A SOLUTION AHEAD

products & services

CAPABILITIES

De Dietrich
PROCESS SYSTEMS

De Dietrich Process Syste

De Dietrich PROCESS SYSTEMS

THE NEW MILLENNIUM MARKED AN EXTRAORDINARY TRANSITION AS DE DIETRICH PROCESS SYSTEMS (DDPS) EMERGED AS ONE OF THE MOST COMPREHENSIVE SUPPLIERS OF ENGINEERED SYSTEMS, EQUIPMENT AND SERVICES FOR THE FINE CHEMICAL AND PHARMACEUTICAL INDUSTRIES. THROUGH THE INTEGRATION OF DE DIETRICH GLASS LINING, ROSENMUND AND QVF PROCESS SYSTEMS, DDPS HAS BECOME A NEW GLOBAL COMPANY THAT PROVIDES A BROAD RANGE OF SOLUTIONS TO ITS CUSTOMERS.

WORLDWIDE, MORE THAN 1,500 EMPLOYEES AND 15 SUBSIDIARIES FORM THE DDPS NETWORK THAT PROVIDES UNEQUALED SERVICE TO CUSTOMERS. THE U.S. CORPORATE HEADQUARTERS IS LOCATED IN UNION, NEW JERSEY WITH PRODUCTION, DESIGN AND FABRICATION FACILITIES IN CORPUS CHRISTI, TEXAS AND CHARLOTTE, NORTH CAROLINA. ADDITIONALLY, A NETWORK OF SALES AND SERVICE REPRESENTATIVES IS LOCATED THROUGHOUT NORTH AMERICA. WHETHER YOUR PROJECT INVOLVES THE DESIGN, CONSTRUCTION AND INSTALLATION OF TURNKEY SYSTEMS OR REPLACEMENT PARTS AND MAINTENANCE SERVICE, OUR GOAL IS TO BE THE GLOBAL SOLUTION FOR YOUR PROCESSING NEEDS.

ems: The New Global Solution

Founded in 1684, French-based De Dietrich has evolved into a world leader in the manufacture of glass-lined equipment for the pharmaceutical and chemical industries. State-of-the-art production facilities in France and Texas utilize cutting edge technology and the highest quality control procedures to line stainless and carbon steel vessels with 3009 glass. De Dietrich Glass-Lining manufactures a full line of unjacketed, conventional jacketed and split-pipe coil jacketed reactors, storage tanks, receivers, columns, dryer-blenders and Nutsche filters ranging in sizes up to 35,000 gallons. De Dietrich also manufactures and stocks a full complement of related instrumentation, accessories and spare parts. Additionally, De Dietrich performs reglassing of existing equipment, training seminars and on-site repair and maintenance.

Founded in 1810 in Liestal, Switzerland, Rosenmund is the recognized industry leader in the design, development, construction, installation and support of Nutsche filtration, mixing and drying equipment for the pharmaceutical and chemical industries. Rosenmund pioneered the very first Nutsche Filter/Dryer and has been a driving force in the development of this technology ever since. In 1999, Rosenmund was purchased by De Dietrich.

Today, Rosenmund continues to bring innovative products to market in the areas of liquids/solids separation, drying technology, vacuum and gas handling systems, control packages, and product charging and containment systems. Rosenmund has fabrication facilities in Switzerland and France with engineering and assembly services in Charlotte, North Carolina. Beyond the supply of equipment, Rosenmund provides process assistance and optimization, equipment repairs, refurbishment and rental services.

QVF was created in 1953 as a subsidiary of Quickfit and Quartz, Ltd. and the James A. Jobling Company, Ltd. In 1998, QVF bought Schott Engineering and merged the two companies and product lines. In 2000, QVF became a member of De Dietrich Process Systems.

With manufacturing facilities in Germany and the United Kingdom, QVF continues to be a world force in process plant technology. QVF is the leading supplier of borosilicate glass process plant and associated equipment. QVF has unequaled experience in the design, engineering, procurement, installation and commissioning of everything from complete glass-lined and borosilicate glass reaction, distillation, extraction, evaporation, cryogenic and absorption systems. Ranging in size from one liter to full scale production, these systems include sulfuric and nitric acid concentration plants and cGMP equipment. Through a large inventory of spare parts and accessories stocked in our New Jersey headquarters, QVF provides a variety of aftermarket services ranging from start-up assistance to retrofits of systems.

reaction technology

GLASS REACTOR VESSELS

- Volumes from 1 to 500 liters
- Pressures from full vacuum to one bar
- Temperatures from cryogenic to 400°F
- Unjacketed, single and double jacketed
- Mini-plant scalable reactors
- Spherical or cylindrical shape

GLASS-LINED REACTOR VESSELS

- Volumes from 1 to 35,000 gallons
- Pressures from full vacuum to 600 psig
- Temperatures from -100°F to 550°F
- OptiMix® reactors with integrated baffles
- Conventional and HemiCoil® jackets
- Closed-welded and clamp-top designs
- Carbon or stainless steel construction
- Clean pharmaceutical designs available

The pharmaceutical and chemical industries utilize reaction units to conduct everything from R&D to bulk production. The reactor vessel is at the heart of these units. DDPS offers a very broad range of reactor choices and accessories manufactured from borosilicate glass, glass-lined carbon steel and glass-lined stainless steel. Whether they are glass or glass-lined, all of the DDPS reactors feature: excellent resistance to corrosion, smooth non-stick properties, non-catalytic inertness, cleanliness, versatility and customization. Additionally, DDPS can supply controls, instrumentation, CIP and vacuum systems, and heating and cooling control packages to optimize reactor performance.

Left: 4,000 gallon OptiMix® reactor

Center: QVF jacketed glass reactors

Right: 29,000 gallon HemiCoil® reactor

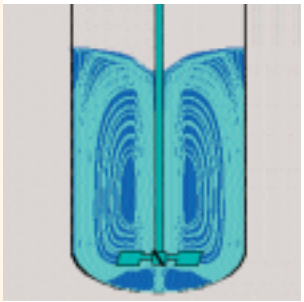
mixing & heat transfer

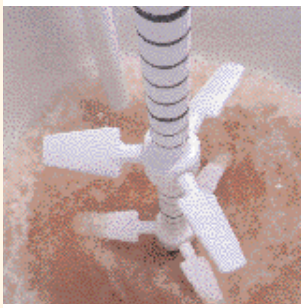
AGITATORS

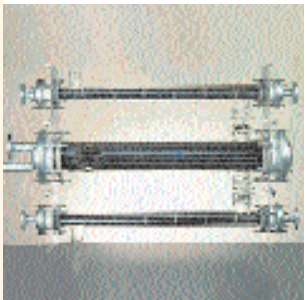
- GlasLock® or one-piece construction
- Single or multiple tier blade configurations
- Glass-lined, glass, PTFE-lined and alloy construction
- Adjustable blade pitch
- PBT, VBT, hydrofoil, retreat curve impeller and Rushton turbine designs
- Variable and fixed-speed, helical-gear drives

HEAT EXCHANGERS

- Shell and tube, coil condenser, jacketed-pipe and dimpled-plate offerings
- Heat transfer areas up to 600 ft^2
- Temperatures from -60°F to 450°F
- High performance corrosion resistant materials
  - Glass-lined steel
  - Borosilicate glass
  - Silicon carbide
- Single, double and triple-pass arrangements







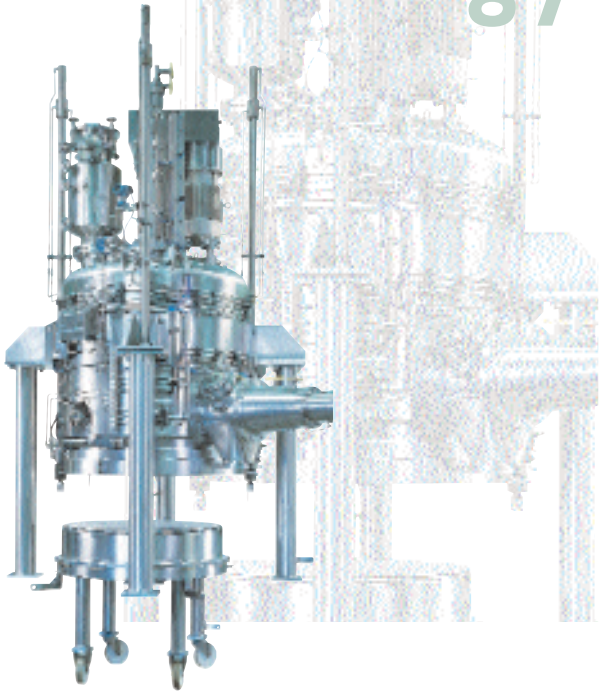
Efficient mixing and heat transfer are essential to the reaction process. DDPS stocks a line of agitators, condensers, heat exchangers and associated equipment to optimize your mixing and heat transfer requirements. Our computer software appropriately sizes a heat exchanger or simulates an existing agitation system to provide a thorough comparison with alternate mixing solutions. The new OptiMix® reactor with three baffles built into the vessel wall vastly improves mixing performance and frees up top-head nozzles on glass-lined reactors. GlasLock® agitators are the only glass-lined agitators in the world with individually adjustable and removable blades. Finally, there are many different drive and seal configurations available to complete the mixing system engineered for your process needs.

Top: Mixing simulation for a glass-lined reactor

Center: Dual-flight GlasLock® agitator

Bottom: Glass/SiC shell and tube HX

separation technology



DISTILLATION

- Glass and glass-lined columns with internals and packings
- Diameters ranging from 1.5" to over 96"
- DURAPACK high-efficient, structured packing
- Manual and automatic reflux separators

FILTRATION

- Agitated Nutsche filter and filter/dryer designs
- Full-process containment
- Minimal heel
- Filter area ranging from 0.002 m^2 to 16.0 m^2
- Operating pressures up to 90 psig/Full Vacuum
- Temperatures of -30° to 220°C
- Special designs for sterile and lethal service applications
- Agitated Nutsche filter/dryer combines filtration and drying in one vessel

EVAPORATION

- Glass-thin film evaporators
- EVAPOR centrifugal-thin film evaporator
- Climbing-film evaporators

Both mechanical and thermal separation techniques are required in the CPI industry to produce an intermediate or final product. Processes, including distillation, evaporation, extraction and filtration, are employed to separate liquids from liquids as well as liquids from solids. From individual components to complete separation systems, DDPS has the necessary equipment and knowledge to assist you with your separation needs.

Rosenmund filters and filter/dryers have many features that make them the recognized industry leader including: unique "S" blade agitator design for efficient processing, side discharge valve with maintenance trolley, and interlocking control systems for operation safety and ease.

Left: QVF Rotovap unit

Center: ROMAN Filter

Right: Rosenmund Filter/Dryer

drying technology

SPHERICAL DRYERS

- Ideal for cGMP applications
- Effective capacities from 50 to 4,000 liters
- Heating surface areas from 1.5 to 16.5 m^2
- Minimal heel/maximum solids discharge
- Contoured bottom discharge valve with no dead space
- Top or bottom-driven agitation

UNIVERSAL VACUUM DRYERS

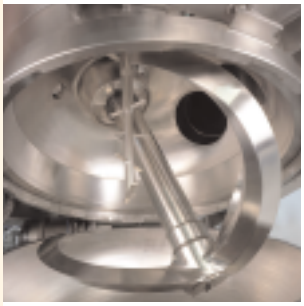
- Applications include pharmaceutical intermediates, fine and specialty chemicals
- Multiple functionality - drying, mixing, milling, granulation, evaporation and crystallization
- Effective capacities from 50 to 8,000 liters
- Heating surface areas from 1.2 to 29.6 m^2
- Ideal for difficult drying applications
- Product area completely contained
- Spray assembly on agitator for introduction of carrier gas or liquid for granulation

AGITATED PAN DRYERS

- Specifically designed for batch drying of solids
- Top and bottom entry-drive technology
- Unique "vortex" mixing action for improved drying performance

DOUBLE CONE DRYER BLENDERS

- Glass-lined construction
- Sizes from 100 to 7,200 liters



High-efficiency dryers significantly reduce production and drying times, improve product quality, maximize product recovery and minimize environmental and worker exposure. DDPS dryers feature unique vessel and agitator designs that meet the most stringent pharmaceutical specifications. Easy to clean spherical, universal and batch-agitated pan dryers are available for both dedicated and multi-purpose applications. In order to ensure proper selection of drying equipment, we have a state-of-the-art test facility in Europe, as well as a US rental fleet for on-site customer testing.

Top: Rosenmund Universal Dryer

Center: 2,000 liter spherical dryer

Bottom: Glass-lined double cone dryer with stainless steel sheathing

solids handling & containment

POWDER TRANSFER SYSTEMS

- Ideal for finished pharmaceuticals, fine chemicals, metal powders, dyes, etc.
- Charge under pressure or vacuum, with or without solvents present
- Fully pneumatic, ideal for explosion-proof environments
- Charge almost any powder, safely and dust-free
- Design conforms to cGMP requirements
- Mounts directly on process vessel or can be portable for multiple vessel use
- Simple, ergonomic, user-friendly operation

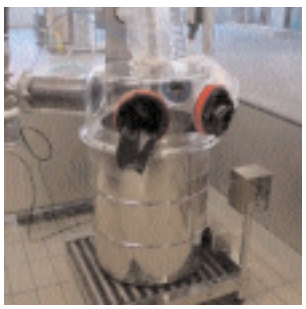
CONTAINMENT SYSTEMS

- Used in conjunction with filters, dryers, reactors, blenders, etc.
- Cost-effective solutions
- Transfer powders without endangering personnel or disrupting other production processes
- Containment levels to 1microgram/m^3 at 1m
- Inexpensive, compact portable and fixed designs
- Suitable to empty virtually any size steel, plastic or fiber double-lined drum

SAMPLING

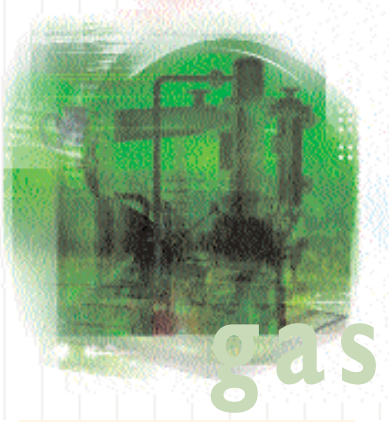
- Samples can be taken with or without a glove box and transferred to a remote location
- System is compact, easy to operate and conforms to cGMP
- The sample does not come in contact with human or mechanical components that can cause contamination or physical change

Major concerns for the chemical processing and pharmaceutical industries include the safe containment and prevention of cross contamination of potentially hazardous powders. DDPS offers equipment that samples, isolates and transfers powder (including some wet cakes) to and from drums, process vessels and bulk storage containers. Mobile and dedicated solutions with low installation, maintenance and operating costs are available. Solids can be charged and discharged in an oxygen-free inert atmosphere. To ensure application capability, factory testing can be performed, or rental units are available for on-site trials.



Left: Powder containment system

Right: Drum containment system



gas & liquid handling

VACUUM PACKAGES

- APOVAC® process vacuum and gas compression with solvent recovery
- COMBIVAC® multi-stage vacuum system with blower and ejector
- COMPOVAC® gas recirculation system for filtration and drying in Nutsche Filter/Dryers to reduce nitrogen consumption

VACUUM, CERAMIC CENTRIFUGAL AND MAGNETIC DRIVE PUMPS

- Dry-running vacuum pumps
- Ceramic centrifugal pumps
- Ceramic magnetic drive pumps

VALVES

- Constructed from glass, ceramic and glass-lined materials
- Automatic or manual operations with sizes from 15 to 150 mm
- Flush-bottom outlet, sampling, plug and ball types
- Knife-gate Kammerer valves for handling solids, gases and vacuum

PIPE AND FITTINGS

- Glass and glass-lined sections starting at 1" diameter
- Complete line of elbows, tees, crosses and reducers
- Jacketed and non-jacketed pipe designs

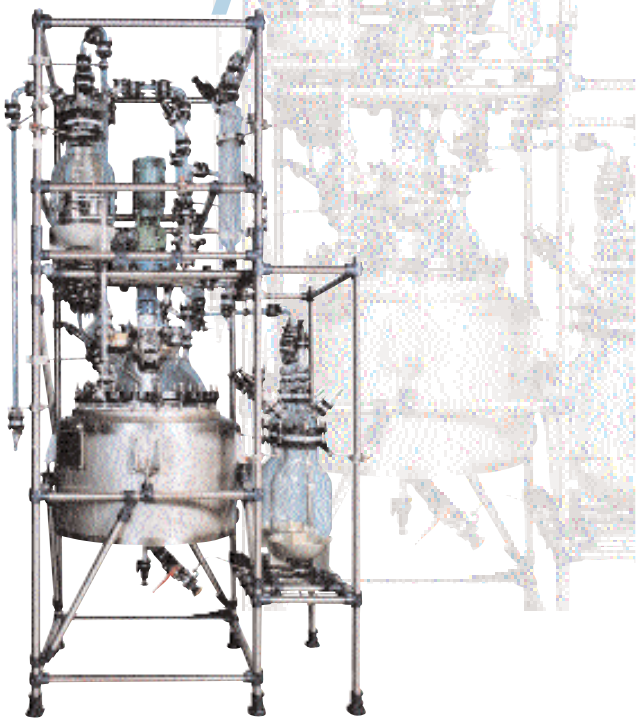
Corrosive and abrasive liquids and gases can be very demanding on CPI equipment, reducing service life and increasing maintenance and operating costs. DDPS has a complete line of pumps, vacuum systems, valves, pipe, fittings and hardware constructed out of extremely corrosion resistant materials designed to handle the transportation and removal of these materials. Smooth ceramic and glass materials are inert and resistant to almost all chemical attack, which assures product purity and provides substantial durability and versatility. They also inhibit or prevent scale formation and product build-up. Vacuum generation, solvent recovery, gas compression and fugitive emissions control can be addressed with our skid-mounted vacuum and gas handling packages.

Top: Ceramic-lined centrifugal pump

Center: APOVAC® vacuum system

Bottom: COMPOVAC® vacuum system

engineered systems



SYSTEM PORTFOLIO

- Kilo lab systems
- Pilot plant systems
- Sulfuric acid concentration
- Nitric acid concentration
- Plating chemical recovery
- Filter/dryer systems
- Reactor systems
- Distillation systems
- Ancillary equipment
- Heating and cooling modules
- Vacuum systems
- Instrumentation and controls

DDPS has the capability to provide a system of equipment based around one or more of its core technologies. This can include externally sourced equipment that is designed, specified and purchased for each specific application. This assures that the ancillary equipment is seamlessly integrated to complete the system and achieve the processing goals.

DDPS' US-based Engineered Systems team can assume a greater scope of responsibility which can significantly reduce the overall project costs and reduce customers' internal project management requirements. Furthermore, by combining DDPS' unique and thorough knowledge of its core equipment with a wide range of engineering expertise (process, mechanical, controls, etc.), projects of any size, from small reaction systems to complete pilot plants, can be completed on time and within budget constraints.

Left: Pharma reactor

Center: Reactor/filter dryer system

Right: Modular pilot plant filter/dryer system

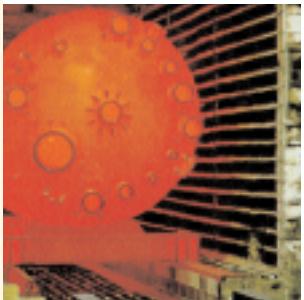
spare parts & support services

STOCKING PROGRAMS

- Glass-lined agitators, baffles and covers
- Gaskets, clamps and bolting hardware
- Seals and seal parts
- Tantalum and PTFE repair parts for glass-lined equipment
- Glass process piping and components
- Valve and pump parts
- Drives and drive parts
- Multi-layer filter media
- Control and hydraulic systems components

SUPPORT SERVICES

- Custom training seminars
- Rental equipment for on-site pilot plant test work
- Reglassing old vessels
- Repairing glass and glass-lined vessels
- Refurbish filters and dryers to nearly new condition
- Rebuilding drives, seals and pumps
- On-site inspection and repair
- Jacket cleaning
- Field service personnel located across the United States for quick response
- Installation and start-up assistance



DDPS stocks a comprehensive range of replacement parts and provides numerous services to optimize performance and minimize downtime of its equipment for many years after the sale. DDPS' wide range of services includes upgrading and refurbishing existing filters, dryers and gas-handling systems; repairing or reglassing damaged or worn out glass-lined parts and vessels; and providing a variety of preventative maintenance services. The DDPS in-house capabilities include replacing/rebuilding wear parts and seals; restoring interior and exterior finishes; completing major vessel and hardware repairs; and updating control and hydraulic systems. DDPS' team of experienced service engineers often performs repair and maintenance services on equipment while it is installed in the process plant.

Top: Clean Valve

Center: Reactor inspection and maintenance

Bottom: Reglassing a reactor

De Dietrich
PROCESS SYSTEMS

UNITED STATES
908 686 4900
704 587 0440

FRANCE
33 3 88 53 23 00

SWITZERLAND
41 61 925 11 11

GERMANY
49 61 31 97 04 0

GREAT BRITAIN
44 1785 609 900

IRELAND
353 61 366925

SOUTH AFRICA
27 11 918 4131

BELGIUM
32 16 40 5000

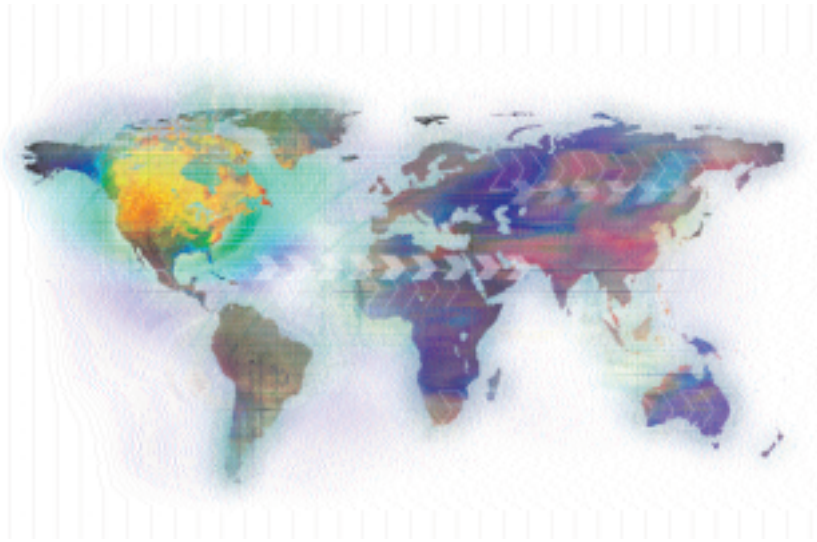
NETHERLANDS
31 765 42 15 44

SPAIN
34 93 29 20 520

SINGAPORE
65 861 1232

CHINA
86 21 5351 1817

BRAZIL
55 11 6703 7380



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De Dietrich ROSENMUND QVF

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