



THE FRED D. PFENING COMPANY  
DEDICATED TO THE BAKING  
INDUSTRY SINCE 1919

## MINOR INGREDIENT SYSTEMS

A minor ingredient system automatically weighs ingredients and delivers them directly to a mixer or a portable container. The system improves productivity, batch accuracy and quality control and will provide many years of reliable, trouble-free service.

**A basic minor ingredient system includes:**

- Ingredient storage bins.
- Ingredient feeders.
- Precision scales for accurately weighing ingredients.
- Hoppers or portable containers for receiving weighed batches.
- Dust collection system.
- PLC or computer-based batching control system.

**More sophisticated systems may include:**

- Remote ingredient bag dump or bulk bag unloading stations.
- Vacuum or pressure air conveying systems.
- Delivery to multiple use points.
- Provisions for multiple deliveries per batch.
- Control of mix time, rework, etc.

**Related systems are (see separate brochures):**

- Bulk flour systems.
- Bulk sugar systems.
- Powdered sugar systems.
- Liquid ingredient systems.
- Batching control systems.



**A minor ingredient system offers many advantages:**

- Provides accurate amounts of each ingredient without human error.
- Higher productivity with system automation.
- Provides automated electronic record keeping and inventory control.
- Eliminates open bags and bins in mixing area.
- Centralizes ingredient handling.
- Improves dust control.
- Saves floor space.

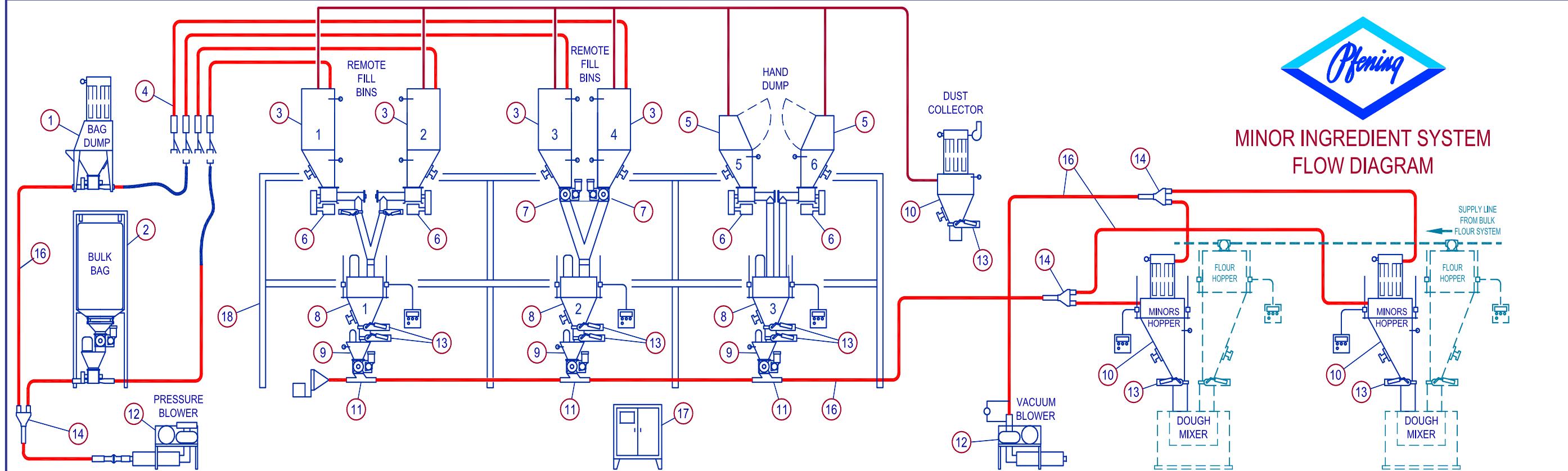
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## MINOR INGREDIENT SYSTEM FLOW DIAGRAM



### TYPICAL MINOR SYSTEM FEATURES (for more details see individual brochures):



1. **Bag-dump stations** – Pfening bag dump stations are integrated into the pneumatic conveying system for remote filling of ingredient bins from bags or containers. These stations include a fully enclosed, stainless steel dump hopper, with safety grate and gas-spring assisted door. The dust collector may be integral or remote. A rotary feeder is mounted to the bottom of the unit.



2. **Bulk bag unloaders** – For materials used in amounts justifying bulk bags of 1000 pounds or more, Pfening offers unloaders which feature integral hoists, spout connectors, paddle and/or vibratory dischargers, and feeders for connection to pressure or vacuum conveying systems. Bulk bags are set in place, the discharge spout is connected, and then it is automatically emptied by the discharger.



3. **Remote fill bins** – These are larger bins, filled from a remote bag dump station or bulk bag unloader. They are generally round, equipped with individual dust collectors or connections to a central remote dust collector, and provided with level controls. Vibratory or fluidizer-type discharge are provided as needed. The discharge connects directly to a screw feeder or rotary feeder. Bins may be stainless steel, aluminum, or mild steel as required.



4. **Remote bin fill tubes** – Fill lines to each ingredient bin are manifolded into a hose connection station. Each tube is clearly marked and interlocked with limit switches to ensure that the proper material is loaded into each bin. The operator connects the hose from the bag dump or bulk bag unloader to the appropriate fill tube where the interlock controls confirm the material on the control panel.



5. **Hand dump bins** – These are stainless steel bins constructed for direct bag dumping of ingredients into bins. They have a bag support grate, gas spring assisted cover, and are connected to a dust collection system. Vibratory or fluidizer type discharge are provided as needed. The discharge connects directly to a screw or rotary feeder.



6. **Screw feeders** – Rugged screw feeders are sized for the volume of the material to be discharged and continuously welded with sanitary flighting. The units are provided with a secondary outlet for emptying material from the bin for clean-out. The drive is mounted underneath to allow full disassembly. A variable frequency drive (VFD) is provided for scaling accuracy, allowing high-speed operation for most of the delivery, then a slow speed “dribble” at the end.



7. **Precision rotary airlocks** – For certain applications airlocks may be provided. Pfening has developed innovative rotor designs to improve airlock discharge accuracy. For this application, a variable frequency drive (VFD) is standard, allowing high-speed operation followed by a slow speed “dribble” for improved scaling accuracy. Cast iron, stainless steel and hard-chrome construction are available.



8. **Scale hoppers** – Stainless or mild steel hoppers are mounted on electronic load cells that weigh ingredients. The hoppers are sized for the application and generally have multiple inlet openings and an air filter. The load cells are S-type stainless steel sealed units suspended from vibration isolators for superior performance. The scale hopper is equipped with a butterfly valve discharge and has vibratory and/or air fluidizer type discharge.



9. **Surge Hopper** – These isolate the scale hoppers from the conveying line. They receive the weighed ingredients and discharge them into a rotary feeder. An inlet butterfly valve provides complete isolation for the scale hopper from the disturbances of the conveying air, insuring maximum weighing accuracy. An air filter bag is provided to control dust and vent air in or out of the surge hopper. A level control is standard, along with vibratory or fluidizer type discharge.



10. **Receiving hoppers** – Stainless or mild steel hoppers are generally mounted on electronic load cells to receive ingredients from the conveying system and discharge it into a mixer. The load cells are S-type stainless steel sealed units with precision bearing type suspension for superior performance. The load cells are carefully matched to the application for unsurpassed accuracy. The receiving hopper is equipped with a dust collector and vibratory and/or air fluidizer type discharge aids.



11. **Rotary feeder** – Precision machined, heavy-duty rotary vane, blow-through type feeders meter ingredients into either a pressure or vacuum conveying line. Standard construction is cast iron body with steel rotor. Includes rugged low-maintenance gearmotor with guard and chain drive. Stainless steel and hard chrome construction are also available.



**12. Conveying blower** – Pfening conveying blowers, either pressure or vacuum, utilize a rugged industrial grade positive displacement rotary blower and a premium quality energy efficient motor with v-belt drive. The frame is a sanitary, all-welded open design to minimize dust accumulation. An efficient intake-filter/silencer and discharge muffler are standard, along with a check valve, relief valve and pressure switch with gauge. Pfening's long experience with bulk system engineering provides more accurate blower sizing, resulting in lower initial costs and operating expenses than the oversized units frequently furnished by less experienced firms.



**13. Butterfly valves** – The scale hopper is equipped with a butterfly valve for quick discharge. This valve has a sanitary, corrosion resistant aluminum body and a food-grade white rubber seat for a tight seal. It is operated by an air cylinder and equipped with a solenoid valve. The valve may have either a fabric discharge sleeve or a stainless steel spout. Available in 10" and 12" sizes.



**14. Diverter valve** – The three-way diverter valve switches flow from one conveying line to another. It has a lightweight corrosion-resistant aluminum body and a precision-machined bronze diverter vane. There are no rubber parts or seals in the product zone. The valve is operated by a stainless steel air cylinder and comes complete with solenoid valve, position switches, and wiring harness for easy installation. It is available in 3", 4" and 5" sizes. Stainless steel and hard chrome versions are also available.



**15. Dust collector** – Easy-open, top-access dust collector is used to vent conveying air from bin filling and air conveying. Housing is stainless steel and filters snap in from the top side and require no tools. Filters are washable FDA compliant cartridge type with PTFE membrane for effective filtration and dust release. Reliable, reverse pulse on-line cleaning is used during collector operation. Efficient design minimizes air consumption and maintenance.



**16. Conveying tubing** – Standard ingredient system piping is 3", 4", or 5" O.D. lightweight aluminum tubing. Four-bolt clamp type gasketed couplings with grounding strap are standard. Supports include heavy-duty clamps with hangers and bracing for securing conveying tubing. Elbows are precision formed, smooth both inside and out. Intermediate radius elbows are used, as they have been demonstrated to be more efficient than short or long radius elbows. Stainless steel tubing and elbows and sanitary connectors are available for special requirements.



**17. Batching and control system** – Pfening provides ingredient batching control systems designed to suit the application. The control system ranges from semi-automatic, requiring operator input at key steps, to a fully automatic, computer-based recipe management system that produces batches from a central production schedule. The operator interfaces (HMI) are generally touch-screen panels programmed specifically for the project and enable the operator to control the system, track inventory and troubleshoot problems. The logic tasks are usually performed by a PLC, but are computer-based where complex recipe and batch management is required. These systems may be programmed to provide data to central Management Information Systems. Pfening supplies Allen-Bradley components and Rockwell software as standard.



**18. Hopper support stands** – Pfening can provide support stands if it is impractical to hang the scale hoppers from the ceiling. These may be as simple as a four-legged structural framework or may include complex walkways, access/service platforms, and integral pipe and tubing supports. They may be for single or multiple hoppers. Stainless steel or mild steel construction is available.

## INSTALLATION, START-UP AND TRAINING SERVICES

Pfening can provide full turnkey installation in your facility, including startup service and operator training. Experienced field supervisors, mechanical installers and electricians are available to install all Pfening equipment. Expert Pfening engineers will commission the system and train the operators on its use, sanitation, and maintenance. These services may be ordered with the equipment or added any time.

Pfening will be ready to supply parts, service, and technical assistance now, next year, or in ten years. We have been in business since 1919.