De Dietrich
PROCESS SYSTEMS

Innovation · Passion · Solutions

THE EXPERTISE YOU NEED.

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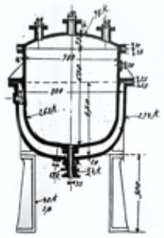
OUR HISTORY

The De Dietrich Process Systems Group is built on the core values of innovation, passion and solutions. Our company has maintained success for over three centuries based on our steadfast commitment to providing state-of-the-art glass-lined, glass and filter/dryer equipment. Throughout our long-standing history, De Dietrich Process Systems has continued to evolve and bring specialized solutions to the market, offering a comprehensive range of engineered systems, equipment and services for the fine chemical, pharmaceutical and allied industries.

1778

King Louis XVI granted Jean de Dietrich the use of a hunting horn as trademark



1870

De Dietrich & Cie produced the first **glass-lined** vessels in Zinswiller (France)

1998

Rosenmund Guedu acquisition (Switzerland)

Filter / Dryer, Powder Handling

2010

Creation of Budapest workshop (Hungary)

Stainless Steel & alloy expertise

2020

Pharma and Green Chemistry development

2001

De Dietrich Process Systems Group is created

Equipment and Systems portfolio

Diversification & activity expansion

1684

Jean Dietrich purchases the Jaegerthal forge

1792

Philippe Frédéric de Dietrich, 1st mayor of Strasbourg, orders the « Marseillaise », the French National Anthem

1976

Expansion in the U.S.A.

2000

QVF® acquisition (Germany)

Glass & Process Systems

2006

Creation of Wuxi Factory (China)

2021

Waste Recycling Development

Creation of a second factory in China

Dedicated to glass-lined components

Trial Center in Semur-en-Auxois

Opening of our new «Tech Lab» dedicated to powder handling solutions

- **3 centuries of experience and expertise**
- **Consolidation of an important international group with a large portfolio**
- **High quality equipment supported by continuous innovation**

Committed to a

better world.

One of De Dietrich Process Systems missions is to contribute to the improvement of global health and preservation of our planet by providing the pharmaceutical and chemical industries with technological solutions optimized in terms of safety, quality, reliability, cleanability, energy consumption & production tool sustainability.

Our corporate objectives also include providing complete solutions that focus on containment, meeting customer needs associated with operational safety, working conditions, product quality, environmental protection, and supporting the green chemistry industry by providing it with specific equipment and solutions, such as waste recycling solutions and plant-based chemistry solutions.

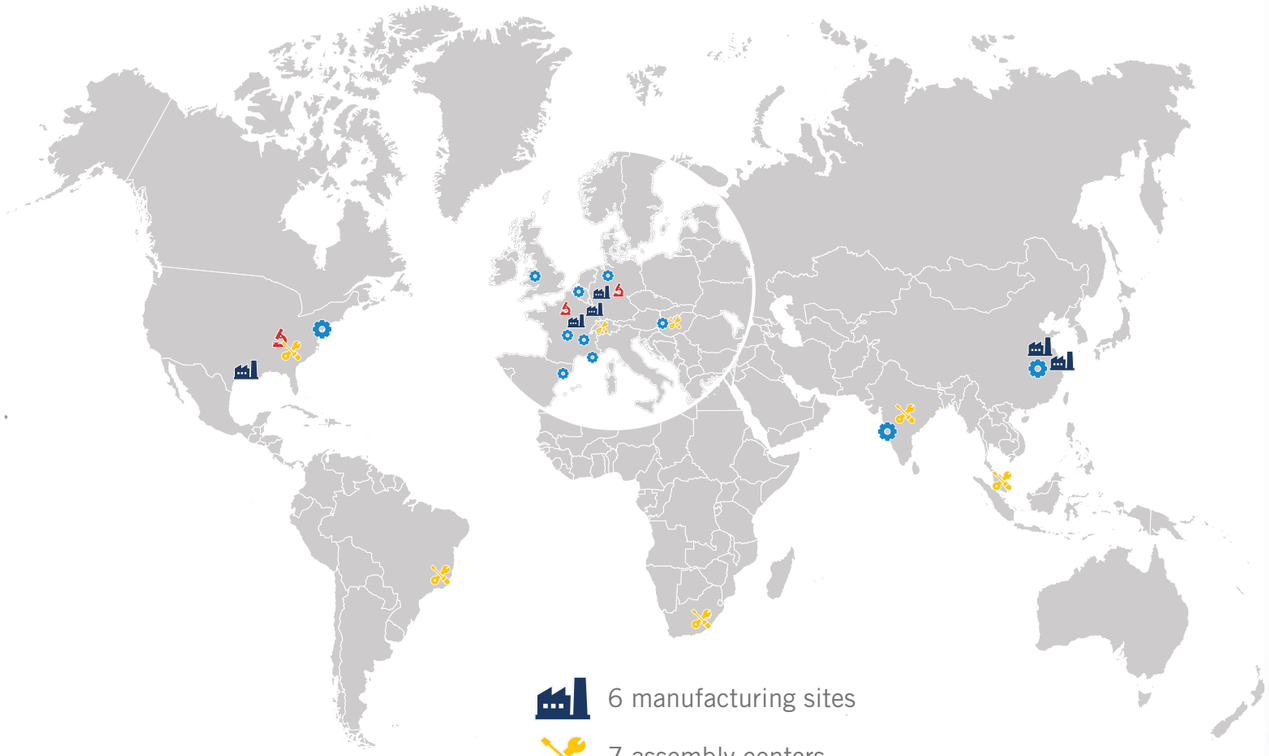
INTERNATIONAL PRESENCE WITH LOCAL SUPPORT

Our experience and relationships within the pharmaceutical and fine chemical industries make De Dietrich Process Systems uniquely suited to support you with your processing needs.

The expertise we have developed in the field of manufacturing process equipment combined with the knowledge and experience of our engineering teams has allowed us to confidently support the commissioning, installation and operation of thousands of systems over the years.

With several subsidiaries worldwide, De Dietrich Process Systems is a truly global company providing unmatched service close to its customers premises.

Because we believe our customers deserve the best, we provide state-of-the-art solutions with the same level of commitment and quality to customers in every part of the world.



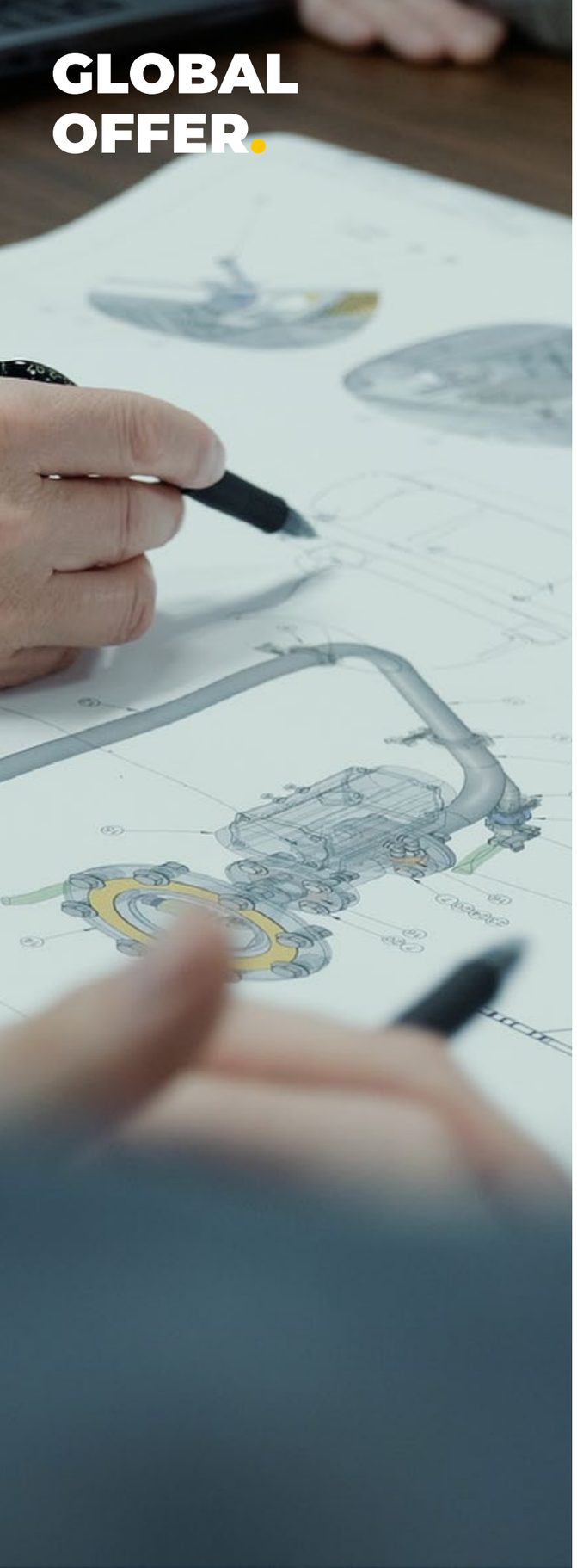
- 6 manufacturing sites
- 7 assembly centers
- 11 engineering & services centers
- 3 Techlabs & trial centers

KEY FACTS

- Family-owned company (78% De Dietrich family ; 22% BPI France)
- 1000 employees
- Headquartered in Alsace, France
- Founded in 1684

CHAPTER 1

CUSTOMERS & MARKETS.



from idea to success

- BASIC ENGINEERING
- SIMULATIONS & STUDIES
- PILOT PLANTS & TECH LABS
- DETAILED ENGINEERING
- SOLUTIONS, EQUIPMENT, UTILITIES, AUTOMATION
- DOCUMENTATION & QUALIFICATION
- TRANSPORTATION, BUILDING & FIELD PROJECT MANAGEMENT
- START-UP & COMMISSIONING
- AFTERMARKET SERVICES

TURNKEY SOLUTIONS

De Dietrich Process Systems can help you define the right solutions for your applications.

Our specialized and experienced engineering teams will work closely with you to design a system based around one or more of our core technologies.

In addition, we can incorporate externally-sourced equipment (stainless steel, alloy, tantalum, PTFE and more) that we design, specify and purchase on your behalf. This ensures that all equipment is seamlessly integrated, processing goals are achieved and project timelines are kept on track.

ENGINEERING CAPABILITIES

PHARMA & GREEN (90 PEOPLE)
- France (Lyon, Dijon, Grasse)
- Spain (Barcelona)
- United Kingdom (Stafford)
- U.S.A. (Charlotte)
- Switzerland (Geneva)

CHEMICALS (80 PEOPLE)
- Germany (Mainz)
- India (Mumbai)
- China (Wuxi)
- Belgium (Leuven)

Before starting your project, you can as well rely on efficient Tech Labs centers in France, Germany & USA in order to realize trials and validate your process (reaction, mixing, drying, powder handling, various processes)

Based on our technical expertise and breadth of experience, we can tackle projects of any size, from small reaction systems to complete industrial plants. De Dietrich Process Systems can propose turnkey units for several processes in the pharmaceutical, plant-based and chemical industries, thanks to our wide range of solutions.

- **Reaction**
- **Evaporation – Concentration**
- **Condensation**
- **Distillation**
- **Liquid-Liquid Extraction**
- **Continuous Flow-Chemistry**
- **Solid-Liquid Extraction**
- **Filtration/Drying**
- **Mixing**
- **Containment**
- **Powder Handling**
- **Heat Transfer**

Our solutions are specifically engineered to carry out the performance objectives of your unique process.

Turnkey Solutions Highlights

- Capabilities to offer you fully integrated solutions
- One single project manager to take care of your project
- Refurbishement and upgrade of your existing units
- High-quality equipment supported by continuous innovation
- In-house pilot plants and R&D centers to perform trials on your processes
- Pharmaceutical, chemical, plant-based and emerging markets presence
- Worldwide coverage

- API
- HPAPI
- Generics
- Intermediate
- Peptides
- Lipids
- Contrast media

PHARMACEUTICAL

Our global reach combined with a diverse products offering enables us to serve a broad range of markets:

The pharmaceutical industry is changing rapidly and the technologies needed to produce pharmaceutical ingredients must keep pace.

Whether for the manufacture of active or highly active ingredients, excipients, intermediates or any other pharmaceutical product, De Dietrich Process Systems is able to offer you solutions, equipment and services that will meet your performance and normative needs.

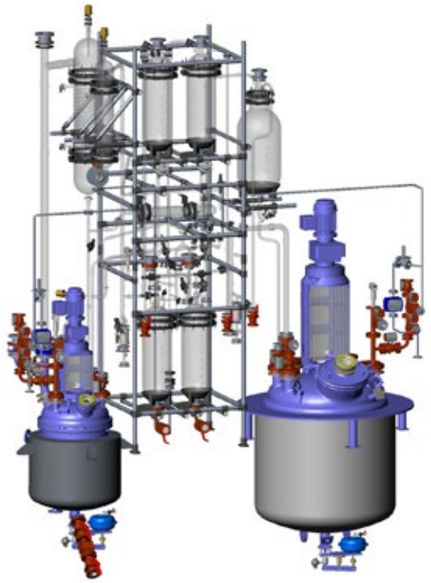
Our wide expertise and experienced engineering teams allow us to meet your specific application requirements and partner with you on turnkey projects of any sizes, from small reaction systems to industrial plants at different levels:

UPSTREAM STUDIES
- Mixing
- CIP
- Scale-up
- Trials & Rental
- Process Improvement

SOLUTION DEFINITION
- Reaction
- Distillation
- Extraction
- Evaporation
- Powder Handling etc.

PHARMA QUALIFICATION
- FAT/SAT
- DQ, IQ, OQ, PQ
- Quality assurance
- Qualification Test
- Databook

SERVICES
- Installation
- Commissioning
- Upgrade/modernization
- Maintenance
- Preventive maintenance



THE TAILOR MADE APPROACH DEDICATED TO YOUR PROCESS:

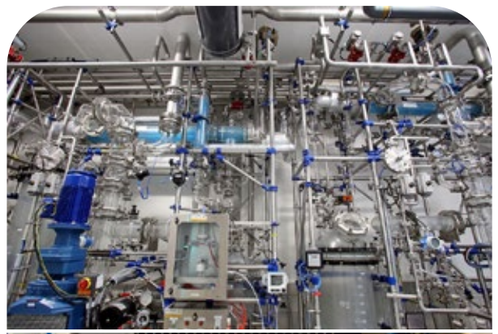
We are able to provide turnkey units using technologies based on our core business, or more broadly by integrating sourced equipment of any material. For the challenges you face on a daily basis such as performance, cleanability, operator and product protection, we have developed our expertise and solutions in:

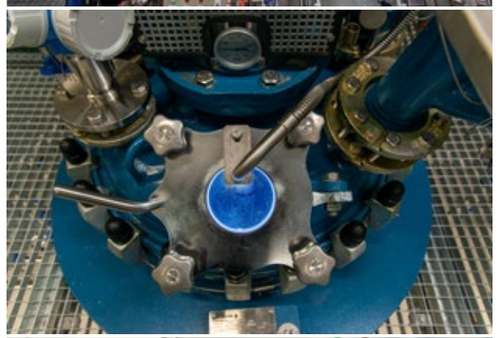
- Agitation and heat exchange
- CIP (Cleaning In Place)
- Confined powder handling solutions

Our solutions comply with the strictest standards to guarantee your peace of mind.

Pharmaceutical Highlights

- Turnkey unit
- Multi-purpose design with full consideration of cGMP constraints
- 1 single project manager to manage the complete project
- FDA compliant solutions: cGMP, CFR21 part 11
- Pharma qualification
- From laboratory scale up to production plant
- Powder handling containment solutions
- Performance efficiency in mixing, cleaning, heat exchange
- Worldwide fitters team provide technical and support services





PHARMACEUTICAL

De Dietrich Process Systems new development

POWDER HANDLING & CONTAINMENT

The safety of your employees, production efficiency and non-contamination are key criterias of any solids handling process. To meet these expectations, De Dietrich Process Systems has developed expertise in containment and transfer of powders which are crucial for pharmaceutical applications.

De Dietrich Process Systems offers a wide range of solutions that allow to load/unload, take samples from reactors, filter / dryers or other equipment in a highly contained way.

TECH LAB

Our brand new technical center in France allows us to perform trials for powder handling:

- Powder characterization through analytical instrumentation
- Transportation trials in dense phase
- Productivity and performance simulation with different packaging formats (big bags, drums, bags...)
- Trials with our various type of filter / dryers (Nutsche Filter, conical, spherical & universal dryers) under a pharmaceutical environment
- Scalability trials from laboratory phase to semi-industrial phase
- Validation of intensification technologies (microwave, ultrasounds...)

ALLOY AND STAINLESS STEEL SOLUTIONS

Based on our traditional competences, we have developed expertise for alloy solutions (reactor, agitator, Powder Pump, filter / dryer...), knowing that in pharmaceutical industries, these materials are often used.

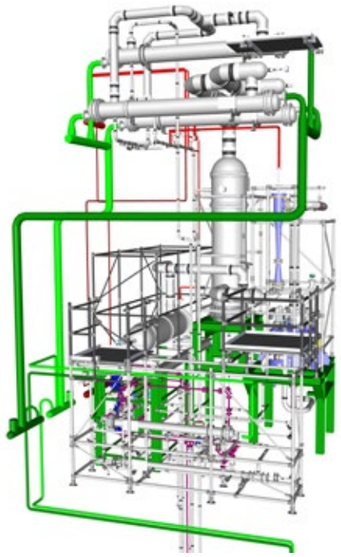
This range of equipment expands our existing portfolio and allows us to provide complete systems based on your needs.

CONTINUOUS FLOW REACTION

Continuous flow reaction technology should be a strong trend in the near future. We are currently working to develop solutions to better suit the needs of our customers in this field.

The CryoFlowSkid is our first solution brought to market.

- Organics
- Inorganic Plastics
- Dyes & pigments
- Soap & detergents
- Explosives
- Bromine
- Fertilizers
- Crop protection
- Precious metals...



CHEMICAL

Experienced to handle corrosive processes

In the world of chemistry, De Dietrich Process Systems Group is world-renowned for its nitric and sulfuric acid reconcentration plants, for the bromine production plants and many other highly corrosive applications.

Projects can not be regarded as isolated systems, they need to be integrated into the entire process. Our Group designs process systems that focus on your considerations, not our products portfolio. Therefore all materials can be used: alloys, PTFE, glass-lining, glass, glass fibers reinforced (GFRP)....

Based on the strength of our engineering experience, the Group has developed proprietary process technologies and offers performance guarantees on the following process systems:

- Product recovery and product purification
- Waste water treatment
- Exhaust gas / exhaust air purification
- Recovery, concentration and purification of mineral acids
- Reaction with halogens
- ...much more

In addition to our process systems capabilities, we offer a wide range of services that cover conceptual design studies, feasibility studies, trials, basic and detailed engineering, HAZOP studies, validation, procurement, building and commissioning.

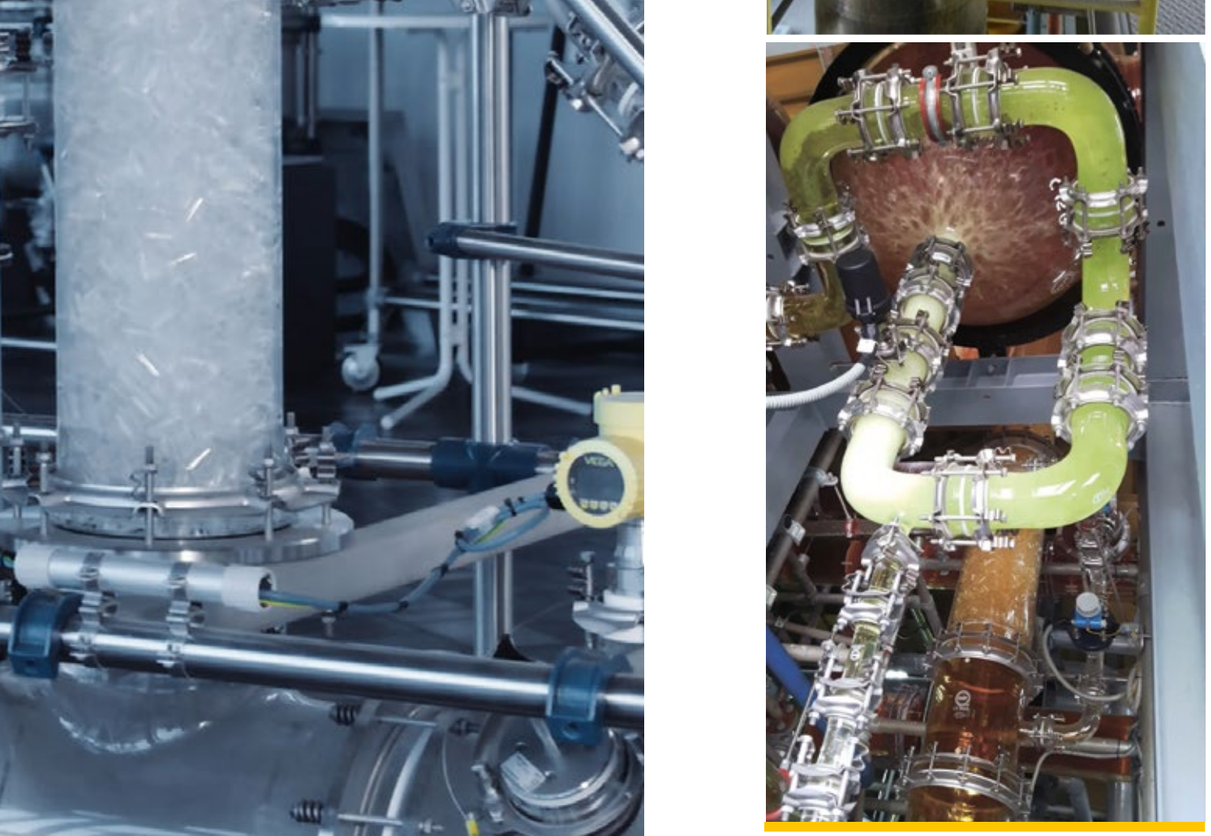
Examples of applications:

NAC/SAC, BROM, TDI, MDI, CL2-SAC, Nitro Cellulose, SA Peroxide, PAC, Lithium, Explosives, NA Purification, SA-Vitamin, Pesticide, Nitrobenzene... and much more

Chemical Highlights

- In-house process design and process guarantee
- Proprietary internal columns Durapack® technology
- Hundreds of plants already installed around the world
- Mastering of high corrosive resistant technologies (enamel, borosilicate, tantalum, alloys...)
- Huge experience for sulfuric / nitric acid recovery and bromine production and much more
- Worldwide fitters team provide technical and support services
- 1 single project manager to handle the complete project

CUSTOMERS & MARKETS.



CHEMICAL

Our proprietary process systems

One partner for equipment, process and project management

As a manufacturer and engineer of corrosion resistant equipment and systems, we have developed technical expertise on many highly corrosive processes. Our know-how on processing acids, halides such as bromine and other corrosive media is built on decades of experience. We have built hundreds of plants around the world. From feasibility studies in our test facility to the final commissioning at your site, we are confident in our ability to be your partner. You can source complete plants with a process guarantee from one global partner providing local service over the entire life cycle of your system.

SULFURIC ACID RECOVERY

The sustainable solution
Concentrated sulfuric acid is frequently used for drying processes. Recycling the diluted sulfuric acid with a process plant from De Dietrich Process Systems is a sustainable, proven solution.

Advantages:

- Concentration up to 98%wt sulfuric acid
- Feed rate 100kg/h up to 145t/h
- Low acid concentration in waste water
- QVF® Process with horizontal evaporator
- More than 250 installations worldwide

NITRIC ACID RECOVERY

It's the material that enables the QVF® process
The economic recycling of nitric acid waste streams is the key for most nitric acid consuming processes. The efficient removal of the impurities and concentration of the nitric acid above 68%wt is one of our core competences.

Advantages:

- Concentration up to 99,8wt% nitric acid
- Feed rate 100kg/h up to 30t/h
- Lowest energy consumption
- QVF® Process with sulfuric acid
- More than 100 installations worldwide

BROMINE PRODUCTION

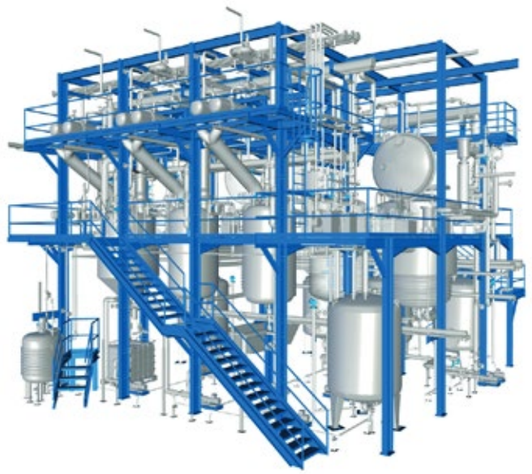
Proven efficiency and safety
Whether it is about the production of bromine from brines or the removal of bromides from aqueous streams, we have the equipment and the process to safely handle this extremely corrosive material.

Advantages:

- Production of 99,9wt% bromine
- Debromination down to 10ppm
- Efficient processes
- Bromine resistant material
- Safe design dedicated to bromine
- More than 50 years of experience

CUSTOMERS & MARKETS.

- Food & Beverage
- Nutrition & Health
- Cosmetics
- Fragrances
- Cannabis Derivatives
- Bio Materials & Energy
- Green Chemistry
- Waste Recycling



GREEN CHEMISTRY

At De Dietrich Process Systems, we believe that plant-based chemistry, through the use of renewable biomass, is the path towards a sustainable and eco-responsible economy.

We provide to our customers a comprehensive set of technologies and process solutions for the production of refined bio-sourced ingredients and solvent recovery. Thanks to our expertise and adapted equipment, especially our extractor which is able to gently mix, filter and dry the raw material, we can treat almost every kind of natural raw materials, even powders.

From natural ingredients to intermediate & finished products:

- Concrete
- Absolute
- Resinoid
- Hydrolat
- Essential oil…

Dedicated to various applications:

FOOD & BEVERAGE:
Natural flavors, Natural colorants, Food preservatives and enhancers, Texturants, Antioxidants

NUTRITION & HEALTH:
Botanical API's, Natural excipients, Herbal extracts, Dietary supplements

COSMETICS:
Botanical API, Natural extracts, Colorants, Texturants, Refined oils

FRAGRANCES:
Refined essential oils, Resinoids, Concretes, Absolutes

CANNABIS DERIVATIVES:
Cannabinoids (CBD, THC, CBN, CBG,..), Terpenes, Flavonoids

Green Chemistry Highlights

- We provide support in all engineering and coordination phases of your projects
- Simulation tools and trial center in France to thoroughly design the process systems and utilities need
- Miniplants skids to support your R&D programs
- State-of-the-art industrial technologies such as our All-In-One extractor for process biomass, to extract and purify high-quality ingredients
- Turnkey solutions, commissioning, training and After Sales services, for reliable long-term operations

CHAPTER 2

GLASS-LINED TECHNOLOGY.

GLASS-LINED TECHNOLOGY.

OUR GLASS-LINED EQUIPMENT

OUR ENAMEL

Since 1870, De Dietrich Process Systems has been producing an exclusive enamel, the fundamental ingredient of our superior glass lining. We have improved it over the years, creating the most reliable enamel in the market.

The basis of our glass lining is the well-recognized DD3009 enamel.

DD3009 STANDARD

The original dark blue enamel commonly used for chemical applications.

DD3009 WHITE / LIGHT BLUE

A white / light blue variant often used in pharmaceutical applications for cleanability purposes (product residue is easily visible on bright surface).

DD3009 CONDUCTIGLASS®

By incorporating thin, homogenous platinum fibers in our enamel layers, we can protect your vessels against electrostatic damages that may appear with non-conductive mediums (~10^8 Ω.cm).

DD3009 HA

For highly corrosive applications, we can increase the enamel thickness of our vessels. We apply the first enamel layer in white and then apply the subsequent layers in blue. When the white layer becomes exposed, it provides a visual indication that the warning level has been reached.

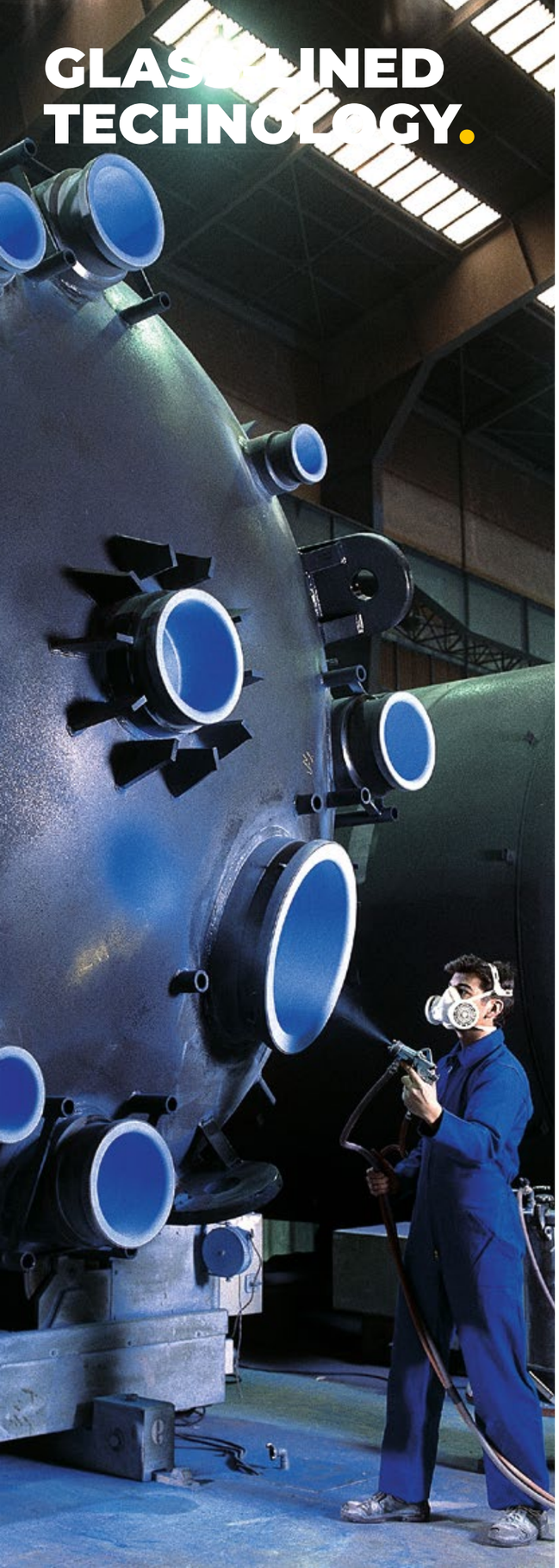
DD3009 HA PRINCIPLE

Our glass-lined equipment is particularly suitable for high corrosive applications (e.g. acid or alkali media in the chemical field), as well as in pharmaceutical environments where contamination-free operations are mandatory. Our signature enamel, known as DD3009, is multipurpose for all of your process needs. The DD3009 enamel is manufactured only in our plant in France, allowing us to maintain a perfect quality and ensuring consistency for all our glass-lined equipment worldwide.

DD3009 enamel advantages:

- Multipurpose applications (pharmaceutical, chemical, food)
- Chemical resistance to a wide range of acids and alkalis
- Excellent resistance to corrosion, abrasion, mechanical and thermal shocks
- Durable
- Anti-adhesive surface
- Free of toxic metals
- Impervious to catalytic effects

DD3009 enamel is the best in class according to laboratory studies conducted by major chemical and pharmaceutical companies.

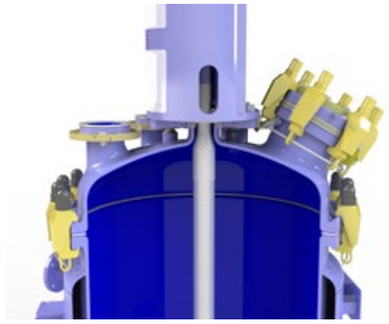


REACTION

De Dietrich Process Systems can provide glass-lined reactors to meet a wide variety of chemical processes and volume requirements, from laboratory scale and pilot plant sizes up to very large production units.

Thanks to the properties of our DD3009 enamel, all our reactors have excellent resistance to corrosion, smooth non-stick properties and non-catalytic inertness. They can be designed for high versatility in multiproduct applications, or specialized to optimize a specific processing requirement.

We cover all the standard range of DIN reactors: AE, BE, CE.



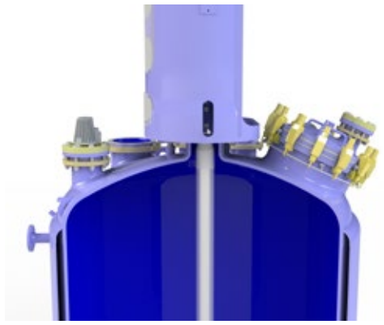
AE

Clamped or flanged-top reactors

Large top cover design, heating / cooling by jacket or halfcoil system, available from 63L to 6,300L (other sizes and process conditions possible upon request)

Design pressure: -1 / +6 bar
Design temperature: -25 / +200°C

Advantages:
- Removable top head
- Easy access to facilitate maintenance operations
- Opening enables use of one-piece agitators
- Especially adapted for small capacity (<1,000L)
- From 63L to 6,300L



BE

Closed-welded reactors

Close-welded reactor design, heating / cooling by jacket or halfcoil system, available from 630L to 40,000L (other sizes and process conditions possible upon request)

Design pressure: -1 / +6 bar
Design temperature: -25 / +200°C

Advantages:
- Top head strength enables higher internal pressure rating
- More and larger process nozzles
- No need for large gasket (shimming, leakage)
- Pharma design
- Fewer spare parts needed
- Reduced principal area for potential leaks
- From 630L to 40,000L
- Max size achieved: 110 000L

CE

Clamped or flanged-top reactors

Small top cover design, heating / cooling by jacket or halfcoil system, available from 630L to 40,000L (other sizes and process conditions possible upon request)

Design pressure: -1 / +6 bar
Design temperature: -25 / +200°C

Advantages:
- Opening enables use of one-piece agitators while reducing the use of big gasket in comparison with the AE reactor
- From 630L to 40,000L

OPTIMIX®

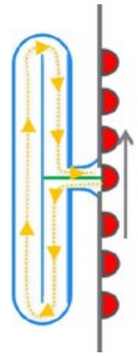
OptiMix® is a solution that integrates three baffles on the vessel wall, improving mixing and heat transfer performances. The OptiMix® configuration also includes a temperature probe in the bottom part of the reactor. OptiMix® technology is available for all DIN range reactors (AE, BE, CE).

Advantages:

- Improvement of heat transfer
- Increase of mass transfer
- Reduction of reaction time
- All nozzles free for other devices
- Up to 3 rows of baffles
- No more vortex, less waste
- Temperature measurement at low volume
- Suitable for every kind of reactor (AE, BE, CE)
- Baffles distant from wall:
  - One attachment
  - No deposits on wall
  - Easy to clean
  - No dead zone
  - No expansion stresses on baffles

OPTIMIX® - HE

This version allows thermal fluid to flow inside the wall-mounted baffles in order to heat/cool down the baffles, resulting in heat exchange improvement up to 27%.



GLASLOCK® SYSTEM

The GlasLock® System is the only agitator in the world with removable blades. This patented system allows you to change blade angles and designs for optimized mixing and simplified maintenance operations. This agitator design is suitable for AE, BE, CE and OptiMix® reactors.

We have developed our own mixing software and are using CFD software as well to help you define the best blade configuration. Thanks to our wide range of blades, we can propose the best solutions for your processes.

Advantages:

- Improved mixing compared to standard one-piece design
- Individual dismantling of the blades
- Spare parts standardization
- Easy and quick maintenance
- Minimum agitated volume up to 1% as per some blade designs
- Various blade designs available to optimize different processes
- Up to 3 stages on the agitator

BLADE DESIGN EXAMPLES	Flat blades 90°	Hydrofoil blades	Optifoil blades	Viscofoil blades	Rushton turbine	Trapezoidal blades 90°
PRIMARY FLOW	100% radial	25% radial 75% axial	25% radial 75% axial	75% tangential 25% axial	100% radial	100% radial
MAX. VISCOSITY CP	6.000	6.000	8.000	120.000	3.000	6.000
HOMOGENIZATION	+	++	++	++	-	+
SUSPENSION	++	++	+++	+	-	++
DISPERSAL	++	+	+	-	++	++
GAS/LIQUID	+++	-	-	-	+++	+++
HEAT EXCHANGE	++	++	++	+++	+	++
CRYSTALLIZATION (FRAGILE PARTICLE)	-	++	+++	++	-	-

Applications
+++ perfectly suitable ++ more than suitable + suitable - not recommended

other blades design exists

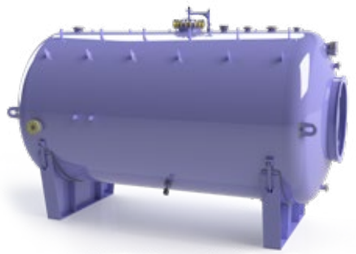
GLASS-LINED TECHNOLOGY.

COLUMNS (UP TO DN 2400)

We are able to design and manufacture glass-lined columns up to DN 2400. Our vast experience with this product allows us to produce columns with very flat flanges to simplify the installation and ensure good sealing. Additionally, we can provide column internals in various materials to fit your process requirements.

Advantages:

- High corrosion resistance
- Huge mastering of the flange's flatness
- DIN m/f of the flange's flatness on request
- Max. segment 5,5m height
- Overall height already realized: 52m



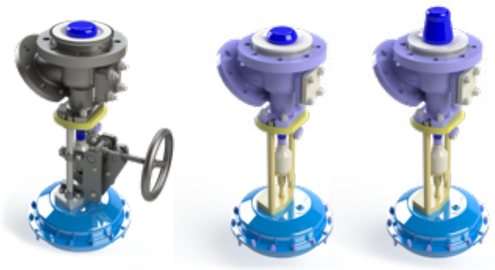
STORAGE TANKS & RECEIVERS

Horizontal and vertical storage equipment for high corrosive and pharmaceutical products.
Working conditions such as temperature and pressure can be adapted as per your needs.

Advantages:

- High corrosion resistance
- From 50L up to 120,000L
- Jacket or half coil

SPARE PARTS & COMPONENTS



CLEANVALVE

De Dietrich Process Systems carries a range of valves that effectively controls the flow of liquids, gases and slurries in reactors, tanks and other process equipment. Our patented Cleanvalve® is usable for glass-lined, stainless steel or nickel alloy reactors / tanks.

Advantages:

- Available in glass-lined / stainless steel / nickel alloy
- Easy cleaning (flat seat, draining design, rectractable spray ball)
- Sealing by chevron packing
- Temperature sensor possible
- 45° and 60° outlet nozzle

PIPING

Covered with our DD3009 enamel, our glass-lined pipes and fittings are made with the same care used on all our equipment, giving the optimum properties of cleanability, mechanical and corrosion resistance.

Advantages:

- High corrosion and mechanical resistance
- Designed to resist high stresses and avoid enamel breakage
- Easy to clean
- CE marking for the whole range of piping

GLASS-LINED TECHNOLOGY.

MULTIPROBE®

An innovative "plug & play" system to take representative samples in highly corrosive environments, in optimal security conditions at the heart of the reaction. The sampling baffle allows several functions in one nozzle: baffling, sampling, temperature measurement and pH measurement.

Advantages:

- Plug & play systems
- Representative samples
- Operator safety
- 4 functions in one product:
  - Baffling
  - Sampling
  - Temperature measurement
  - pH measurement

FUSED GLASS MANHOLE COVER

Our fused glass solution consists of a sight glass fused into a glass-lined steel mount (manhole or handhole).

In comparison with traditional solutions, fused glass offers better resistance to high pressure, thermal shock and fracture.

Our manhole can be equipped with a quick and easy handhole which can integrate the fused glass solution as well.

Advantages:

- Very good visibility inside the reactor
- Easy cleaning:
  - No dead zone
  - No gaskets
  - Higher resistance

NICKEL COATING

For pharmaceutical applications, we provide a special coating on glass-lined equipment as well as on parts where paint chips can potentially contaminate batches. Typical parts to be nickel coated include:

- Manhole cover and manhole protection ring
- Sight glass flange
- Piping
- Seal housing flange

Advantages:

- Bonds perfectly with the base material
- Impact resistant
- Suitable for applications in the food and pharmaceutical industries
- Easy to clean due to a specific surface preparation (roughness Ra<1.6 µm)
- Makes it possible to apply surface coating to components with complex geometries

CHAPTER 3

FILTER / DRYERS & POWDER HANDLING.

FILTER / DRYERS & POWDER HANDLING.

FILTRATION & DRYING

In processes where the final product is a solid, it is usually necessary to remove the solid from a slurry. De Dietrich Process Systems is the world leader in Nutsche filtration for batch processes.

Our technology is particularly suited to meet the stringent requirements of the pharmaceutical and fine chemical industries for solids washing and separation, even in the most challenging process conditions.

With sizes ranging from 0,03 to 16m² in stainless steel, glass-lined, alloy and other materials, De Dietrich Process Systems offers the widest range of filters and filter / dryers on the market. From laboratory to pilot and full production scale, our filtration solutions are highly versatile and adaptable to many chemical processes (pharmaceuticals, chemicals, natural extraction, precious metals, dyes...).

Filter / Dryer fully insulated for clean environment

AGITATED NUTSCHE FILTER AND FILTER / DRYER

The filter/dryer performs a multitude of tasks including filtration, displacement or reslurry washing and vacuum or convection drying. It can discharge wet cake, slurry, liquid or dried cake to less than 0.1% moisture.

Sterile filter / dryer

For products requiring sterile manufacturing conditions, our filter / dryer can be specifically designed to include steam-in-place (SIP) capabilities and eliminate all internal dead spaces. Key designs include the side discharge valve, mechanical seal and base design.

Materials: stainless steel 316 L, alloy C-22 and other alloys (from 0.03 m² to 16 m² of filtration surface)

Glass-lined filter / dryer

When traditional nickel alloys (C-22,C-276, B-3, ...) are not resistant enough or not considered as adequate for cleaning purposes, De Dietrich Process Systems can offer a glass-lined agitated filter / dryer solution. The outstanding corrosion resistance of enamel, the low roughness combined with the filtration and drying know-how make for a unique solution.

Materials: glass-lined steel (from 0.2 m² to 3 m² of filtration surface)

Thanks to our various materials and designs, our range of filter / dryers fit perfectly with several applications: HPAPI, sterile API, agrochemicals, catalyst, flavors food, cosmetics and much more.

Advantages:

- 2 functions combined
- Limited overall dimensions
- Closed system: no operator contact, no product transfer from one machine to another
- Heated filter plate for more efficient drying
- Agitator with gas knife system to blow the powder for a total discharge
- Side discharge valve with metal-to-metal seals eliminating cleanability issues
- Universal filter media allows the use of all types of filter media: cloth, single layer metal screen or multi-layer sintered metal. Version without screws (up to 8 m²) available for easy cleanability

FILTER / DRYER & POWDER HANDLING.

ROLAB FILTER / DRYER

RoLab is a standardized unit designed for pilot scale, multi-product environments. RoLab is mobile, easy to install and operate, and available with filtration areas between 0.03 and 0.4 m².

ROLAB FILTER / DRYER WITH MICROWAVE

Microwaves can be added on a RoLab as an additional energy source to further reduce the drying time significantly. Through careful control of product temperature along with forwarded and reflected microwave power, this technique is ideal for the fast processing of pharmaceutical products.

Advantages:

- Heated agitator and vessel
- Side discharge valve for protected discharge of the product
- Gas Knife System for complete discharge of the product
- Dust filter for improvement of the drying process
- Mounting screws of the filter media placed outside of the product space
- Attachment for sampling
- WIP-device for efficient cleaning of the inner vessel
- Tachometer of the agitator
- Containment systems

GLASS NUTSCHE FILTER

The glass Nutsche filter for vacuum filtration ideally meets the special demands of R&D as well as small scale production in the fine chemical and pharmaceutical industry.

Advantages:

- Mobile filter plate
- Glass cover with height adjustable blade to smooth the filter cake
- Excellent corrosion resistance
- Smooth, pore-free surface
- Transparency
- No metal in contact with the product
- Simple substitution of the filter cloth
- From DN300 up to DN1000

De Dietrich
PROCESS SYSTEMS

DRYING EQUIPMENT

Almost all chemical and pharmaceutical production processes require drying to achieve the final product.

De Dietrich Process Systems offers a wide range of high efficiency vacuum dryers which can improve production capacities by reducing drying times while fulfilling product quality, environmental and safety conditions.

DOUBLE CONICAL DRYER

Equipment designed for drying easily flowing products.

This concept provides a simple solution for many drying requirements.

The rotation of the double conical dryer allows the product to be mixed without an internal agitator.

Advantages:

- Glass-lined or stainless steel version
- Low operation and maintenance costs
- Good quality / price ratio
- Total emptying of powders
- For enamelled version: high corrosion resistance, metal free, easy to clean

PAN DRYER

Top or bottom driven, this dryer is designed for batch drying and can achieve very good efficiency.

The dryer is equipped with a lateral discharge valve allowing a perfect unloading of the product.

Advantages:

- Very good drying efficiency up to 0,1% moisture level
- Good mixing and thermal homogeneity
- Small footprint
- Side discharge valve
- Easy to clean (CIP/WIP and SIP)

SPHERICAL DRYER

Ideal for API product to be processed under cGMP.

The easy cleanability and perfect discharge of the product are the main assets of this equipment.

The dryer can integrate a heated agitator, increasing the heat exchange surface to speed up the drying step.

Advantages:

- A multipurpose solution for drying, mixing and granulating
- Easy to clean (CIP/WIP and SIP)
- Simple emptying and total discharge
- Usable with high pressure
- Top cover easy to open for quick inspection
- Standalone or ceiling installation
- 3-blades agitators for perfect mixing
- High speed chopper to reduce lump formation

UNIVERSAL DRYER

It combines special process steps including evaporation, drying, mixing, milling and granulation.

Thanks to a great heated surface (wall and agitator) this dryer offers a very good drying yield and high filling volume.

Ideal to dry all kind of products, whatever their characteristics.

Advantages:

- Short drying time
- High filling volume
- Agitator and chopper in one system
- Reliable lumpbreaking
- Small particle / grain size
- Wet and dry milling
- 3-blades agitators for perfect mixing
- Full-surface heating of the agitator and vessel

FILTER / DRYER & POWDER HANDLING.

CONTAINMENT

Corrosive, abrasive and other hazardous products can pose safety and environmental concerns.
The products need to be protected as well as the operator.

De Dietrich Process Systems has developed a complete range of innovative and efficient solutions when strict containment is required. Whether the product is chemically corrosive, pharmaceutically active, or any other type of containment scenario.

POWDER PUMP

The solution for conveying/charging powder from one piece of equipment to another safely and efficiently. Suitable for the transfer of raw, intermediate or finished products for the chemical and pharmaceutical industries, as well as other industries with various solid handling needs.

Advantages:

- Ability to charge equipment under pressure or vacuum
- No dust formation
- Loading is possible over long distances and at higher levels
- Trials have been performed on a large range of powders (from carbon black to damp powders)
- Smaller footprint
- Simple and accessible maintenance
- Clean-In-Place (CIP) solutions
- Mobile solutions available (on trolley)

PACK OFF STATION

The Pack Off Station is designed for charging of powders in a controlled manner into drums using continuous bag liners for high level containment.
This system allows for contained charging of wet or dry powders into lined drums under manual or automatic control.

Advantages:

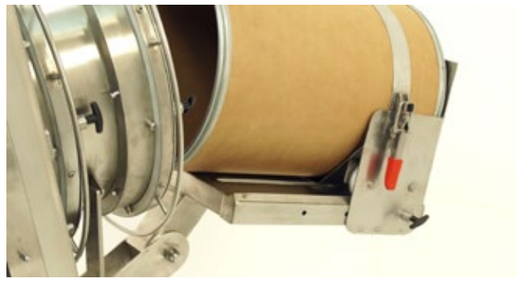
- Safe and contained handling of toxic and explosive powders
- Maintains industrial hygiene
- Handles wet or dry powders
- Ergonomic design
- Adaptable to auxiliary equipment

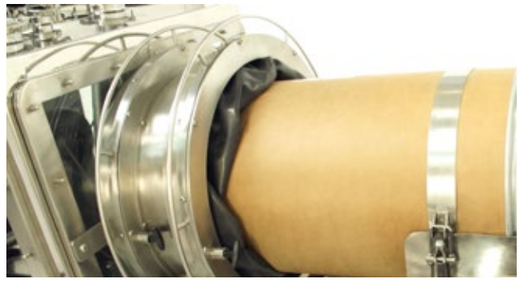
De Dietrich
PROCESS SYSTEMS

DRUM IRIS TECHNOLOGY™

The docking of drums for powder transfer could represent a challenging yet necessary operation while developing most production processes, especially when high containment is a must.

De Dietrich Process Systems offers the Patented Technology DIT – Drum Iris Technology, which is an innovative and easy to use solution for a fast connection. DIT is the perfect alternative to the common docking methods based on bag in - bag out or inflatable gaskets, and provides higher easiness of use and compatibility with drums of all diameters.





WORKING PRINCIPLE

The DIT- Drum Iris Technology is based on a double iris valve interface, with full diameter opening and closing ends by means of an elastomeric diaphragm (IRIS).

The docking process consists of opening the external iris valve and then introducing the drum until it touches the internal iris still closed. After closing the external valve on the container body, the internal valve is opened to introduce the top of the drum.

By this time, both iris valves can be squeezed on the drum body to seal the system to very low OEB 5 band containment values.

The double elastic barrier minimizes the contact surface of the drum with the inner potentially contaminated atmosphere. The docking operations can be fully automatic without introducing the need of any kind of consumables.

Furthermore, a negative or positive pressure difference (pressure cascade) between the double iris pass box and the adjacent environments is easy to achieve and maintain during all operations.

Advantages:

- Wide opening up to 700 mm
- Great versatility, allowing for drums of multiple diameters to be docked.
- Easy cleaning and maintenance
- Single use elastomers version
- External body of the drum not in contact with the process
- Fully automated or manual docking system

Materials:

- The elastomers of the iris valves can be produced with a wide range of materials, both conductive and non-conductive. The most commonly used material are EPDM, Silicone, FKM and for single use fast assembly version PU or LDPE.

DRUM DOCK STATION FOR POWDER TRANSFER

The charging of reactors from drums is a very common application and, especially when the powder to be transferred is highly toxic, it must be performed in a contained environment.

De Dietrich Process Systems Drum Dock Stations are equipped with DIT Drum Iris Technology, to assure the superior containment performance and ease of use, facilitating integration with multiple systems, processes and equipment.

DRUM DOCK STATION SINGLE CHAMBER

This docking station is designed to help operators safely transfer materials out of drums. The pneumatic lifter allows inverting drums to remove the contents with few operator interaction. The drums can be either connected from the bottom or the back of the station. Equipped with the DIT system, transfers are done in a contained way.

Advantages:

- DIT technology integrated on chamber back or working bench
- Body built in AISI 304, AISI 316, HASTELLOY C-22
- ATEX version available
- Up to OEB 5 containment level
- Easy integration of multiple powder transfer systems
- Exhaust system with double Push-Push H14 filtration unit, for negative pressure process
- Spray-ball and spray-gun for CIP process
- Side liner for waste bag-out
- Back or bottom connection possible

DRUM DOCK STATION DOUBLE CHAMBER

This version is a variant of the single chamber, integrating a second chamber for a higher level of containment.

Advantages:

As above and:

- Up to OEB 6 containment level
- Handling of powder done in the main chamber in order to keep the pre-chamber clean
- Customizable number of gloves for each chamber
- Internal transfer port with inflatable flush mounted gasket
- Fully integrable with high containment valves
- Customizable overall dimensions

DRUM DOCK STATION GLOVE BAGS

This solution allows you to charge powders manually and directly from a drum to your reactor in total safety. The station can be designed as per your environmental constraints and will be perfectly adapted to your needs. The DIT system is integrated to reach optimal performance.

Advantages:

- Single or double DIT technology integrated with the glove bag
- Glove bags built in antistatic PU or LDPE
- ATEX version available
- Up to OEB 4 containment level
- Direct reactor charging
- Thermo-welded gloves
- Spray-gun for CIP process
- Side liner for waste bag-out
- Customizable design and overall dimensions

DE DIETRICH PROCESS SYSTEMS: GROUP PRESENTATION

CHAPTER 4

BOROSILICATE GLASS.

BOROSILICATE GLASS.

BOROSILICATE GLASS 3.3

QVF® - The material advantage
The almost universal corrosion resistance of borosilicate glass 3.3 is the major reason for its ongoing use in the chemical and pharmaceutical industries.

Borosilicate glass's chemical composition and physical properties are well defined by international standards so that it can be safely used. The transparency permits observation of the process without instruments and the smoothness significantly eases the cleaning of the equipment. All glass components are made of only borosilicate glass 3.3 and provide a long-lasting unique functionality. You can rely on De Dietrich Process Systems as a strong engineering and manufacturing partner for glass solutions.

QVF® SUPRA-LINE

The component for chemical systems
Decades of experience in developing and providing highly functional QVF® glass components for reaction and thermal separation systems have led to this comprehensive component system which is compatible to all its precursors.

Advantages:

- Columns up to DN1000 - spheres up to 500L
- Highly corrosion resistant for universal use
- Proven design for efficient processes
- High precision dimensions to ease service
- Robust for a long life cycle
- Compatible to all former glass component systems
- Certified pressure resistance
- Certified tightness of flange connections and valves

BORESIST®

Piping system for waste water and vent gas
The smooth glass surface minimizes residue build-up and the transparency enables visual monitoring of the free flow. In combination with the chemical inertness, Bororesist® is ideal for heavily loaded waste streams.

Advantages:

- DN40 up to DN150
- Smooth inner surface for eased liquid flow
- Transparency enables visual inspection
- Non-flammable, reduces risks
- Pressure resistant, for safe operation
- Chemical resistant, for industrial environments
- Certified waste water system

GLASS SYSTEMS

The clear solution
The detailed knowledge about the borosilicate glass in combination with the engineering competences developed together with our partners throught recent decades enable us to provide state-of-the-art systems for reaction and thermal separation processes including distillation, extraction, absorption and filtration.

Advantages:

- Made of the modular QVF® SUPRA-Line system
- Easy to clean
- -90 to 220°C
- -1 to +4barg
- cGMP compliant
- Documentation for DQ, IQ, OQ qualification
- For EX-rated areas and processes

De Dietrich PROCESS SYSTEMS

QVF® SUPRA-LINE

The component system
Borosilicate glass 3.3 has been a proven material for the chemical and pharmaceutical industries for decades.

QVF® SUPRA-Line permits the building of complete chemical systems and also fits to the former QVF® and SCHOTT® glass plants. This comprehensive system features borosilicate glass 3.3 components as well as flange connections, holders and structures, instrumentation and stirrer drives. All these components have been continuously improved to provide long lasting functionality within compact dimensions. Some major highlights include:

REACTOR

The heart of a synthesis plant
Efficient mixing and predictable heat transfer are essential for a reliable reaction process. This is achieved by robust EX-protected drives with various types of stirrer seals that ensure safe long-term operation.

Advantages:

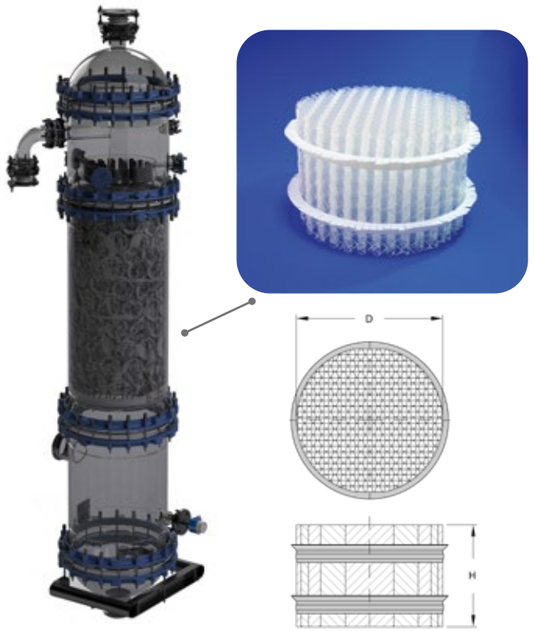
- Jacketed vessels up to 100L
- Triple wall reactors for cryogenic reactions
- OptiMix® baffles for efficient mixing
- Dead space reduced for complete mixing
- Consistent geometries easing scale-up
- Robust EX-certified drives with industrial seals
- Certified pressure resistance

SHELL & TUBE HEAT EXCHANGER

The modular system
In case the required heat transfer rates are too high for coil type heat exchangers, these shell & tube heat exchangers are the convenient solution. Due to the modular design, this type of heat exchanger can be adapted to many different process steps.

Advantages:

- Up to DN300 with 27m² heat exchange area
- -1 up to +3 barg on process side
- +6 barg on service side
- Tubes made of glass or SiC
- Shell made of glass-lined steel, glass or steel
- Tube plate and sealing bushes made of PTFE
- Optional cGMP design



COLUMN

Designed by chemical engineers
Highly efficient glass columns for distillation, extraction and absorption processes can be used in conjunction with various types of column internals to maximize the performance of thermal separation processes.

Advantages:

- Columns up to DN1000
- Various corrosion resistant column internals:
  - Patented structured packing – Durapack®
  - Patented support trays – Core-tray
  - Design support

De Dietrich
PROCESS SYSTEMS

GLASS SYSTEMS

The clear solution
We are the manufacturer of the QVF® SUPRA-Line component system and use it to build state-of-the-art glass systems for reaction and thermal separation processes.

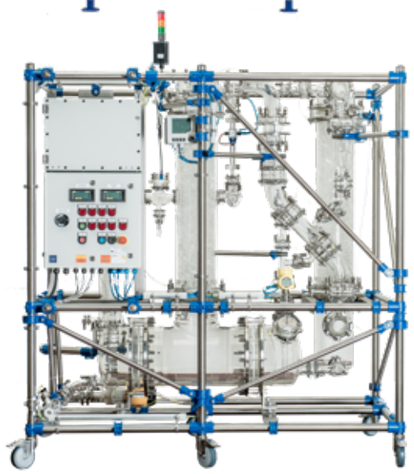
The modular QVF® SUPRA-Line allows for easy modification of existing glass systems to meet updated process requirements, while providing high operational safety and low maintenance costs. These systems are either customized or standardized and only need to be connected to the necessary infrastructure if supplied with measurement and control equipment. A selection of some standardized systems is presented in the following:

UNIVERSAL REACTOR

The solution if a 3 neck flask becomes too small
With this unit, it is possible to safely run reactions with larger quantities in the liquid phase between -20°C and +150°C. Temperature sensitive products can be distilled off at lower temperatures under vacuum.

Advantages:

- Standardized up to 50L reactor volume
- System includes instrumentation
- Easy cleaning due to self-draining construction
- Certificates for material in contact with product
- Robust stirrer drive
- For EX-rated areas and processes



COMPACT SCRUBBER

A complete vent gas solution
The highly corrosion resistant gas scrubber is designed for batch-operated production plants. The compact and mobile turn-key unit provides flexibility, especially in space-constricted facilities.

Advantages:

- Waste gas streams up to 200Nm³/h
- For acidic, caustic and organic gas loads
- Mobile and compact system
- Minimum height at maximum absorption efficiency
- Turn-key unit including control panel

MIXER SETTLER SYSTEM

Continuous extraction unit
Due to the high mixing performance of the stirrer system and the efficiency of the phase separation, almost one theoretical stage can be carried out per mixer settler stage. The phase ratio, throughput and mixing performance can be varied over a wide range to fit different processes.

Advantages:

- Flow rates up to 4,000L/h (sum of both phases)
- Difference in density down to 5%
- Wide operating range
- Compact design
- Turn-key units including control panel
- For EX-rated areas and processes

De Dietrich
PROCESS SYSTEMS

GLASS SYSTEMS

We are always seeking the best process solutions for reaction and thermal processes in the areas of extraction, distillation, absorption and filtration.

This mindset drives us to develop systems with the most advanced technologies, combining the most suitable material. If appropriate, we integrate externally sourced components to ensure the best possible, long lasting process performance. A few examples of the wide range of such systems is shown below:

PHARMA REACTION SYSTEM

Batch process under perfect control
Systems combining a glass-lined vessel for maximum heat transfer with a glass dome for perfect observation of the process can be built in sizes up to 630L. This compact version has been standardized for capacities from 16L to 63L.

Advantages:

- Standardized from 16 to 63L
- Versatile batch reaction system
- Maximum heat transfer for best process control
- Glass cover for perfect observation of the process
- Self draining for easy cleaning
- Fulfilling cGMP requirements
- For EX-rated areas and processes

ROTADEST®

Universal solution for gentle distillation
This rotary evaporator of pilot plant size permits the distillation at low vacuum and hence low temperature. Volatile media can be completely evaporated so that dry solid products can be obtained in the rotating flask.

Advantages:

- Systems with 50L or 100L rotating flask
- Most universal type of evaporator
- For vacuum distillation down to dryness
- Reliable industrial drive
- Fulfilling cGMP requirements
- For EX-rated areas and processes

INNOVATION

CRYOFLOWSKID

Plug & Produce & Develop
Cryogenic 3-step reactions such as organometallic syntheses are usually carried out batchwise at challenging low temperatures. With the CryoFlowSkid, this can be done continuously at much more convenient higher temperatures and, even more important, with higher yields.

Advantages:

- Continuous reaction - capacity up to ~ 5kg/h
- Hydraulic throughput up to 100L/h
- Cryogenic syntheses
- 3 Reaction steps in 1 system
- Fully automated
- Ready for operation
- For EX-rated areas and processes

CHAPTER 5

OUR SERVICE OFFER.

OUR SERVICE OFFER.

LOCAL PRESENCE WITH INTERNATIONAL SUPPORT

De Dietrich Process Systems has developed a worldwide network of local Tech Centers to provide maintenance and support through the entire life cycle of our equipment.

Our Tech Centers offer a broad range of services:

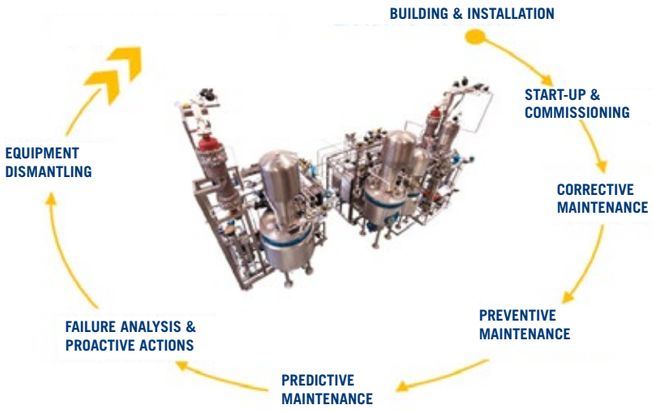
- Field service
- Upgrade & refurbishment
- Spare parts & components
- Trials & rental
- Studies
- Training & customer seminars

FIELD SERVICE

EVERYWHERE IN THE WORLD YOU CAN RELY ON US!

For many years, De Dietrich Process Systems has maintained a global network of field engineers who can help you with the installation, commissioning and maintenance of your equipment.

Regardless of your location, you will be able to connect with a trained technician who will help you to resolve your technical problems on your equipment.



BUILDING, INSTALLATION, DISMANTLING

From small units to complete plants, our team can realize and/or supervise the entire project to guarantee your peace of mind. The coordination of all aspects of the project from start to finish will be handled by one dedicated manager.

START-UP AND COMMISSIONING

Our technicians can realize the start up of your equipment in order to validate the warranty and avoid problems. Start-up (FAT / SAT) are also in our scope and will help you get up and running faster.

MAINTENANCE

- Corrective:
  - **Glass-lined:** screws, plates, sleeves, tantalum, PTFE, customized patches, customized repairs.
  - **Steel:** all kinds of repairs thanks to skilled welders and boiler makers
  - **Replacement of accessories:** all spare parts and components
- Preventive:
  - **Glass-lined:** visual and spark test, thickness, mapping
  - **Steel:** thickness, integrity by ultra sonic, mapping
  - **Glass:** parts inspection
  - **Equipment health check:** inspection and operation, spare parts control
- Predictive: inspection without shutdown, enamel thickness from outside, measurement (thermal, vibration, noise…)

Field Service Highlights

- One dedicated manager to handle your project
- Worldwide network of technicians
- FAT / SAT performed by De Dietrich Process Systems to optimize the start-up time
- Thousands of installations throughout the world

UPGRADE AND REFURBISHMENT

GIVE A SECOND LIFE TO YOUR EXISTING EQUIPMENT!

UPGRADE

Equipment you purchased years ago can be upgraded with our latest techologies in order to improve their efficiency (production yield, cleanability, energy consumption, mixing….). Based on the size of the equipment and level of refurbishment required, we can perform repairs and upgrades on site or in our workshops.

- **For glass-lined equipment:** new agitator and motor, CleanValve, cleaning solutions, sampling, standard design to OptiMix® design…
- **For filter / dryer:** drive unit, discharge valve, Gas Knife agitator, cleaning solutions, motor, filter mesh…

REFURBISHMENT

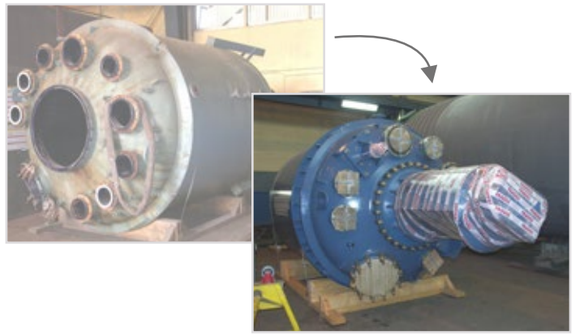
After years of use, some equipment may need refurbishment. If you have equipment that is a candidate for refurbishment, you can rely on us to take care of every step of the cycle (dismantling, refurbishment in our workshops, installation and commissioning) in order to repair and optimize your equipment to like new condition.

- **For stainless steel and other alloy equipment**, parts can be repaired or replaced
- **For glass-lined equipment**, reglassing is mandatory, which consists of removing the old glass-lined layers, checking the steel integrity and starting a new enamel spraying process

All glass-lined reactors, columns and accessories such as covers, agitators and baffles can be reglassed if the steel substrate is in repairable condition.

- **For glass**: Complete refurbishment of your equipment, replacement of seals & accessories, glass thickness measurement. We can bring your equipment into compliance to meet required standards/certifications (Atex, FDA,…)

Whatever the brand of your equipment, we can provide upgrade and modernization services



Upgrade & Refurbishment Highlights

- Economical solution
- Delivery time reduced
- Possibility to upgrade your old equipment
- Same warranty as new equipment
- New documentations and certifications provided
- Intervention on all brands of equipment

SPARE PARTS & COMPONENTS

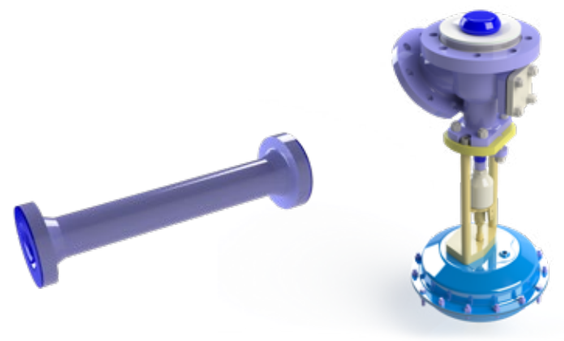
THOUSANDS OF REFERENCES IN STOCK READY TO BE SHIPPED

De Dietrich Process Systems keeps a wide range of components in stock, readily available to minimize your equipment downtime so that you can focus on meeting your production yield.

GLASS-LINED

10,000 different references:

- Mixing technologies (blades, shaft)
- Reactor accessories (baffle, dip pipe, sampling, manhole, clamp…)
- Gaskets (aramid & graphite)
- Valves and piping
- Repair parts….



FILTER / DRYER AND POWDER HANDLING

4,000 references:

- De Dietrich®, Rosenmund® or Guedu® parts

GLASS

- QVF® SUPRA-Line range
- Spare parts for existing plants of the last 60 years
- Boresist® range
- Special parts made of borosilicate 3.3

Spare Parts & Component Highlights

- Quick delivery
- Wide range of components available
- Reduce your downtime
- Allow you to run back your production quicker

TRIALS & RENTAL

TRIALS ARE ESSENTIAL TO VALIDATE YOUR PROCESSES

De Dietrich Process Systems has 3 Tech Labs, located in Germany, USA and France. Our Tech Labs allow us to test your product (or a product with similar characteristic) in real conditions in order to validate the use of our equipment for your process.

FILTRATION

- Filtration rate
- Calculation of the cake specific resistance
- Definition of the best type of media
- Extrapolation of filtration areas and cycle times at the industrial scale

PROCESS

- Glass testing facility, for development of customized components and processes, testing and optimization. Production of small volumes is also possible
- Validate your process
- Define your scale up project

DRYING

- Drying cycle duration
- Agitation speed
- Lump breaking
- Dust filter area
- Required heating power
- Vacuum pump and condenser sizing
- Final product humidity content

POWDER TRANSFER

- Powder transfer to check the behavior of your powder with our equipment and validate successful transport

REACTION

- Agitation performance
- Heat exchange calculation
- Fluid behavior analysis
- Agitator selection (blade type, number of stages, rotation speed…)

WANT TO TEST YOUR PRODUCT IN-HOUSE? WE CAN RENT YOU SEVERAL EQUIPMENT:

- Laboratory filter 0.01m² for filtration media definition
- RoLab filter / dryer, sizes ranging from 0.03m² to 0.4m²
- Pan dryer with bottom driven agitation, type Guedu® 45L
- Vacuum, heating and condensation skid
- Cooling unit

Trial & Rental Highlights

- Validation of equipment before purchase
- Validation of your process
- De Dietrich Process Systems expert advice

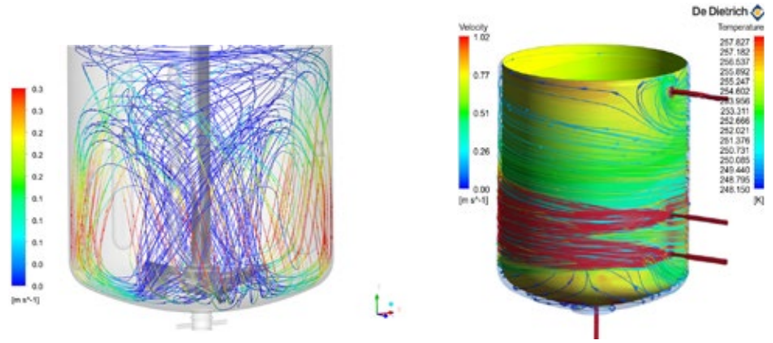
STUDIES

SIMULATION TOOLS TO OPTIMIZE YOUR EQUIPMENT EFFICIENCY

MIXING & HEAT TRANSFER STUDIES (CFD)

Mixing and heat transfer are major process steps in the chemical and pharmaceutical industries, our expertise is based on tests conducted on small-scale models, digital simulations (CFD and one software developed internally) and sustained collaboration with specialist laboratories.

- Heat transfer coefficient
- Heating and cooling times
- Thermal power levels needed for heat transfer
- Heat balance of your reactor
- Mixing and heat exchange efficiency
- Power consumption



CLEAN-IN-PLACE (CIP) STUDIES

Whether for pharmaceutical or chemical applications, cleaning steps are crucial to:

- Avoid cross-contamination
- Save time between batches
- Reduce solvent consumption

For this purpose, De Dietrich Process Systems has developed its own approach based on simulation and testing, that have allowed us to create a precise database, presenting the best spray balls performances per equipment design.

The data obtained from these studies enable us to provide the precise covering rate of your equipment during the cleaning step.

Depending of the equipment design and type of spray ball, we can reach up to 100% coverage.

Study Highlights

- Accurate simulations done by experts
- Definition of the best equipment design thanks to simulations
- Equipment performance analysis
- Years of experience

TRAINING & CUSTOMER SEMINARS

TURN YOUR EMPLOYEES INTO SPECIALISTS!

De Dietrich Process Systems has designed various training modules for customers who would like to learn and increase their skills and know-how on our products. Our training sessions and seminars can be performed in different languages in our workshops or at your site.

Every year, we provide training and seminars for maintenance and inspection teams, project managers, process engineers and specialists on the following topics:

GLASS TRAINING

- Introduction to borosilicate glass
- Glass assembly courses
- Basic courses
- Advanced training courses

GLASS-LINED TRAINING

- Introduction to enamel and glass-lined equipment
- Installation and maintenance of glass-lined equipment
- Workshops (instrumentation, repair, assembly/disassembly)

PROCESS IMPROVEMENT AND OPTIMIZATION

- Introduction to agitation and heat exchange
- Key parameters for calculation (mixing, heat transfer ...)
- Studies of different processes
- Workshops in our laboratory

All our training courses feature theoretical and practical sessions to prepare customers for real-life situations.

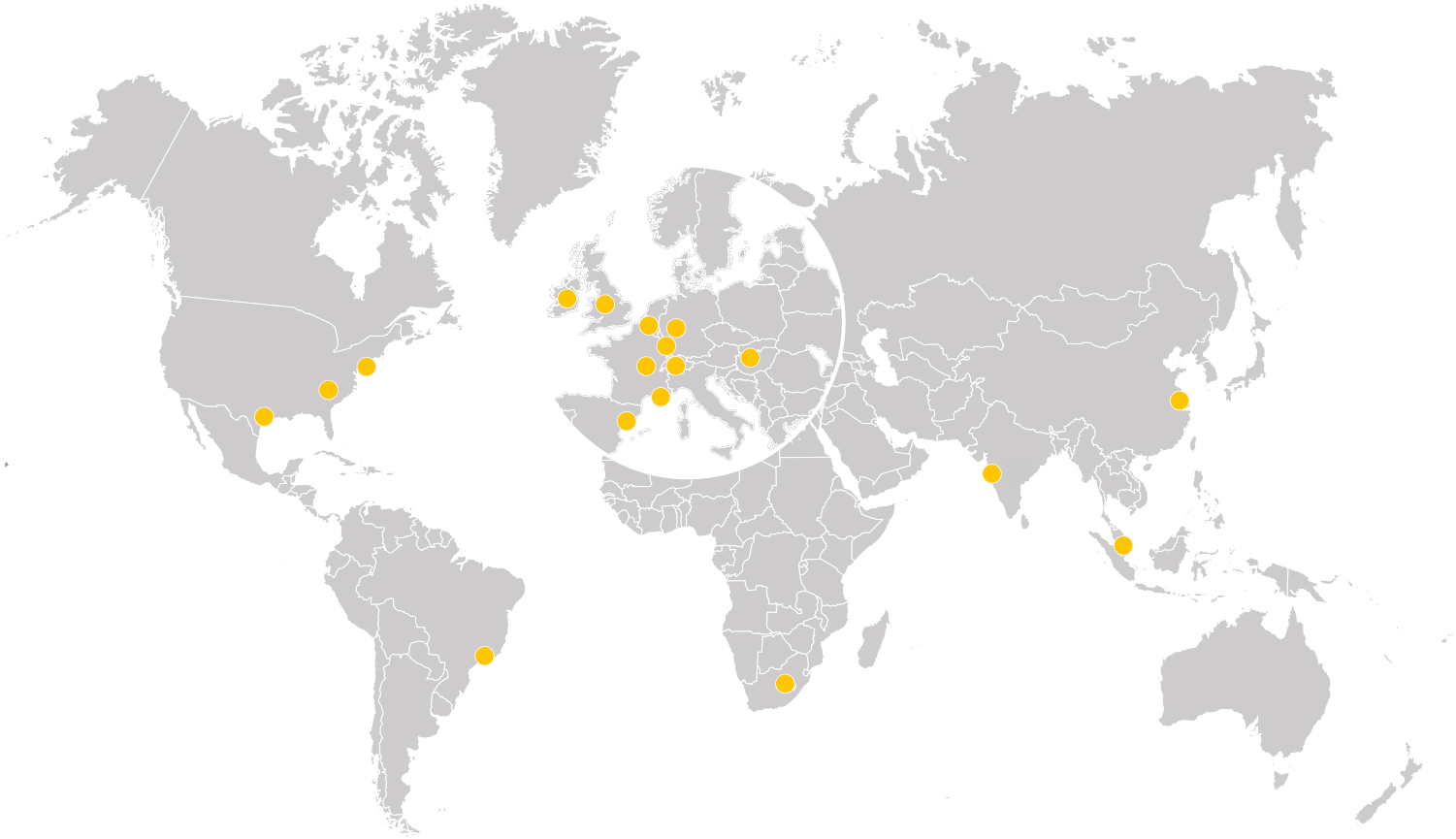
Training & Customer Seminar Highlights

- Targeted and efficient training, based on the essential
- Theoretical and practical sessions
- Customized training available upon request
- Flexibility of the training location (on site or in our workshop)
- Positive customer feedback on training sessions

By choosing De Dietrich Process Systems, you will benefit from a unique expertise built on over 300 years of experience in the chemical and pharmaceutical fields.

From single equipment to complete installations, we provide state-of-the-art solutions thanks to the passion and innovative mindset of the women and men that compose our Group.

If you are looking for reliability, value and expertise, you can trust De Dietrich Process Systems as a partner for your next project.



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De Dietrich Process Systems is the leading global provider of Process Equipment, Engineered Systems and Process Solutions for the fine chemical, chemical and pharmaceutical industry.

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