Mersen Anticorrosion and process equipment

Business Overview

Mersen : global expert in electrical specialities and graphite-based materials

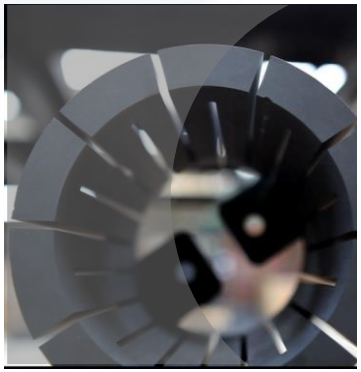
Materials segment

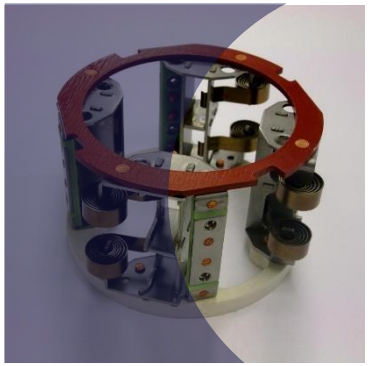
- **Graphite components for high-temperature applications**
- **Anticorrosion systems in graphite and reactive metals**

APPROX. 25% MARKET SHARES WITH LEADING POSITION WORLDWIDE

Electrical segment

- **Components for power electronic**
- **Distribution and protection of electrical equipment**
- **Supply and control of motors (carbon brush)**





Mersen anticorrosion and process equipment

- Design and manufacture process equipment (heat exchangers, pressure vessels, columns, piping, fitting) to comply with corrosive and/hot applications, especially for the chemical industries
- Design and manufacture systems for the acid production, dilution, absorption, production (HCl, H_2SO_4)
- Provide after-sales & engineering services

Our expertise

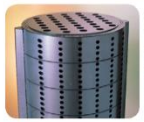
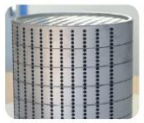
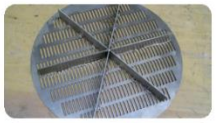
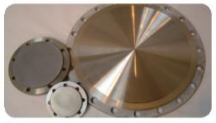
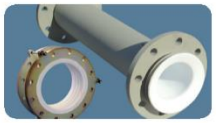
- **Graphite-based equipment**
  - Impregnated graphite quality : “**Graphilor® 3” with 3 types of impregnations** (XTH, XC, XBS)
  - Complete range of heat exchangers
  - Thermal sizing competence

- **Tantalum process equipment**
  - Welding expertise
  - Clad know-how (explosion clad and CL-Clad®)
  - Dedicated manufacturing site

- **Engineered HCl systems**
  - Large modular offer from basic synthesis unit to fully engineered skid system
  - Process engineering department
  - Strong relationship with engineering companies and key end-users

Current portfolio

Equipment

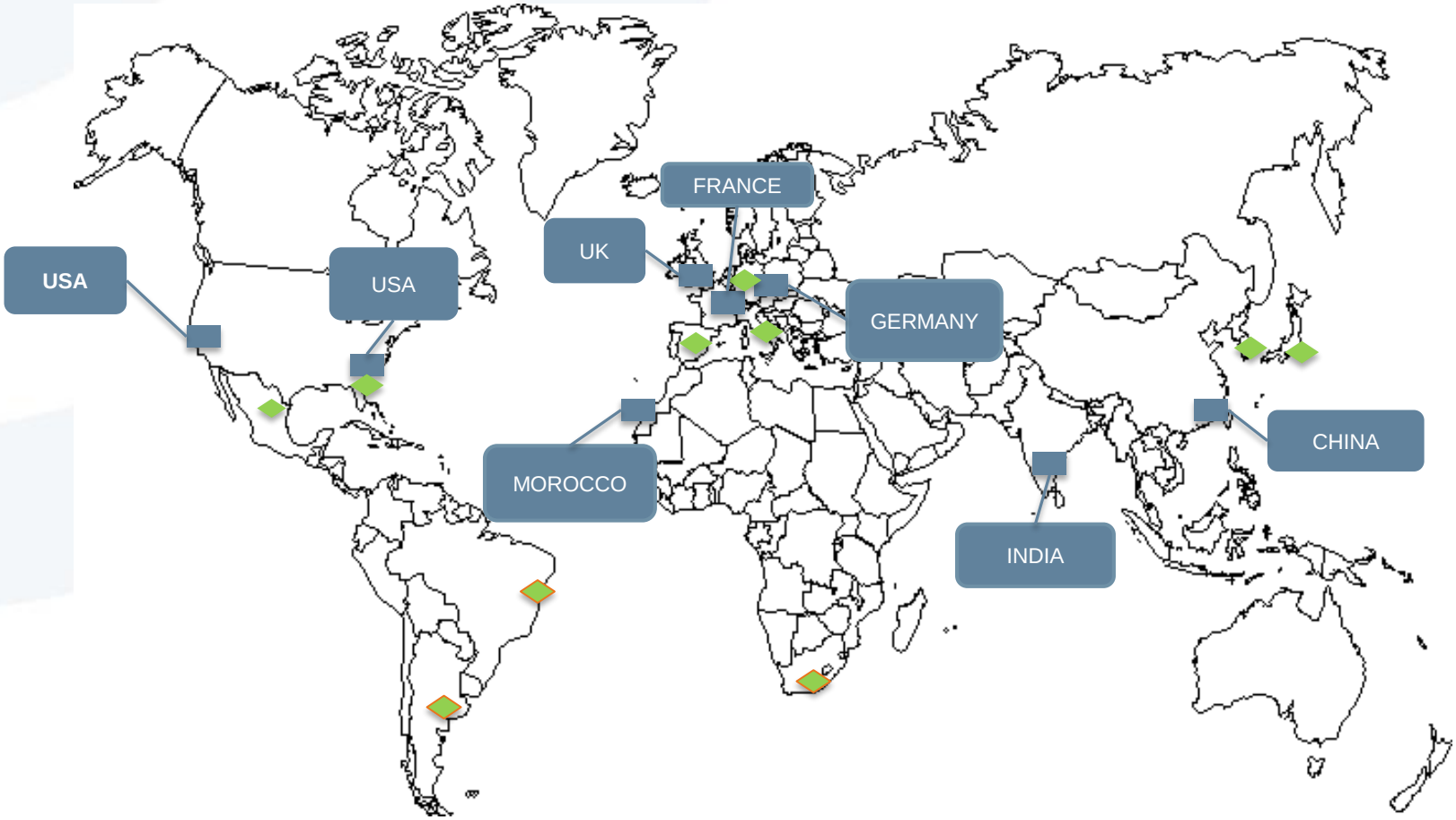
	Reactors Pressure Vessels	Heat exchangers Blocks/Shell & Tubes	Columns	Piping Bellows Fittings
Graphite				
SiC				
Tantalum				
Zirconium				
Titanium				
Carbon Steel Stainless Steel Nickel Alloys				
PTFE				

Engineered Systems

HCl Systems	Acid Systems
- Direct Synthesis, with steam generation in option - Absorption - Evaporation - Concentration - Dilution - Organics treatment	- HBr Synthesis Unit - H_2SO_4 - HF dilution - Cl_2 stripper unit
	
	

Services & Maintenance

Where we are…



Production sites:
Quick Center

Graphilor® 3 : impregnated isostatic graphite with ultra-fine grains

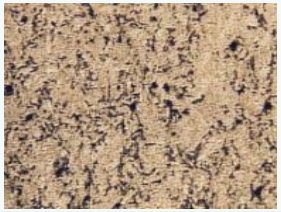
- **Mersen group produces ultra-pure grade of isostatic graphite providing** optimum resilience to extreme temperatures **(up to 3,000° C).**

- **Graphilor® 3 is Mersen's trade mark for impregnated graphite, resulting from the combination between ultra-fine grain graphite and specific resin.**

- **Key advantages of Graphilor® 3:**
  - High resistance to corrosion
  - Resistance to temperature and thermal shock
  - High mechanical resistance
  - Excellence conductivity

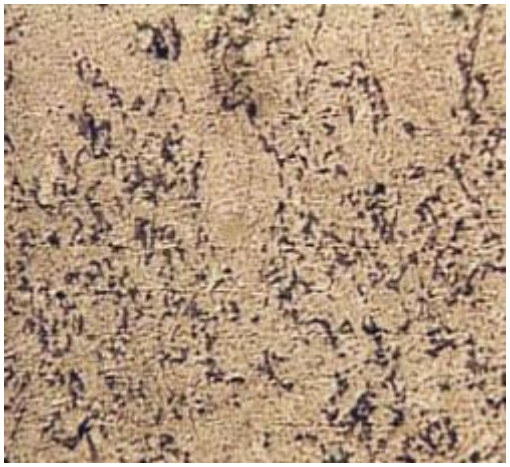
- **Mersen is using 2 different processes:**
  - Isostatic pressing for blocks and tubesheets
  - Extrusion for tubes

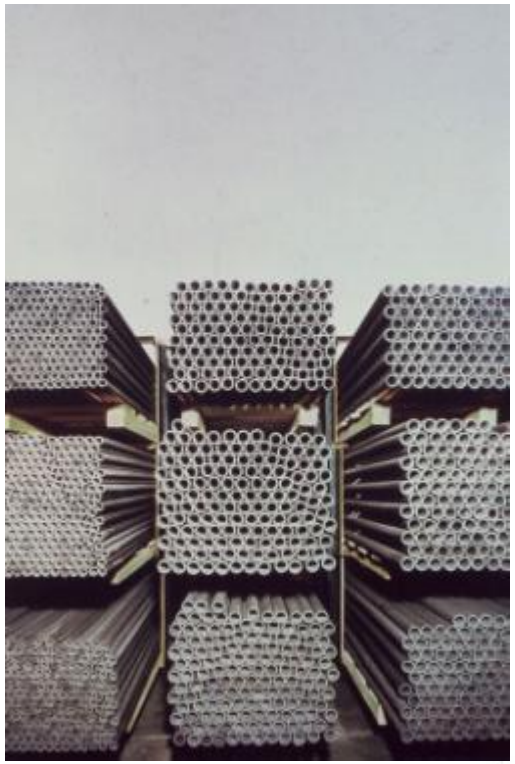
Graphilor® 3 for blocks and columns

		BS	Graphilor® 3		
			XBS	XC	XTH
					
Graphite		S – Fine grain	X – Ultra-fine grain		
Resin		Phenolic	Phenolic	Carbon	PTFE
Available Monolithic blocks		1760 mm	1200 mm	1200 mm	600 mm
Available tubesheet	monolithic	1760 mm	1200 mm	1200 mm	-
	ML	2080mm	2080mm	-	-
Temperature		200 ° C	220 ° C	430 ° C	230 ° C
Mechanical strength TUV Homologation		G 18-15-200	G 20-00-220	G 18-00-400	G 15-00-250

Graphilor® 3 for tubes

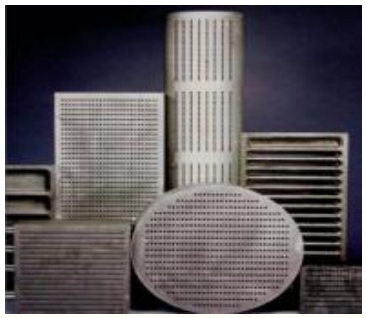
- Tubes are made with Graphilor® 3 XBS
  - Graphite grade X – ultra-fine grain
  - Resin Phenolic
- Temperature : 220° C
- Capability to produce seamless tubes up to 6 meters
- Option : carbon-fiber tubes
- High mechanical strength : all our tubes are homologated G30-00-220 which is the highest available in the market
- State-of-the art manufacturing facility located in France

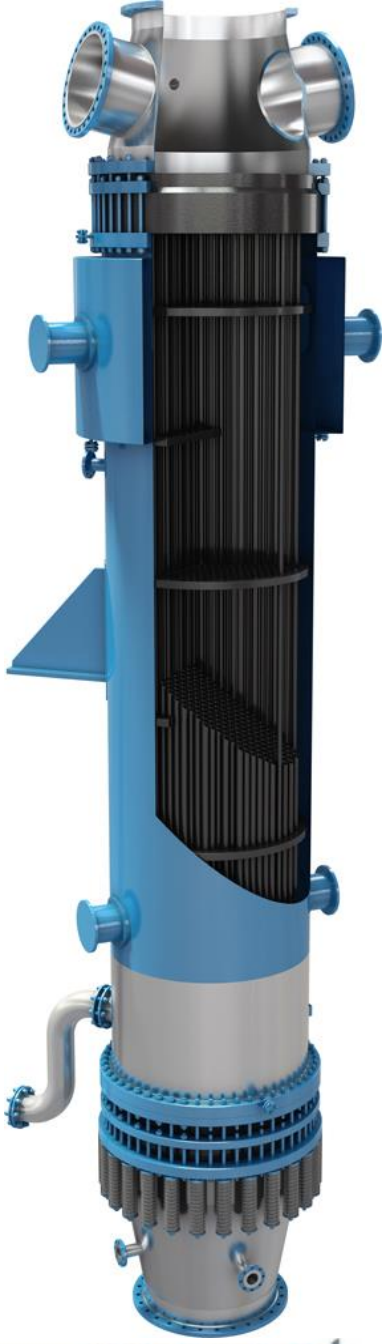




Graphite equipment

- **All the equipment are made with Graphilor® 3, the impregnated isostatic graphite.**
- **Heat Exchangers**
  - Polybloc® & Cubic
  - Polytube ®
- **Columns and accessories (Raschig Rings)**
- **Bursting discs**
- **Manufacturing sites :** Pagny (France), Teesside (UK), El Jadida (Morocco), Salem (USA), Chennai (India), Shanghai (China)

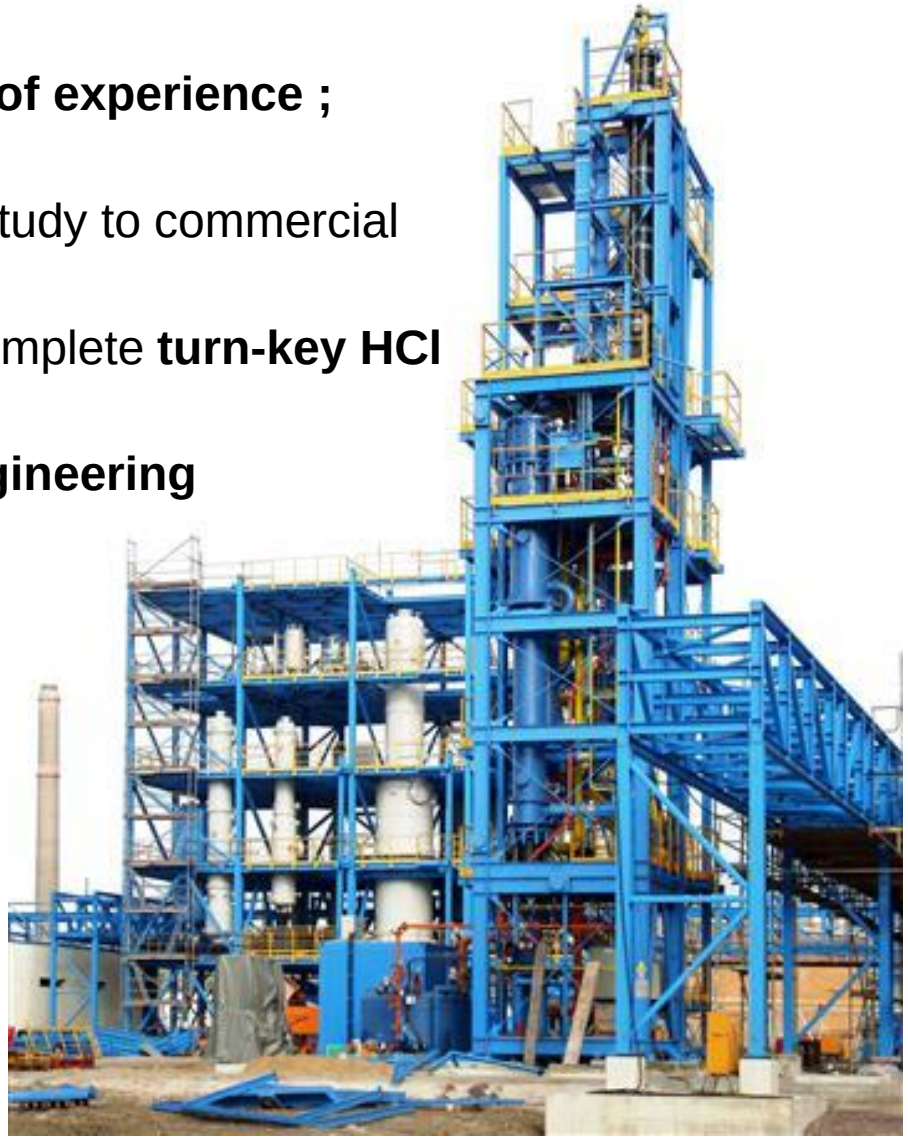




Engineered systems

- **600 units delivered so far ; 54-years of experience ; worldwide references**
- **Project development** from feasibility study to commercial operation
- **Leader** in the design and building of complete **turn-key HCl burner systems**
- **Project management and project engineering**

- Mersen's engineered systems experience includes :
  - Sintaclor®: HCl and HBr synthesis
  - HCL absorption, desorption
  - HCL azeotrope breakers
  - Acid dilution (H_2SO_4, HCl, HF)
  - Heating and cooling package for pickling baths



Tantalum equipment

- **Pressure Vessels, columns & heat exchangers**
  - Solid or Tantalum CL-Clad® (Mersen patented cladding technology)
  - Manufacturing sites : Oxnard (USA), Linsengericht (Germany),

- **CL-Clad® is a brazing process patented by Mersen, for Tantalum applications**
  - CL-Clad® bonding is vacuum-resistant
  - A thin cladded-layer (0,5 to 0,7mm) of Tantalum (Ta) is added to the base plate
  - Base plate is made of carbon or stainless steel

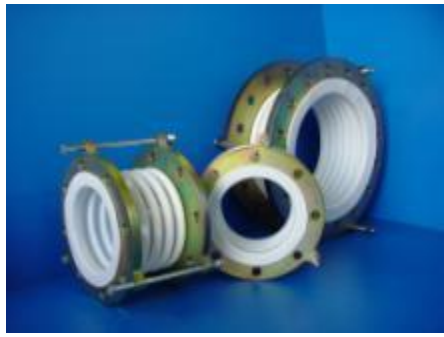
- **Market segments : corrosive process and / or high pressure**

Metallic equipment

- **Pressure vessels, columns, heat exchangers**
- **Materials :** zirconium, titanium, nickel alloys, stainless steel, carbon steel
- **Manufacturing sites** : Oxnard (USA), El Jadida (Morroco), Xianda (China)

Fluoropolymer equipment

- **Armylor® : Mersen's trademark for fluoropolymer equipment**



- **Expertise in fluoropolymer technology**
  - Paste extrusion of fine PTFE powders
  - Isostatic molding
  - PFA injection

- Piping, Fittings, Bellows & compensators and Columns

- **Manufacturing sites** : Pagny (France), Salem (USA), Shanghai (China)

Services & Maintenance

- Local after-sales centers
- Specialists team
- Diagnostics – repair on site or in local workshops