



RAW MATERIAL STORAGE & BLEND SYSTEMS

Intelligent and safe bulk chemical storage and blending systems

- » Comprehensive solutions for unloading, storing, transferring, blending and conditioning of raw materials

What are bulk chemical storage and blending systems?

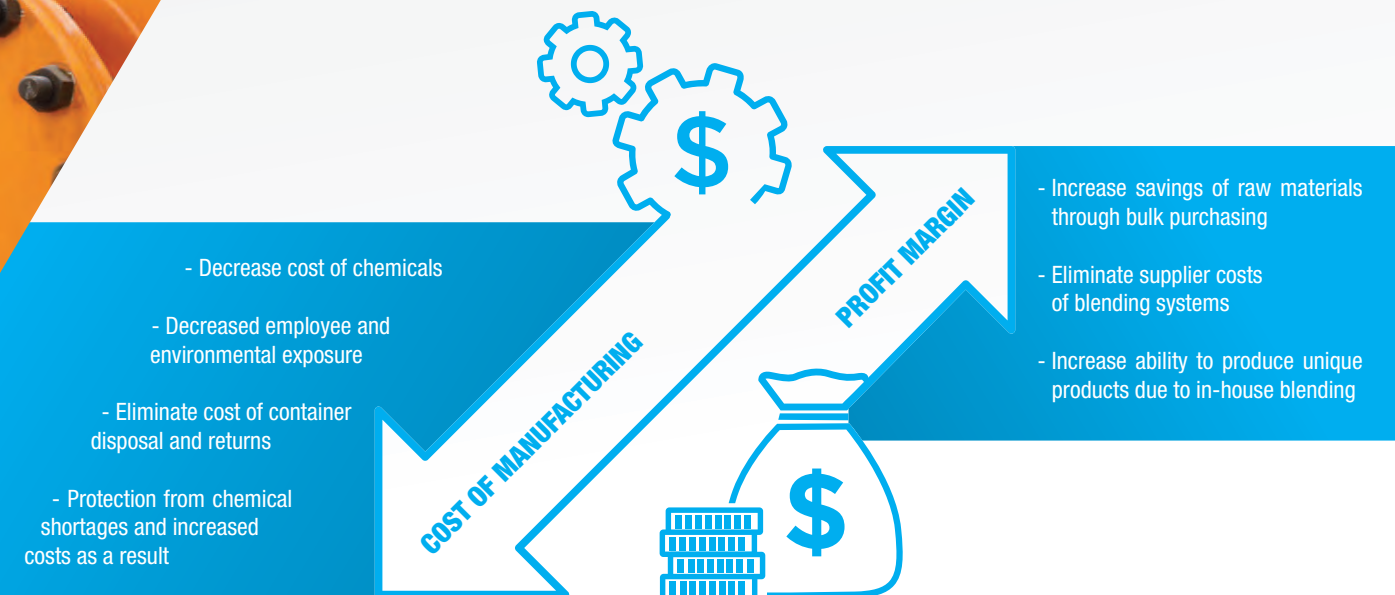


Chemicals are the largest expense in manufacturing polyurethane products. Bulk raw material storage and blending systems help reduce costs and boost profits by:

- >> Protecting the processor from volatile raw material markets by allowing bulk purchases.
- >> Protecting the chemicals from contamination and process inconsistencies that adversely affect product quality.

Bulk chemical storage systems unload, store and transfer intermediate to large quantities of raw materials within a closed loop, minimizing opportunities for contamination, spills, evaporation and employee or environmental exposure.

Blending systems allow in-house formulation of liquid or liquid and solid particle blends to achieve the specific characteristics of an end product. Polyols typically require the addition of blowing agents, activators, emulsifiers, foam stabilizers, flame retardants or other auxiliary materials to achieve those characteristics.



Advantages of bulk storage and blending:

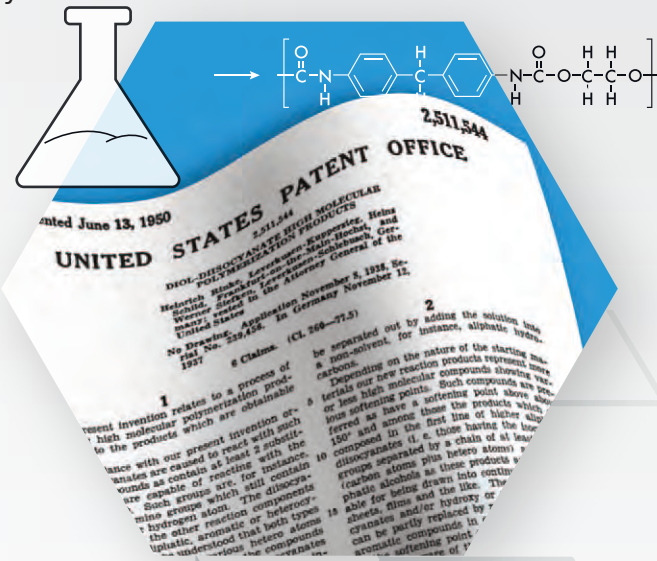
- >> Lower chemical and transportation costs. Buy raw chemicals at commodity prices and transport them at a lower cost per unit.
- >> Lower disposal and labor costs. Larger storage tanks mean fewer drums, bags or totes that require handling and disposal or return.
- >> Improved employee safety and environmental protection. A closed-loop system presents fewer opportunities for exposures and spills.
- >> Reduced factory space for chemical storage.
- >> Protection from outside contaminants, moisture, entrainment of air and evaporation of blowing agents or additives
- >> Increased quality, as well as the ability to produce unique products through in-house blending
- >> Improved profits through more efficient use of raw materials, better chemical consistency and higher quality final product

Why Hennecke?

As a leading global manufacturer of polyurethane processing equipment, the worldwide Hennecke GROUP has the most extensive knowledge of polyurethane chemistry and the conditions and equipment required to maintain process control.

Hennecke Inc. with headquarters in Pittsburgh (PA), has more than 50 years experience when it comes to designing, supplying, installing and commissioning bulk storage and blending systems, beginning with the company's roots as part of a major chemical manufacturer and supplier in the 1960s.

We understand the little things that can turn into big production problems. We make sure those details are addressed so that our worldwide customers can make quality products cost effectively.



Hennecke advantages:

- >> Vast knowledge of circumstances that influence cost-effective raw material storage and processing including the demands that downstream equipment can place on storage and blending systems.
- >> Wide product portfolio. We are the only machinery, plant and system supplier capable of providing solutions for all core technologies in polyurethane processing.
- >> Besides our corporate headquarters in Germany, the Hennecke GROUP operates a total of 13 branches in the world's most important economic hubs. Besides the US, these include China, South Korea, India, Mexico, Russia and Italy. A worldwide network you can rely on.
- >> Our regulatory experience enables us to meet safety, environmental and certification requirements around the world. This also puts us in a position to offer customers worldwide market-oriented bulk chemical storage solutions, regardless of whether PU applications or non-PU applications are on focus.
- >> Exceptional 360°SERVICE customer support. Our experienced engineers, technicians and service personnel can design, install and commission your system, train your employees, and provide service and parts support throughout the life of the equipment.

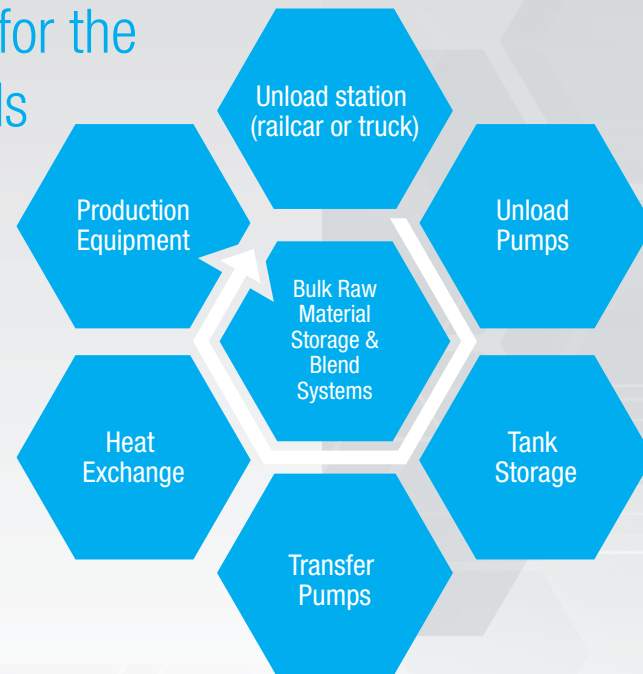


Modular systems designed for the customer's production needs

Hennecke storage and blending solutions are available in a range of types, sizes and modular configurations. Our design engineers work with customers to determine the best combination of storage and blending equipment to satisfy their unique chemical and production requirements.

Bulk storage systems for larger volumes of chemicals include unloading stations for materials delivered by tanker truck or rail car, storage tanks, transfer pumps and all required controls, valves, instrumentation, safety devices and piping.

Intermediate Bulk Container (IBC) stations and bag, drum and holding tank systems also are available for storing smaller quantities of liquid and solid raw materials.



- >> Store and transfer single material streams from one tank or multiple streams from multiple tanks
- >> Medium and large volume systems available with large tank or multiple tanks for the same chemical stream

- >> Multiple stream systems available with storage methods and blending stations to handle liquid chemicals, powdered materials, flammable blowing agents such as Pentane and liquified gases such as CO₂.

Bulk unload stations with pump or pressure transfer

Bulk unload stations are designed for safe, efficient unloading of liquid raw materials delivered by tanker truck or rail car.

The delivery tanker begins unloading chemicals by connecting to pipe couplings and valves mounted in an unload station box. For high viscosity chemicals or longer distances, unload pumps move the chemical from delivery tanker to the bulk storage tank. For short distances and low viscosity materials, a pressure transfer method may be used. A blanket of dry air or nitrogen pressurizes the delivery tanker to push the chemical from tanker to the bulk storage tank.

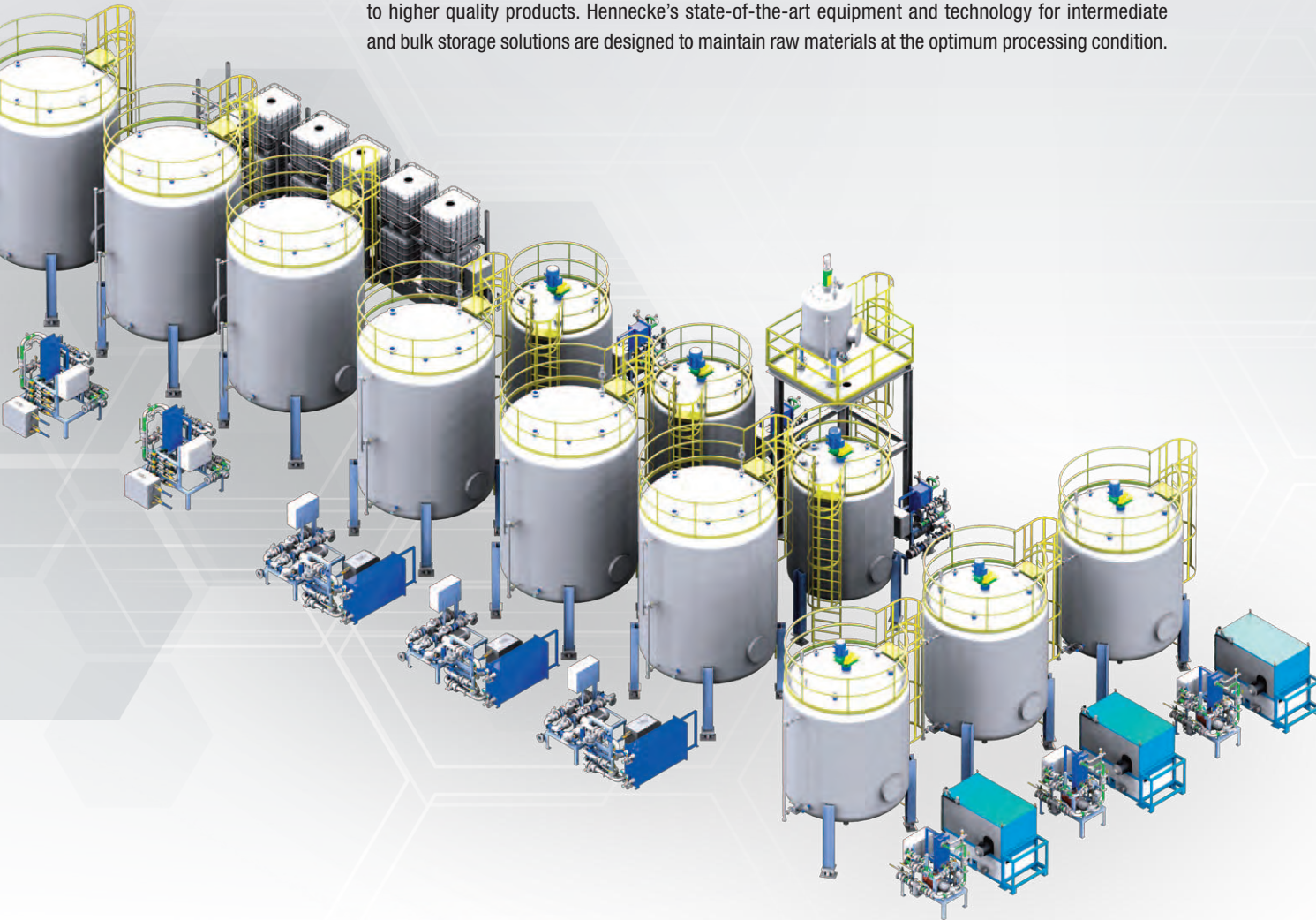


Unload stations with unload pumps feature:

- >> Lockable station boxes for valves and connections to protect systems from tampering and erroneous chemical connections
- >> Dedicated unload pumps available to handle a broad range of flow rates and viscosities
- >> All necessary piping and process, vent and by-pass valves; filters or strainers; and instrumentation
- >> Designed to allow for unloading to single or multiple storage tanks without overfilling
- >> Containment basins, safety instrumentation and control systems available to minimize environmental and employee exposure to chemicals
- >> Additional components for transferring sacks or decanting totes and drums of smaller volume raw materials also available

Raw material storage systems sized to customer needs

Stable storage and handling of polyol, isocyanate, blowing agents and additives ultimately lead to higher quality products. Hennecke's state-of-the-art equipment and technology for intermediate and bulk storage solutions are designed to maintain raw materials at the optimum processing condition.



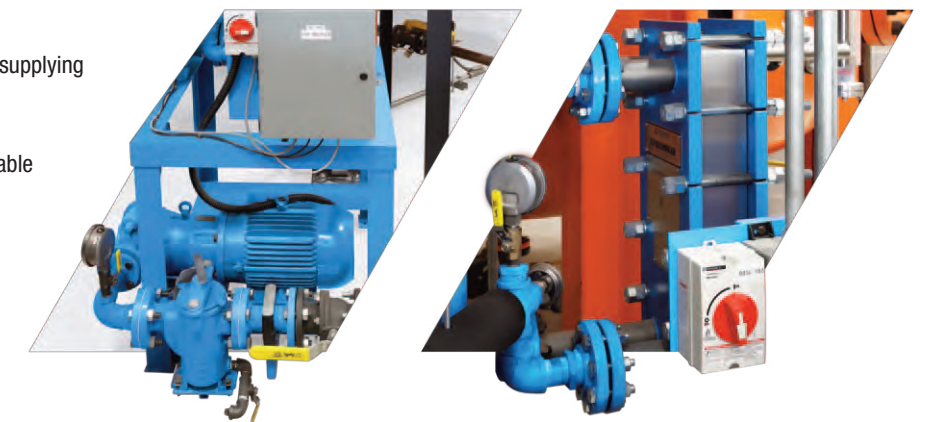
- >> Atmospheric and pressurized systems
- >> Vertical or horizontal tanks to provide needed storage capacity within existing plant space
- >> Carbon steel, stainless steel or Plasite®-lined tanks compatible with the chemicals and process
- >> Tanks sized to customer needs
- >> Necessary valves and instrumentation required for proper operation and maintenance of the system
- >> Vapor transfer, air dryers, tank agitation, level detection and reporting and recirculation lines with or without temperature control are available

Transfer pumps and temperature control

Chemicals used in polyurethane processing are sensitive to temperature and flow fluctuations. Pumps, equipped with variable speed drives, are selected for the type and viscosity of chemical being transferred from storage tanks to blending or metering systems. Tempering devices, such as heat exchangers, temperature control units and chillers, in a closed cooling system ensure appropriate conditioning of primary components.



- >> Transfer pumps available to handle a broad range of chemicals with varying flow and viscosity characteristics
- >> Transfer system designed to maintain constant production parameters to ensure stable output rates
- >> Transfer pumps also can function as unload pumps on smaller and basic systems
- >> Air-cooled or water-cooled system for supplying cold water to temperature control unit
- >> Integrated chillers and Ice Banks available for ultimate temperature control



Blending systems for liquids and powders

Blending systems precisely meter and blend various additive into the main polyol stream to improve both mixing ability and reaction behavior. Hennecke offers proven equipment for conditioning, blending and mixing raw materials with the polyol stream, including static or dynamic mixers and integrated gas loading units.

- >> Systems for continuous or batch blending
- >> Injection blocks with static and dynamic mixing units are used to perfectly blend additives, such as pentane and air, into the polyol stream
- >> Both low-pressure and high-pressure mixing equipment is available, depending on the type of chemicals, production line speed and pump configuration
- >> Gas loading (nucleation) into the polyol component generates a uniform and even finer cell structure (either dry air or nitrogen can be used)
- >> LAMBAMAT for inline blending of non-hazardous chemicals
- >> Holding tanks to feed production lines while new blends are being made
- >> Powder blending and slurry pumping systems
- >> Bag and Super Sack powder feeding systems



Specialized bulk systems for flammable materials

Hennecke experts have the know-how for safe processing of the eco-friendly blowing agent pentane. Because pentane can create an explosive atmosphere at certain gas concentrations our Pentane Process Technology (PPT) comprises a catalogue of primary and secondary safety measures to prevent emergence of explosive mixes right from the start. Our years of global experience with these systems means we can offer you a suitable concept that complies with national and international directives as well as local regulations and requirements.

Numerous safety measurements are integrated into the plant design, including:

- >> Class 1, Division 1 and Class 1, Division 2 systems for flammable chemicals
- >> Double-walled safety storage containers for above-ground or underground installation
- >> Hermetically sealed pump systems and supply lines
- >> Vacuum tanks for degassing
- >> Air extraction units with flow monitoring sensors
- >> Temperature and raw material monitoring
- >> Pentane detection sensors
- >> Leakage control where necessary
- >> Mandatory installation of an independent, decentralized safety control system
- >> PENTAMAT inline blending device for hazardous chemicals



Bulk chemical and blending system controls

Hennecke chemical and blending systems rely on high-quality control components designed for the customer's production environment. Each module is provided with its own electrical control system, including machine-specific control equipment and HMIs. These decentralized units enable the operator to directly set and control individual machine parameters. Individual controls can be connected to a central plant control console that grants access to all systems and parameters regardless of whether these are smaller tank farm solutions or highly complex systems for large scale production.



- » Local controls for basic systems
- » PLC-based systems for equipment control
- » HMI based controls with multiple operator stations for blending systems and larger bulk storage systems
- » More complex production line integration to automatically calculate and formulate blends, monitor consumption and alarms, control process parameters, and display and log relevant production data
- » Transmission via network interface of typical production parameters for logging and remote service functionality

Comprehensive support from a single source

As a system supplier, we will guide you in all phases of your bulk chemical storage and blending project.



In addition to the system design and components, we offer a comprehensive service package covering all aspects of engineering, project management, installation and commissioning, process planning and documentation:

- >> Monitoring and adjustment of production parameters by experienced specialists
- >> Adjustment of customer-specific mixtures in the start-up phase
- >> Operating, maintenance and safety instructions
- >> Optimization of all processes to ensure highly efficient production
- >> Exact project schedule for a strict adherence to deadlines and planning security with the customer concerning returns on investment
- >> Comprehensive documentation of all components including plant layout, foundation drawing, operating points and complete wiring diagrams



And our support does not end there

Thanks to our global positioning, we have a comprehensive sales and service network at our disposal. Our experienced service specialists offer you a wide range of support and qualified training - around the clock, around the world, around your production needs:

- >> Short-term availability of spare parts and tailor-made maintenance contracts as well as fast and exact identification of required components through ID number
- >> Practical training of the machine operators at a Hennecke Group facility and on-site training at the customer's own plant during operation
- >> First-level support around the clock, 365 days a year and second-level support from experienced specialists
- >> Digital infrastructure for qualified and comprehensive support services via remote access
- >> Innovative and effective retrofit solutions for a lengthy and profitable operation of your plant

