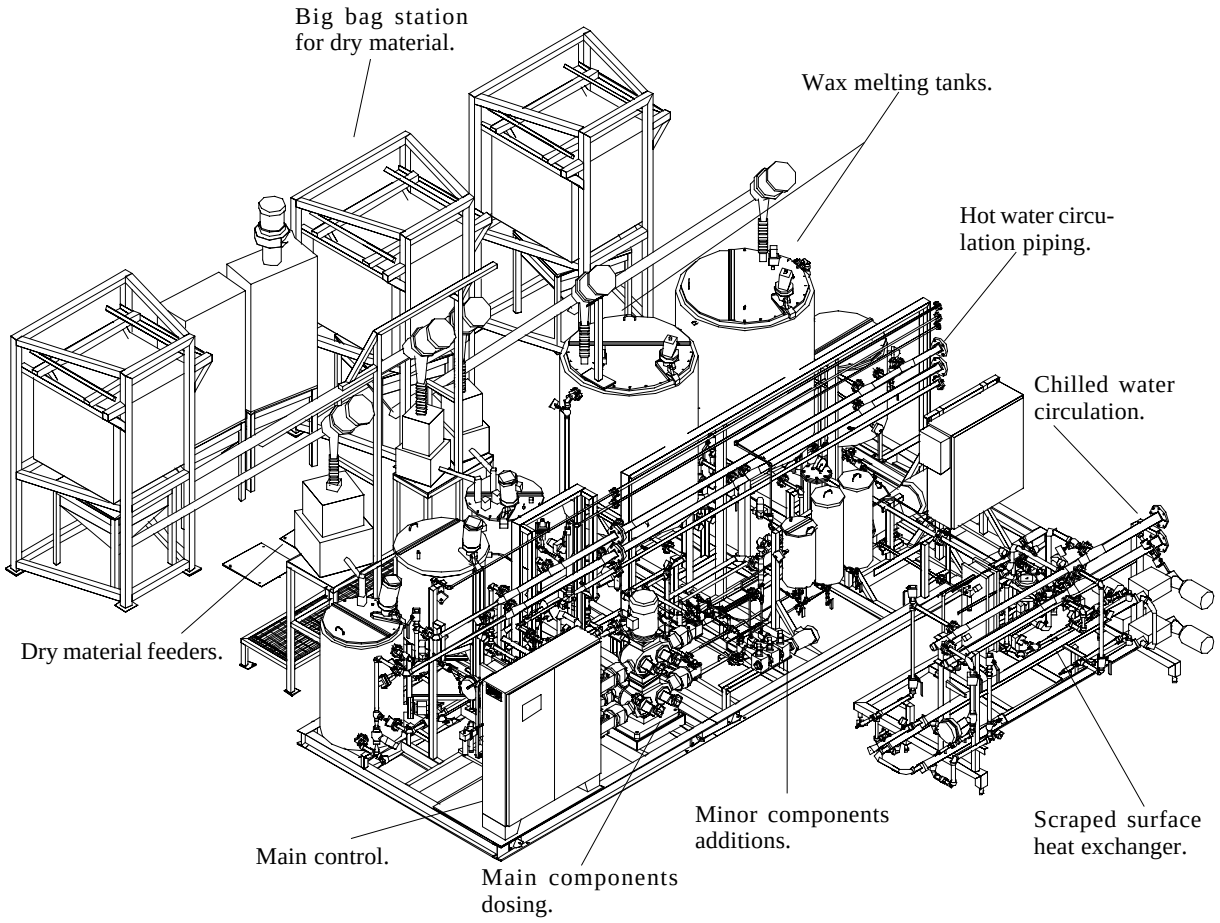
All components are proportioned and blended at this filling line.

A major international personal care products manufacturer formerly used a pure batch approach to meter and mix all ingredients for their various product lines. This system resulted in high product changeover time and waste because the tanks had to be cleaned every time a color or fragrance was changed. Bran+Luebbe recognized that a common base could be produced economically with the existing process, and that the minor, product-distinguishing ingredients could be added as the base was transferred to the filling line.

Benefits

- Filler mounted dosing package cuts waste by 80% annually.
- Improve production flexibility by minimizing changeover time.
- Minimize product changeover scrap.
- The filling line operator now has control over the entire changeover procedure, packaging supplies, and formula.

Personal Care Creme

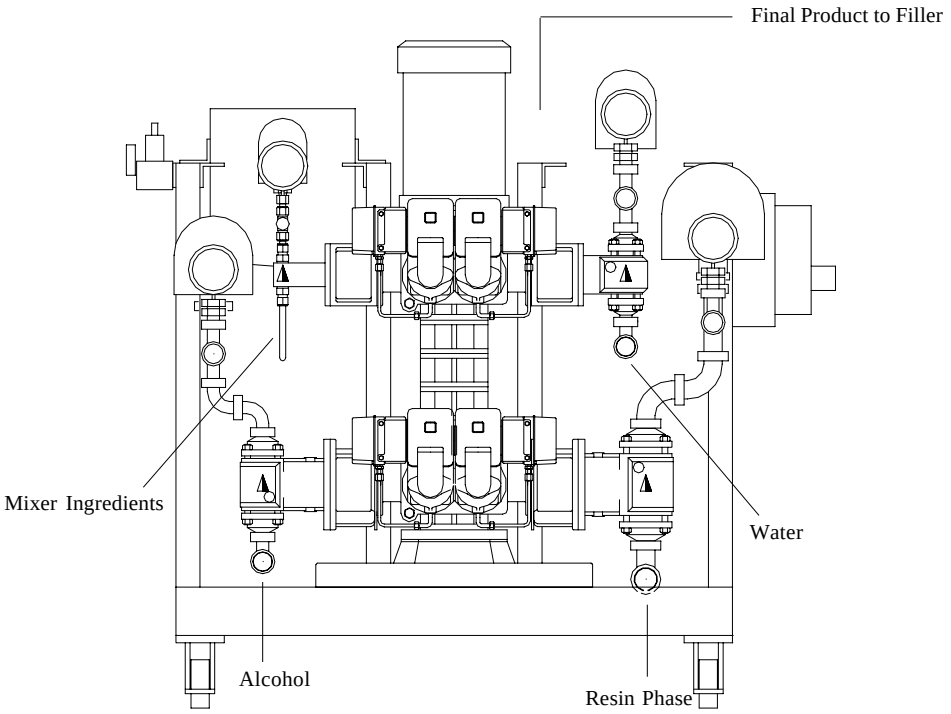


A family of high viscosity creme personal care products is produced in-line from seven liquid and three powder phases. In-line equipment was selected to provide an improved emulsion at greater capacity from less floor space. The system proportions and blends oils, water, waxes, premix, and fragrance on demand to the packaging line(s). The existing batch tank is now used for the premix. Peak heating and cooling demand from the batch process was eliminated.

Benefits

- High viscosity finished product, greater than 200,000 cps.
- Dry materials and waxes are fed automatically to the system by bulk bag system.
- High quality emulsion is created by the Pentax multi-frequency mixer.
- Scraped surface heat exchanger is utilized for fast/efficient final product cooling.
- Significant cost savings in expanding batch capabilities.
- Unattended operation.

Hairspray

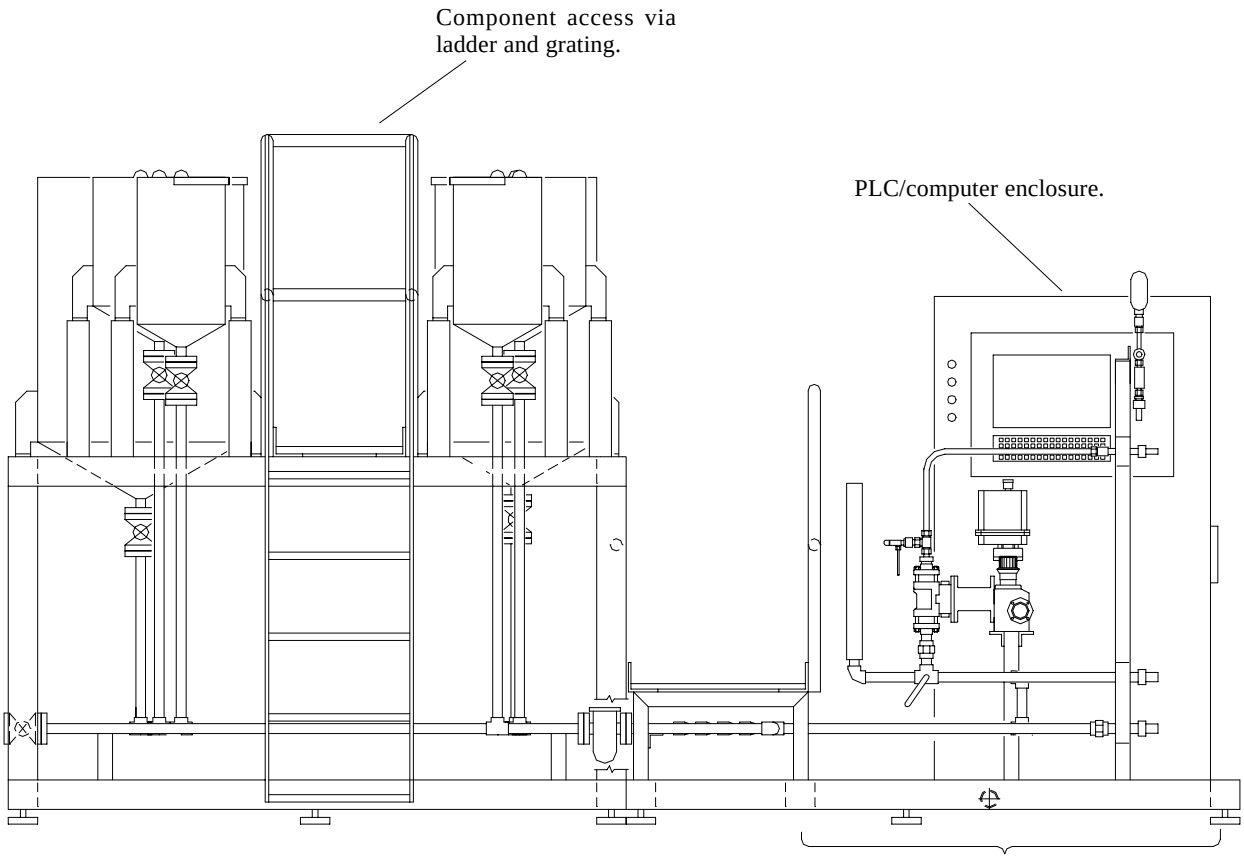


A family of hairspray formulas is ideally suited to a blending process where the resin phase is pre-batched in traditional batch equipment, and the remaining ingredients are blended with in-line equipment directly before filling. The module pictured above combines resin, water, alcohol, and the other minor liquids on-demand. Changeover between product varieties is accomplished with minimum scrap and the least amount of time.

Benefits

- Differing ratios of ingredients are nearly instantly changed to switch from one product to another.
- Automation provides the required degree of remote operation capability, product quality assurance data, and process control.
- Existing batch process is utilized at a higher degree with increased production rate and flexibility.
- Capital costs are minimized compared to the option of batching facility expansion.

Shampoo



A shampoo product line often includes several varieties which share slightly different levels of many common major ingredients, and a few product-distinguishing minor ingredients. Such product families are ideally suited to in-line blending. Liquid and dry metering can be controlled with automation to yield a blend process that requires less labor, is immediately responsive to filler demands, and reduces product changeover costs. On-line pH and viscosity controls maintain tight quality standards. Formula accuracies of ±1% are normally achievable.

Benefits

- Quality, productivity, and cost benefits of continuous over batch processing.
- Sequential mixing preserves correct order of addition.
- Process controls tighten quality consistency.

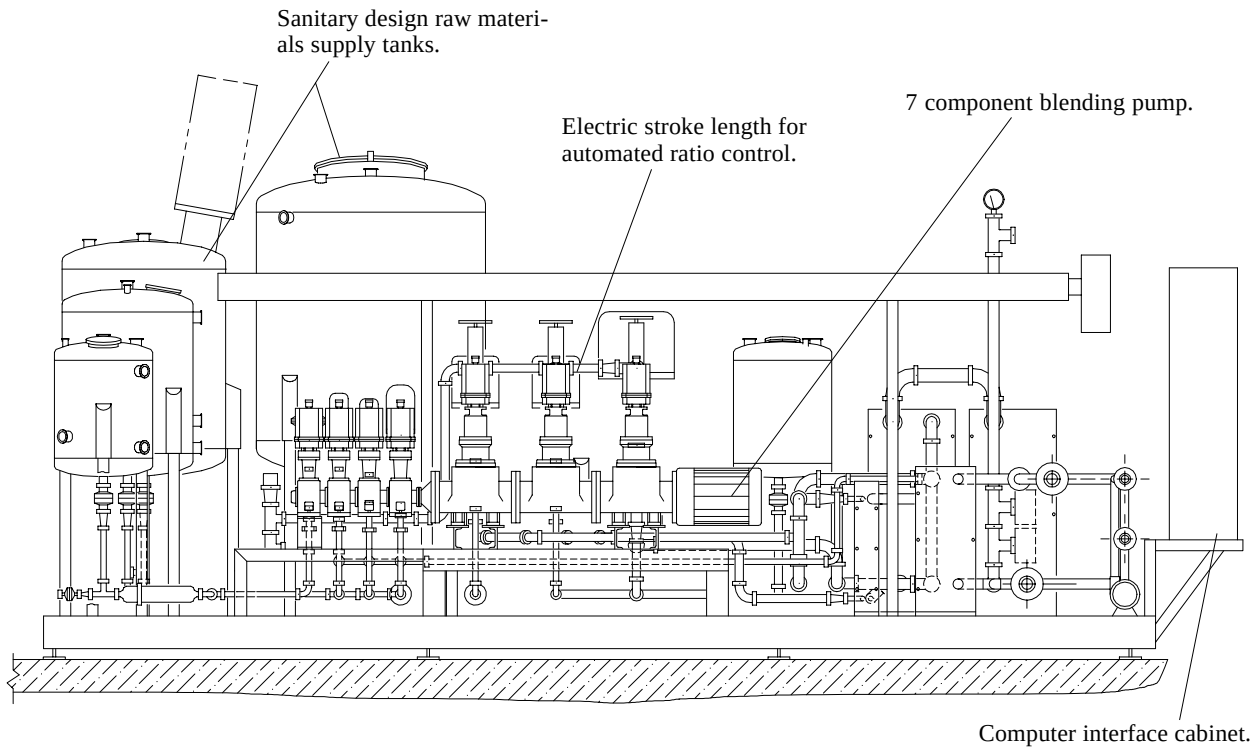
Shampoo

Computer/PLC controlled process provides automated formulation changeover.

Quick connects permit fast component changes.

Calibration vessels for manual flow checking.

Skin Care Lotion

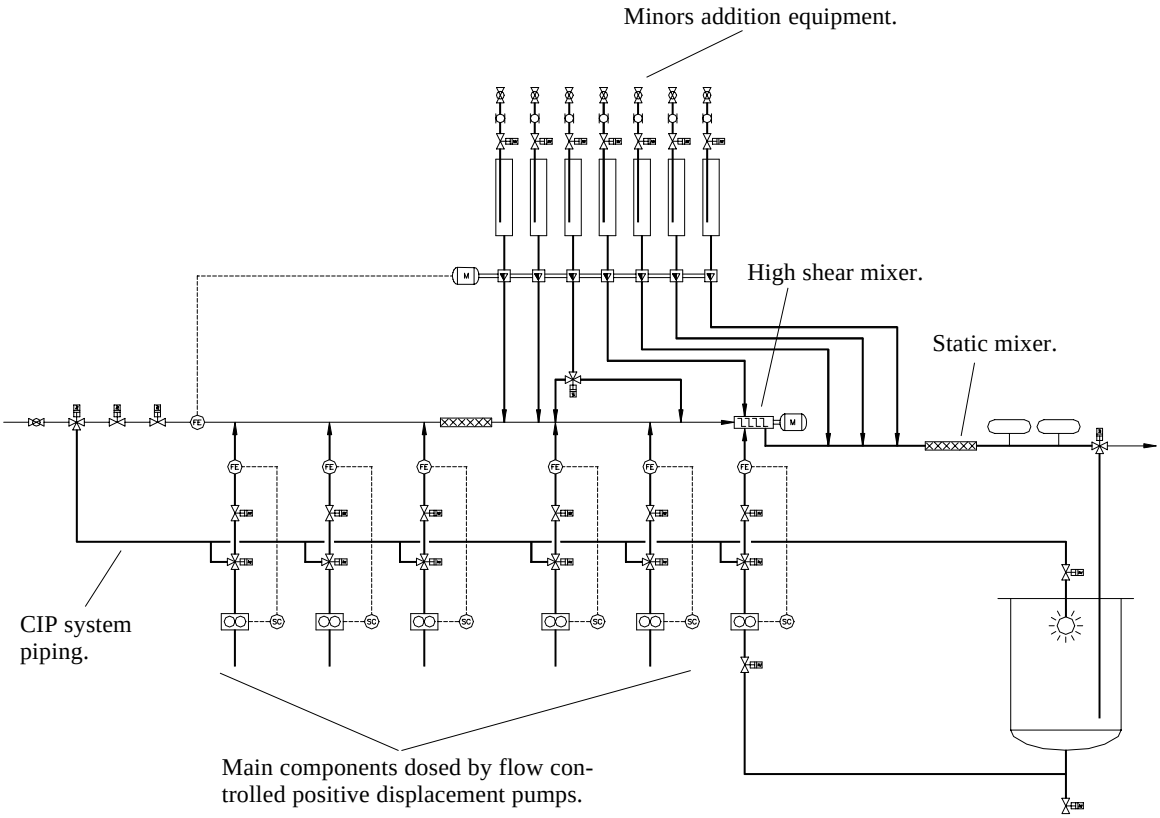


This product's sales volume was high enough to justify a dedicated blending process matched to high-speed filling equipment. Single product manufacturing from dedicated equipment represents the classical use of pure continuous processing and yields the highest productivity, lowest cost, and narrowest quality variance of any technique. Automation of this process was included to provide the operators with a window into the process from a remote control room with alarm and trending capability.

Benefits

- Replacing batch process reduces cost of goods.
- Preserves final product consistency by duplicating the order of addition mixing scheme and temperature adjustment.
- Tight factory space allotment and high capacity requirements both met.

Preservative-Free Cosmetics

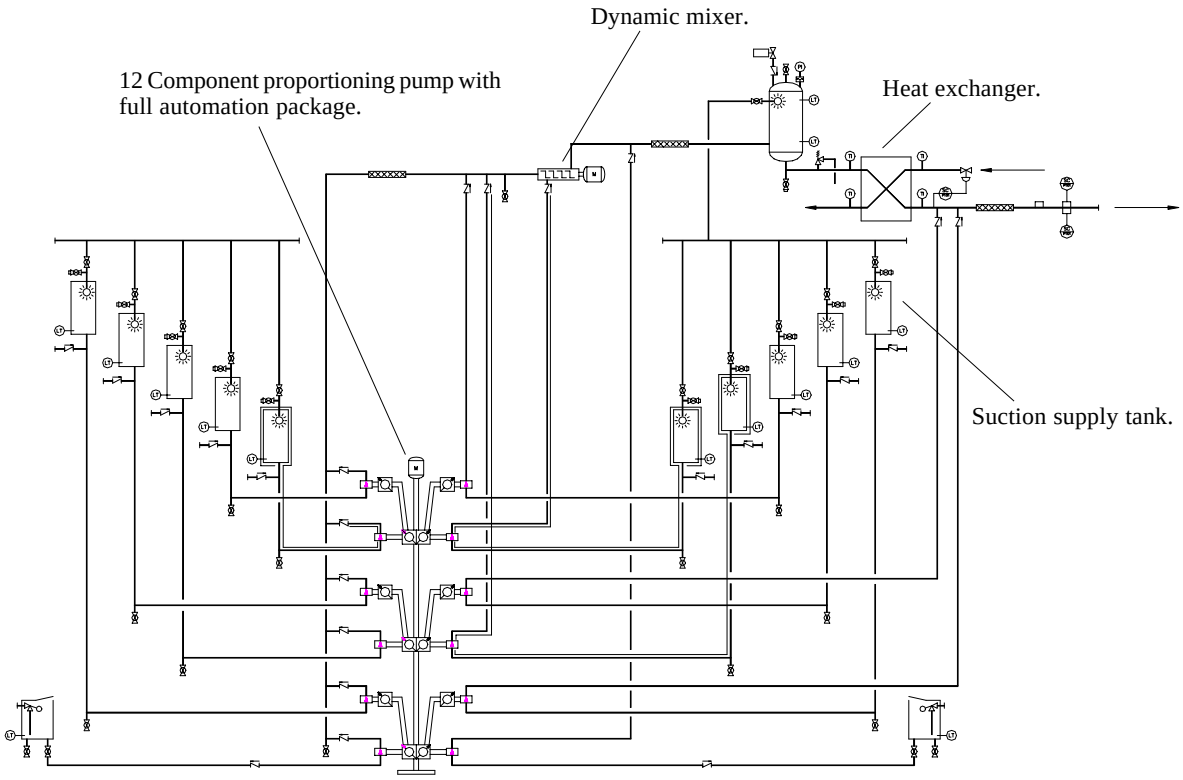


To capitalize on a “preservative-free” marketing claim, this manufacturer needed to change their batch blender. The open-system design did not prevent airborne microbials from entering the product. A closed-system in-line blender enabled the producer to remove all preservatives, yet maintain product shelf-life.

Benefits

- High hygienic standard in product contact zone.
- Metering, closed-loop flow, and on-line analysis ensure formula quality.
- Thirteen ingredients combined simultaneously.
- Marketing advantage of “preservative free” brought to the consumer.
- Make-on-demand concept fulfilled, reducing production costs.

Fabric Softener



Fabric softeners normally require hot and cold phase blending, normally consist of less than a dozen ingredients, and need a prescribed order-of-addition to maintain product integrity. At some point, an emulsion needs to be created, and pH and/or viscosity are controlling quality parameters. These combination of needs are well-served by an in-line, continuous blending concept. When multiple varieties of a formula are required, changeover can be accomplished quickly with such an approach.

Benefits

- About 20gpm from compact system.
- Minimal clean up/start up scrap.
- Minimized operator attention from automated process.
- Quality parameters continuously monitored.

Fabric Softener

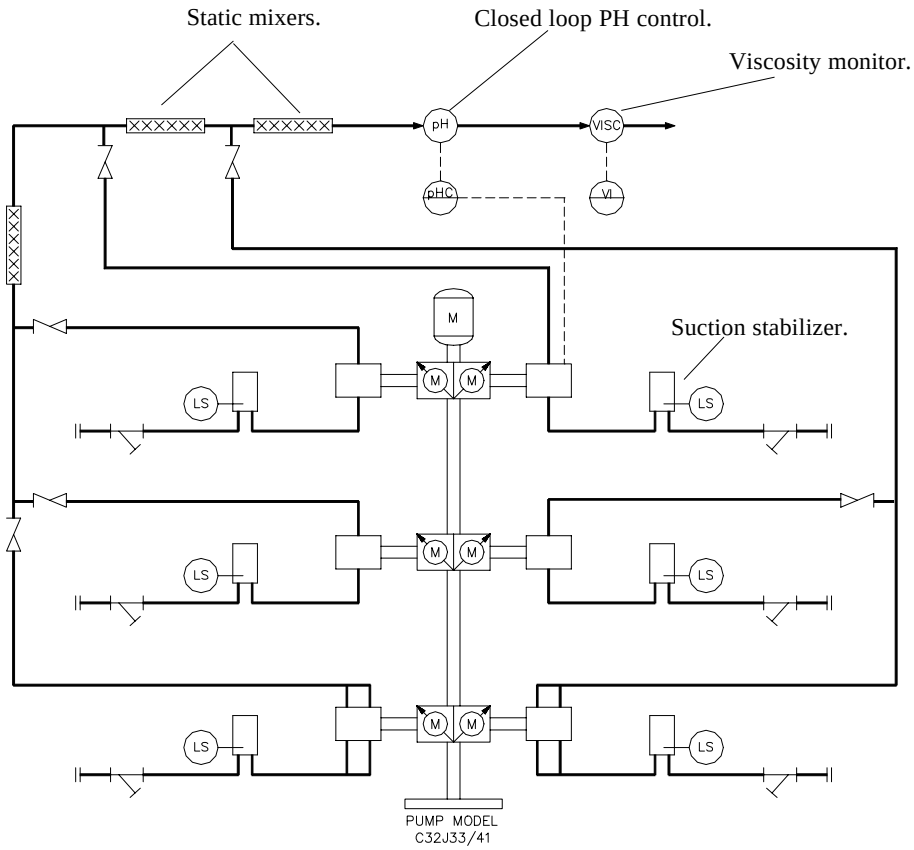
Load cells for loss-in-weight monitoring.

Multiple component proportioning pump.

Component design provides high capacity from minimal floor space.

Final product mixing manifold.

Antiseptic/Disinfectant



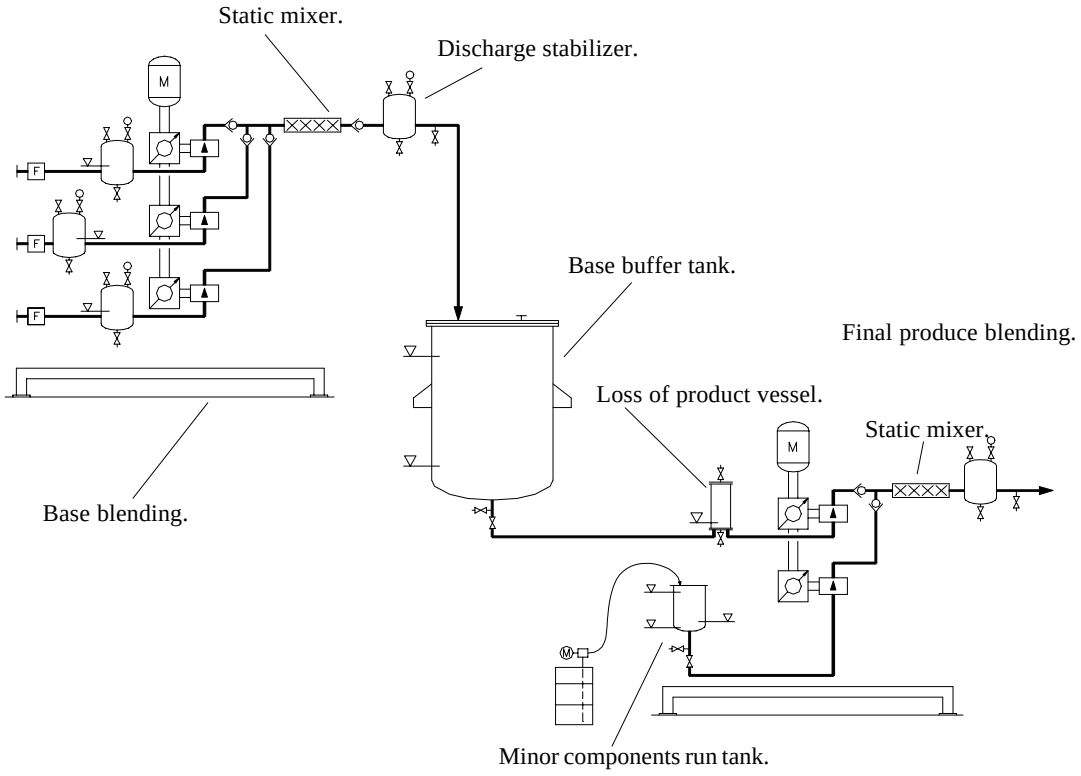
This high-volume, constant formula product was ideally suited to continuous blending. Automation eliminated nearly all required operator attention, and closed-loop control of quality parameters ensured and documented quality. The closed-system nature of continuous blending helped meet plant sanitary and emission standards.

Benefits

- No finished product inventory prior to packaging.
- Product flow fail-safe devices, pH and viscosity monitoring ensure quality.
- 100gpm from 45ft^2 process footprint.

Antiseptic/Disinfectant

Eau de Cologne

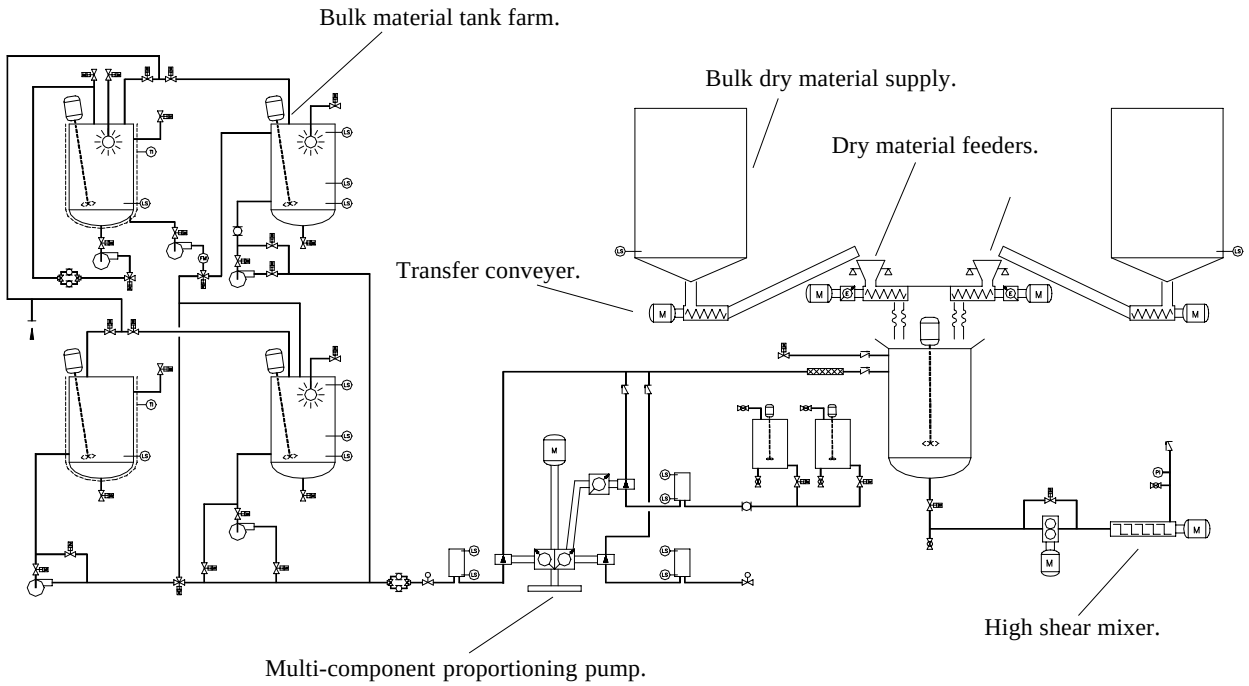


A high-volume fragrance consisted of four liquid ingredients. Three comprised the base, which was most efficiently manufactured in a plant location remote from the filler. The base was blended in-line and pumped by the same pumps used to meter the base ingredients to a small filler feed tank several hundred feet away. The final fragrance addition to the base was accomplished at the filler line, blending only the amount required, on-demand.

Benefits

- Perfume added continuously at filler line.
- Cleaning time and scrap minimized.
- About 1.5gpm from less than 100ft^2 of process space.
- Minimal inventory.
- Fragrance cost savings.

Plaster Bandage Suspension

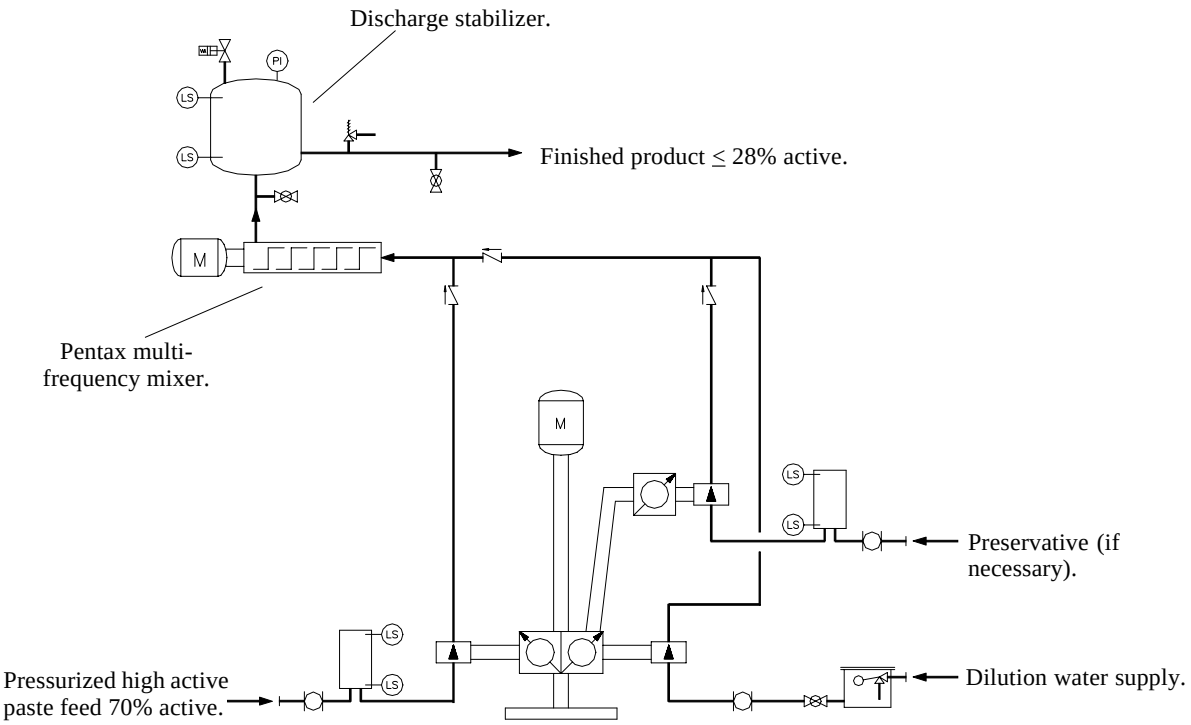


Complete solid/liquid handling metering and mixing process controlled and automated to plant DCS standards.

Benefits

- High automation reduces labor and materials costs.
- Continuous process with turnkey approach allows fast-track, single source responsibility.
- Dry materials are ratio controlled in-line to the liquid components minimizing work in process.

High-Active Surfactant Dilution

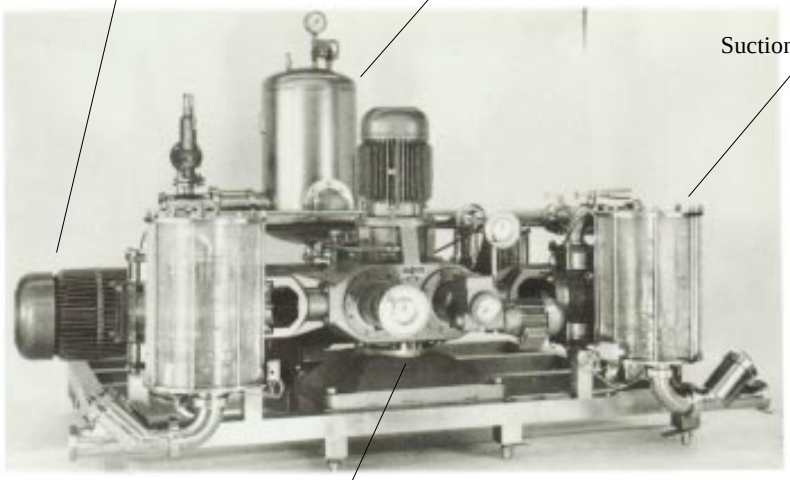


Many surfactants are available in concentrated form (±70% active). Their use in end-products normally requires dilution to ±28% active. Batch dilution can be very difficult due to viscosity anomalies—at intermediate concentrations, viscosities peak at more than 200,000cP. Frequently, batch mixing yields “fish eyes” and gel pockets that, once formed, are nearly impossible to homogenize. The in-line approach shown above eliminates this problem, and is used in more than 40 installations worldwide.

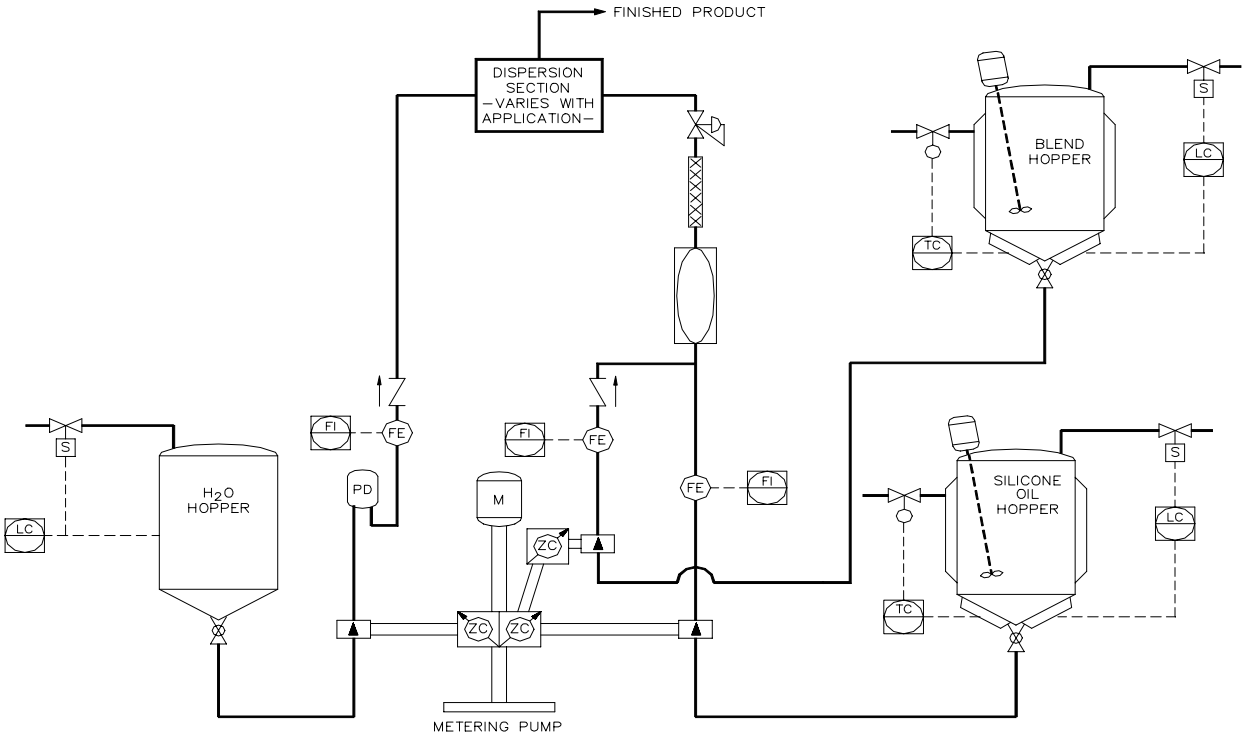
Benefits

- Shipping cost savings from high-active surfactant purchasing.
- Significant processing advantages over batch method.
- Reduced storage requirements.
- Compact, field-proven, trouble-free module requires minimal operator attention.

High-Active Surfactant Dilution



High Viscosity Silicone Oil Dispersion

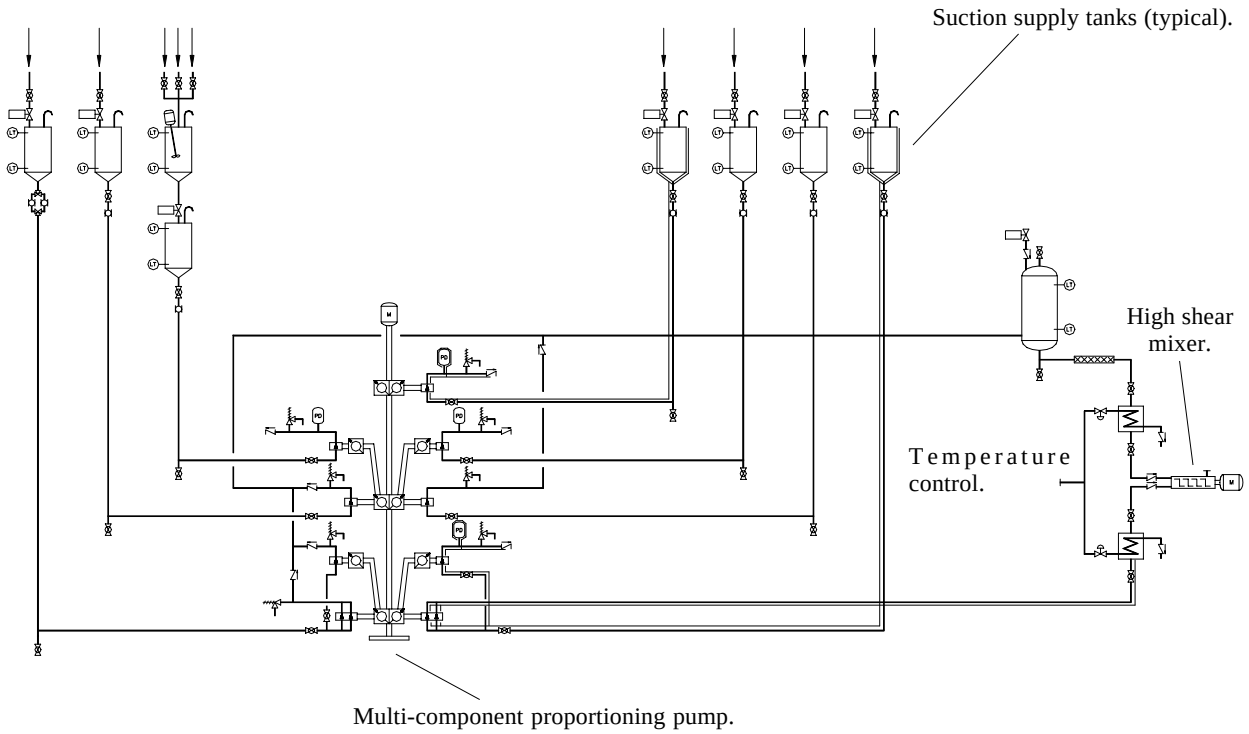


The system pictured above blends silicone oils and additives to create custom blends of silicone emulsions. It also improves upon flexibility, rate, and quality of the existing batch process, and accurately meters high viscosity material (±100,000cP). The complete system includes heat exchangers, tempered water module, proportioning pumps, in-line mixing, tanks, piping, and electrical. The mixing section utilizes a series of in-line mixers for emulsion control.

Benefits

- JIT manufacturing reduces inventory costs and shortens production/packaging cycle.
- Product consistency improved.
- Improves process capability.

Fatty Acid Neutralization

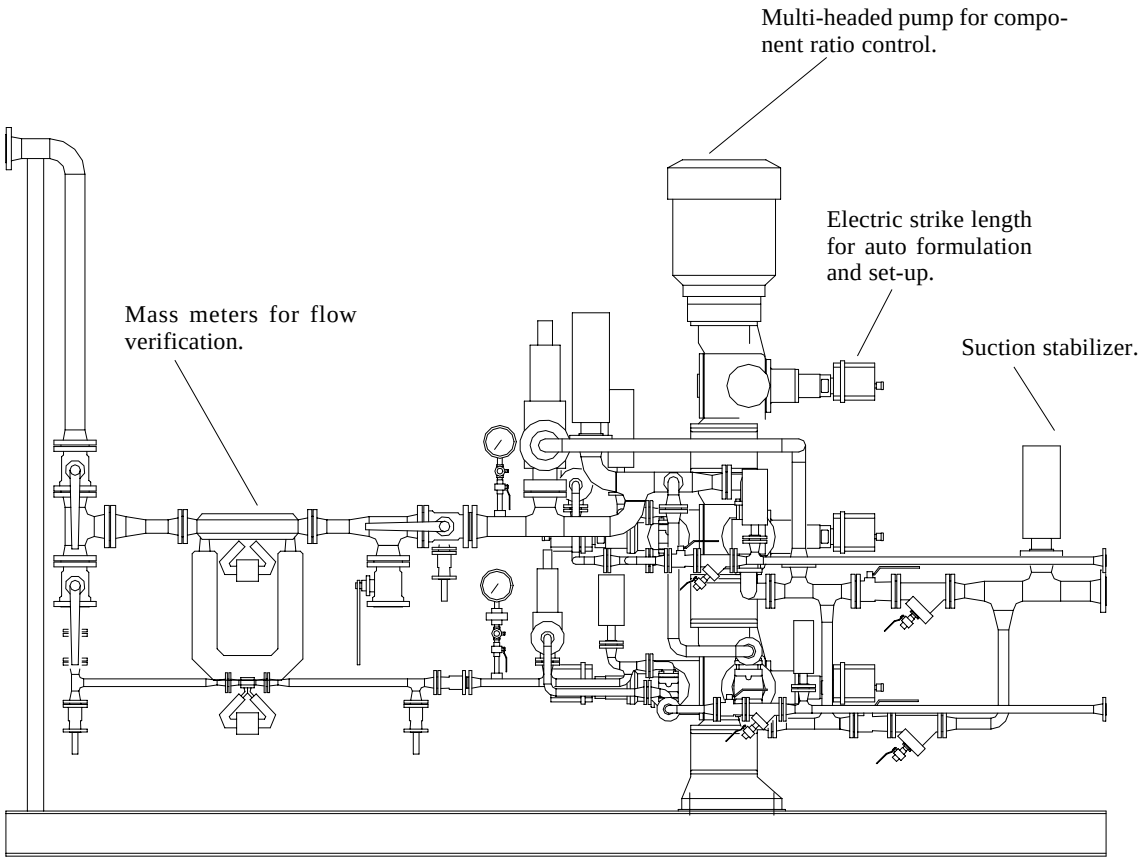


The fatty acid route to soap making is a continuous process requiring accurate liquid metering, in-line intensive mixing, and closed loop control of temperature and pH. Literally billions of pounds of high quality consumer bar soaps have been made with the reliable metering pump technology of Bran+Luebbe.

Benefits

- Accurate, consistent soap quality.
- Closed loop control on alkalinity.
- The world-standard for this application.

Sulfonic Acid Neutralization



Because this customer uses non-neutralized acid in their process, special demands on production are required. The process must be controlled by qualified personnel, requires a separate neutralization tank with a very powerful mixer, and requires longer production time because of considerable foaming. Bran+Luebbe developed a continuous neutralization process which solves these problems.

Benefits

- The production process is continuous.
- The raw material is metered via highly accurate metering pumps, which extract it directly from the storage tanks.
- Any degree of concentration can be selected or set.
- The reaction is completely closed.
- The product is airless and homogeneous.

Sulfonic Acid Neutralization

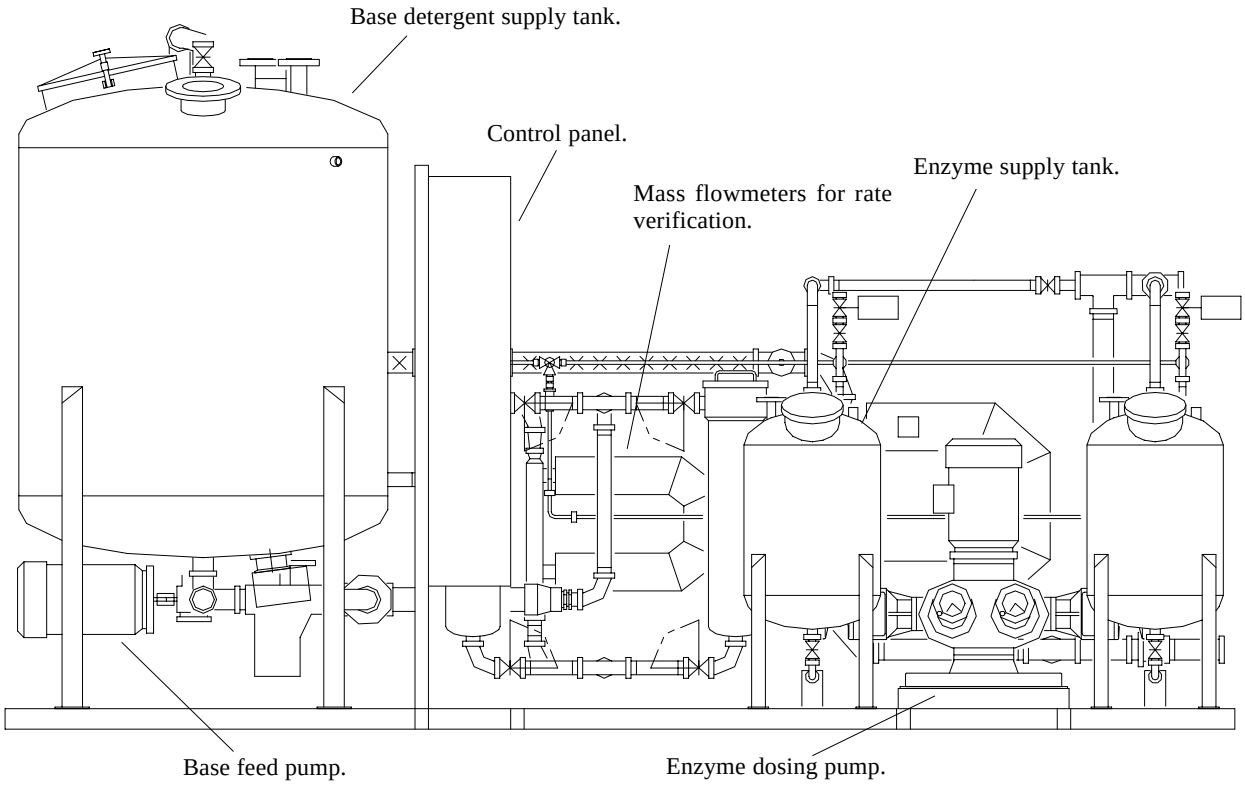
Multi-headed pro-portioning pump.

Suction stabilizer.

Mass flow meters.

Service access platform.

Enzyme Addition



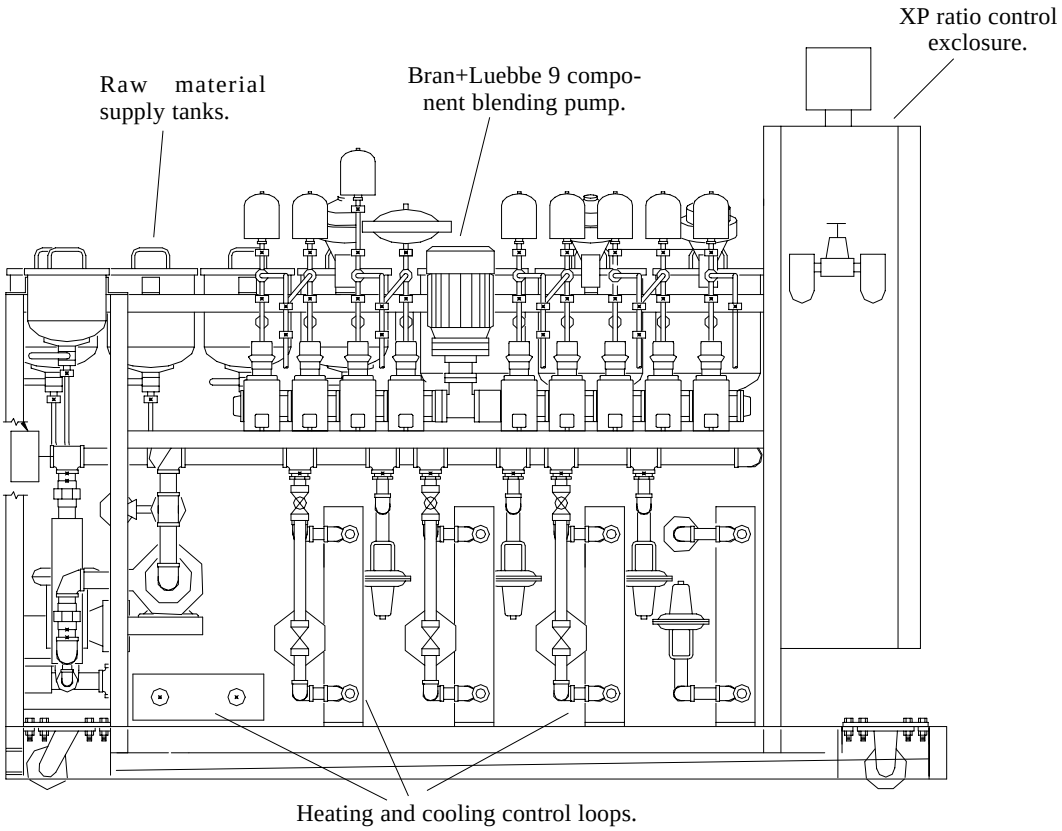
One manufacturer of liquid detergents recognized the potential employee health and safety risks associated with handling concentrated enzymes. This automated and closed-system blending module was developed to allow equipment and materials to be placed in an isolated part of the plant. Removed from the rest of the blending process, the system is controlled from a remote-mounted operator interface panel. A combination of metering and flow meter technology controls additive level, and also provides a documented history of the actual product manufactured.

Benefits

- Minimizes occupational health and safety hazards.
- Accurately controls, monitors, and documents key additive levels.
- Removes a potentially hazardous ingredient from the work area.
- Minimizes/eliminates cross contamination between enzyme and non enzyme products.
- Reduces washout, speeds changeover

Enzyme Addition

OTC Drugs



This manufacturers' production blending processes have evolved to include both batch and continuous methods for optimum quality and minimum cost. The product and process research and development group required a pilot process which simulated the production process, aided the product development effort, and provided scale-up data which closely related to the plant environment. This unit was built for portability and stand-alone operation upon field supply of electrical supply, cold water connection, air supply, and drain. Suitable for Class 1 Division 1 hazardous environment.

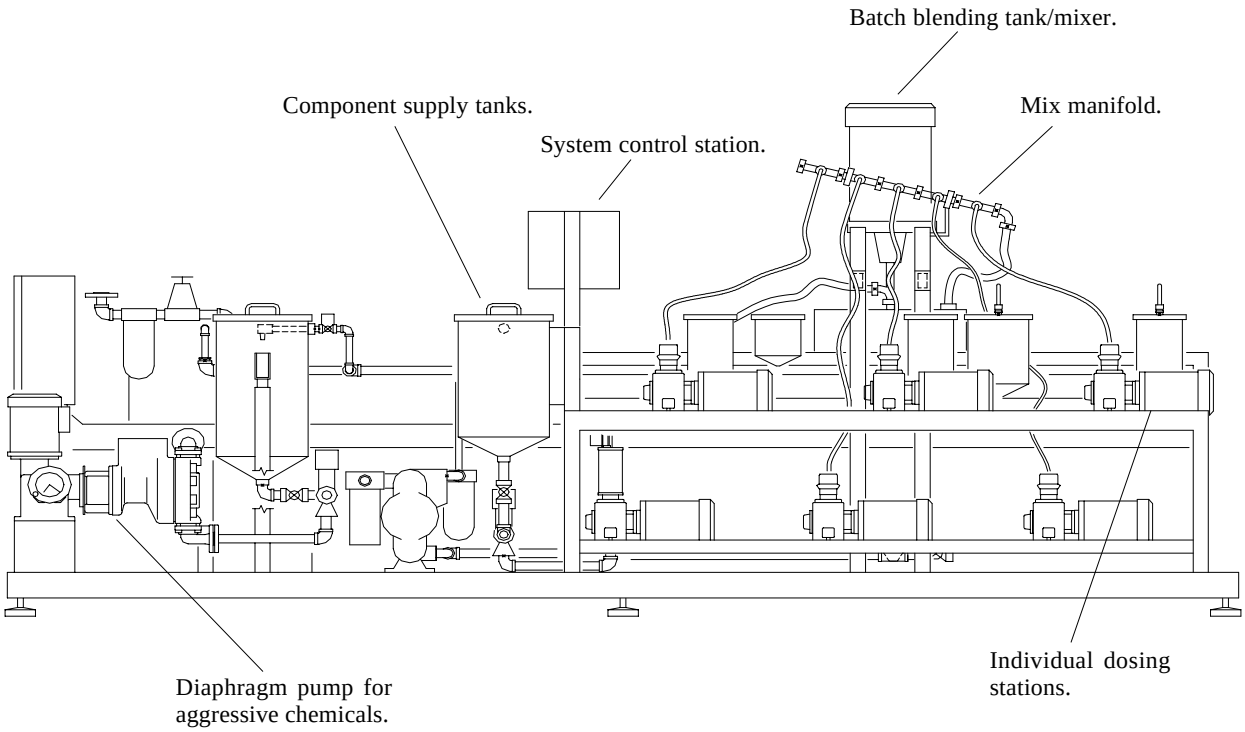
Benefits

- Products are developed with a process that is directly scalable to commercial size.
- Test market production runs are economically made.
- Pilot made products more closely match production made products because the processes are the same.

OTC Drugs


Supply tanks.
Bran+Luebbe's 9 component blending pump.
XP control enclosure.
Stainless steel baseframe.

Batch Processor for Cleaners



This complete batch system duplicates the plant batch process, providing scale-up data and expediting process optimization experiments. Batch controlling software, Bran+Luebbe's Formula Process Manager 1000, gives the pilot engineer a tool with which to build formulas, construct batch cycles, and simulate batch experiments. When a trial is to be run, information from the personal computer is down-loaded to the blender PLC, and the appropriate ingredients are loaded into the unit. When the batch cycle is begun, all rate of addition, mix and hold periods, order of addition, and other key parameters are automatically executed by the process.

Benefits

- Accurate and scalable results from pilot to plant scale.
- Sensible automation for state-of-the-art pilot process development.
- Capable of short production runs of new products.

Batch Processor for Cleaners

Component supply tank.

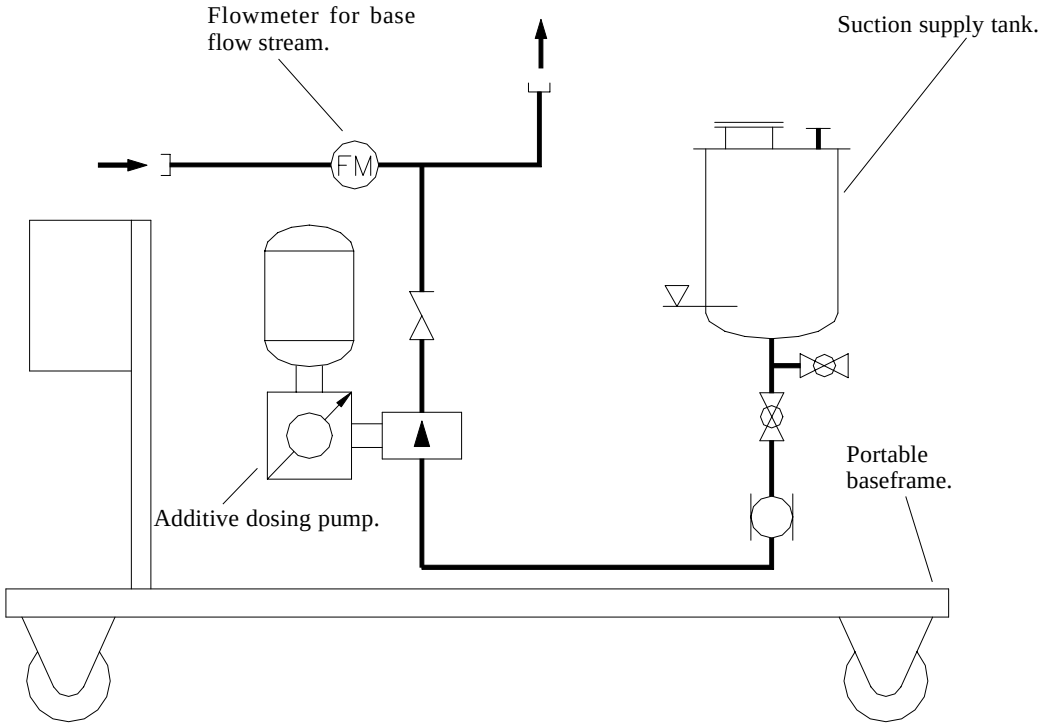
Mix manifolds.

Control station.

Load cell control station.

State of the art formulation manager.

Preservative Addition to Bulk Ingredient

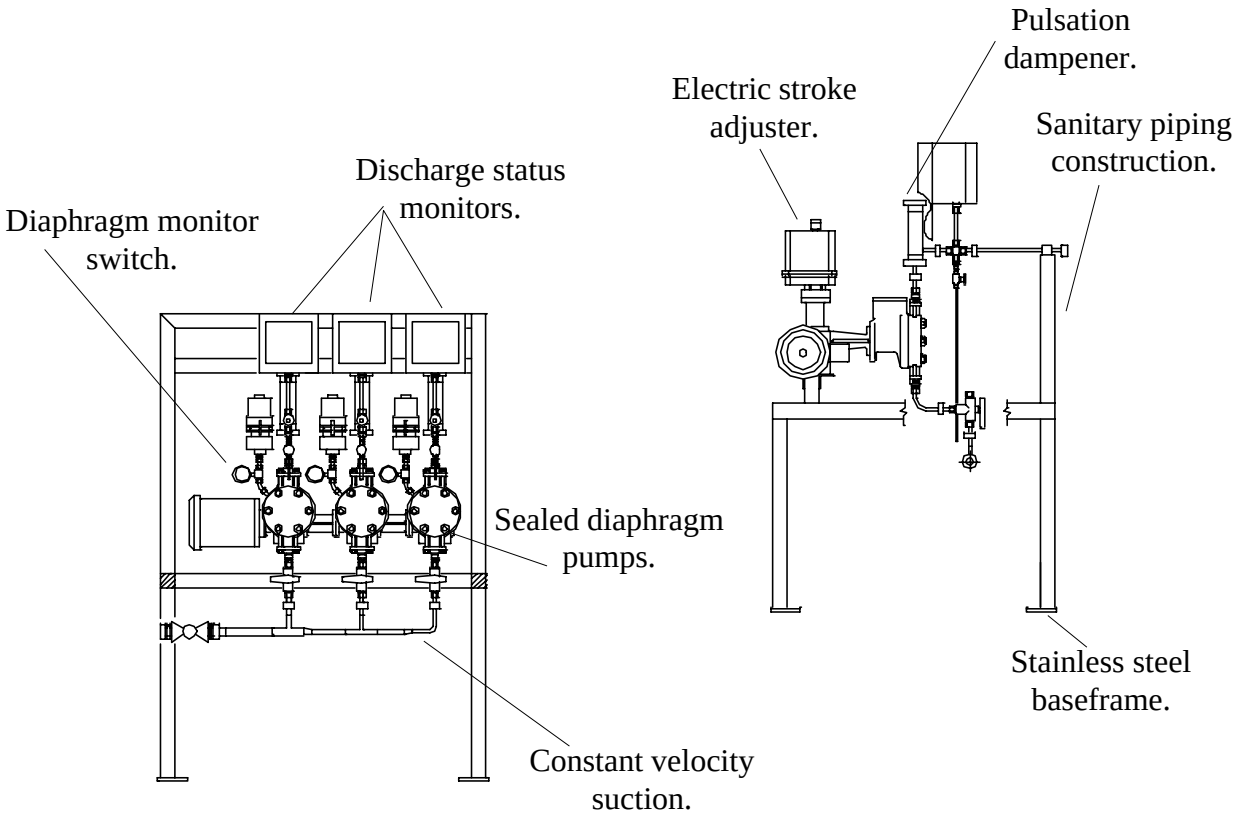


Pictured above is an example of the in-line metering technique used to solve a particular problem with a low cost, simple, yet reliable, machine. A manufacturer purchased bulk truckload quantities of a liquid ingredient and needed to add a preservative to it prior to in-process storage in their plant. Rather than manual addition into a large storage tank, this portable, self-contained unit automatically adds preservative as the main ingredient is transferred from the truck to the plant.

Benefits

- A self-contained sturdy system for reliable plant use.
- Cost savings in materials and labor over previous addition method.
- Portability of unit allows for multiple applications.

Pill Coating Slurry

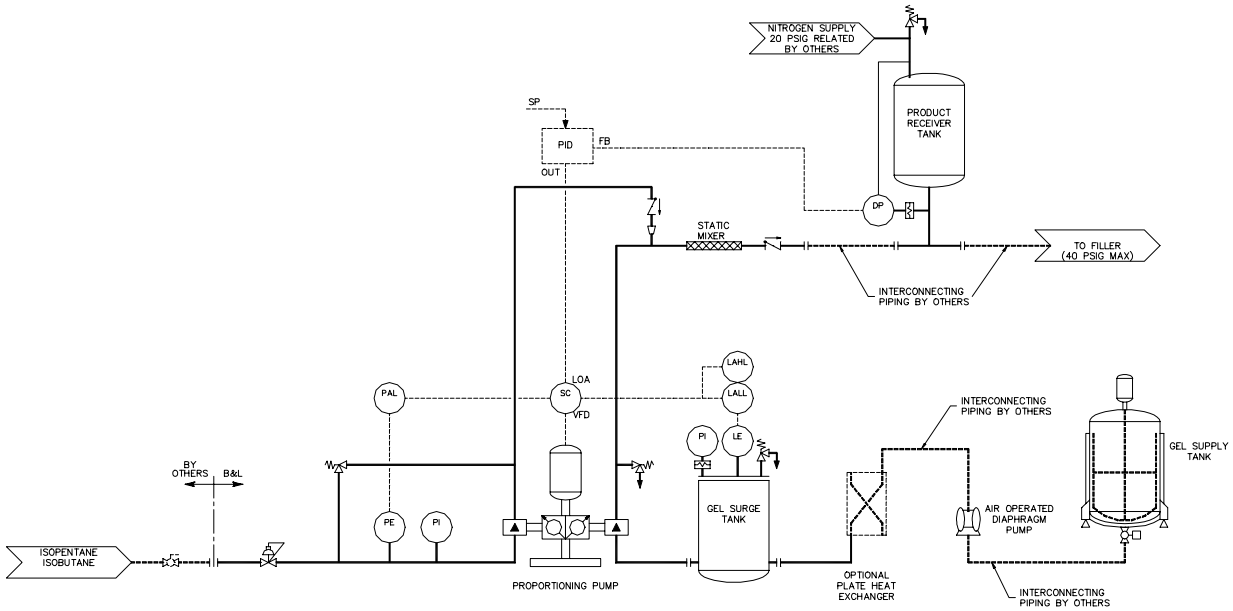


This equipment virtually eliminates operational problems that could exist with the pill coating equipment. The system precisely delivers a pill coating slurry to distribution headers in the pill coaters. Equipment provides uniform flowrates to multiple locations and alarms process upset conditions. Multiple units are in production.

Features include:

- Constant velocity suction to eliminate slurry settling.
- Explosion proof, class 1, division 1 construction.
- Uniform application rates delivered to pill coater.
- Automatic alarm for feeder distribution fault.
- Eliminates off-spec due to coating application problems.

Shaving Gel Hydrocarbon Injection



Many problems are overcome by utilizing an in-line system for hydrocarbon gel proportioning and blending. Blending in a sealed environment eliminates foaming and maximizes hydrocarbon usage.

The gel and hydrocarbon phases are combined in exact proportioned and blended. The finished blend is then routes to a product receiver tank which acts as a surge vessel to minimize the impact of packaging line starts and stops. (Dynamic mixing is optional.)

Benefits

- Production on-demand to filler packaging rate.
- Proven process, modular system design.
- On-line hydrocarbon adjustment; precise control of gel/hydrocarbon ratio.
- Enhanced foam out times.
- Entire process maintained above hydrocarbon vapor pressure.

Personal Care Industry Proven Applications

- Mouthwash
- Gel Shave Cream
- Soap Additives
- Liquid Household Cleaners
- Surfactant Dilution
- Skin Care Lotions
- Prescription Tablet Coatings
- Shampoo
- Hair Conditioner
- Liquid Cosmetics
- Deodorants/Anti-Perspirants
- Hair Setting Gel
- Custom Pilot Systems
- Intravenous Emulsions
- Hairspray
- Baby Oil
- Cologne
- Pill Coating Slurry
- Disinfectants

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