

STEULER

MAINTENANCE WORK IN SULPHURIC ACID PLANTS

ACIDPROOF AND REFRACTORY MATERIALS

COBRAS 2009,
FLORIANÓPOLIS, BRASIL

STEULER

Company History

Foundation 1908

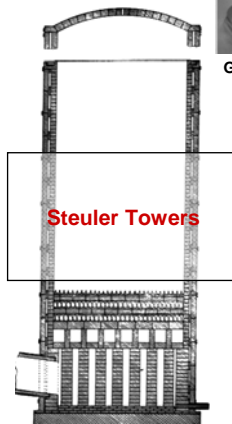
Known Processes:
Birkeland Eydesche Process
Pauling Process
Contact Process (W.Ostwald)
Haber Bosch Process

**Development of
Potassium Silicate
Mortar**

**Acid Proof Brick
Material**



Georg Steuler

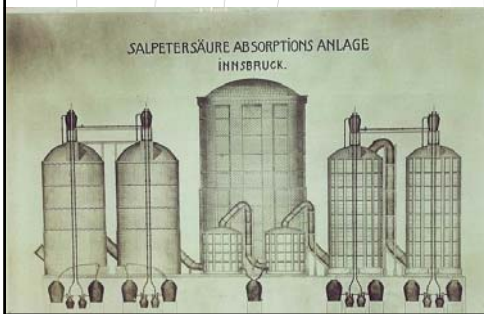


Steuler Towers

**Large Scale
Production of Nitric
Acid / H₂SO₄**

STEULER

Company History 1908 Steuler Group



August 1908.

20	St. Hansbeuch		
	Waggon Breslau 46 Stk.		
	42 Stück Torfformen 180 x 9 x 9 R.		
	42 L.		
	42 B.R.		
	42 L.		
	42 B.R.		
	42 L.		
	700 . Gangweihen . I.	10.800	92
27	Waggon Breslau 46 Stk.		
	42 Stück Torfformen 180 x 9 x 9 R.		
	42 2.		
	42 1.L.		
	42 2.		
	350 . Gangweihen . I.		
	105 200 x 250 mm.		
	105 . Hornschiffen 250 x 250 x 2.		
	1330 . Pfeilspitzen 202 x 200 x 1,5.	15400	92
		26.200	M.

STEULER

Company History 1913 Steuler Group



Hamburg Amerika Linie.

Abgebildet nach dem Porträt von
President Lincoln.

dem Mittel wurden die Verhältnisse des Volkes als
schwersten Kritik unterzogen) und wegen Verleidi-
gung der Berliner Polizei in 200 Mark Geldstrafe
verurteilt. Der Polizeipräsident hatte Strafankrag
erhoben.

Hamburg, 26. März. Die „Hamburg-Amerika-
Linie“ meldet, daß der Dampfer „Steubent Lincoln“
wohlbehalten in Newport angekommen ist. Mit dem
Dampfer reisten 1 Ingenieur und 8 Monteurs der
Firma Steuler & Co., Coblenz, welche in San-
Carolina große Anlagen für die Gewinnung von
Salpetersäure aus der Luft auszuführen hat.

Wien, 26. März. Hier befindet sich eine Schiffe-
reise um das Schicksal des Dampfers „Hansa“,
welcher teilweise an den Strand geplatzt
war. Der Dampfer, der bereits seit fünf
Tagen in Madag. hätte eintreffen müssen, hatte 20
Mann Besatzung und 66 Passagiere an Bord.

Hamburg, 27. März. Während der Verfertigung
eines Kinetographentheaters in Wils-
dorf wurde ein solches Feuerlöcher ein be-
sonnener Schaden, daß im Gebäude zwei Personen

20	St. Hansbeuch		
	Waggon Breslau 46 Stk.		
	42 Stück Torfformen 180 x 9 x 9 R.		
	42 L.		
	42 B.R.		
	42 L.		
	42 B.R.		
	42 L.		
	700 . Gangweihen . I.	10.800	92
27	Waggon Breslau 46 Stk.		
	42 Stück Torfformen 180 x 9 x 9 R.		
	42 2.		
	42 1.L.		
	42 2.		
	350 . Gangweihen . I.		
	105 200 x 250 mm.		
	105 . Hornschiffen 250 x 250 x 2.		
	1330 . Pfeilspitzen 202 x 200 x 1,5.	15400	92
		26.200	M.

STEULER

Steuler Group

Year of Foundation:
Turnover 2008:
Employees:

1908
310 Mio. Euro
App. 1750



Certification:



Certification according to EMAS
Environmental Management
and ISO 14001



DIN ISO 9001 / EN 29001



Security Certified Contractors

STEULER

Corrosion protection materials

Acid proof (chem. resistant) materials

Refractory (Fire resistant) materials



STEULER

Especially in sulphuric acid plants the corrosion protection materials have to withstand extreme chemical, mechanical and thermal demands which makes regular shut downs for maintenance work necessary.

Protection of structures, components, equipment

Protection of environment around the plant



STEULER

A broad variety of different types of corrosion protection systems is suitable for the possible types of chemical, thermal or mechanical attack which will occur in sulphuric acid plants:

Acid proof materials:

Bricks and tiles

Coatings and Floorings

Self levelling, Spray or Trowel applied, FRP...

Rubber linings

NR, IR, IIR, CIIR, BIIR, SBR, CSM...

Thermoplastic linings

PE, PP, PVC, PVDF, PTFE...

Refractory materials:

Bricks

Masses, Mortars, Fibres

STEULER

Acidproof bricks and tiles:

Ceramic bricks and tiles
Carbon bricks, -tiles/graphite bricks
Fusion-cast basalt bricks
Stoneware
Natural stone grade (Granite)



STEULER

Acidproof materials for bedding and jointing:

Synthetic resin materials

Epoxy resin (EP)

(moderate chemical attack)

Polyester (UP) and Vinylester (VE) resin

(Allround systems)

Furane (FU) and Phenolic (PF) resin

(highly resistant against acids)

Potassium silicate materials

Waterglass (WG)



STEULER

Refractory materials



Bricks (Formed materials)

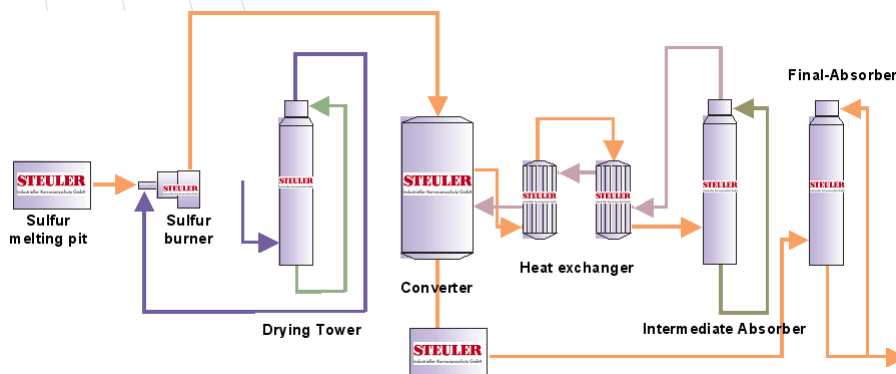
- Schamottebricks*
- Bauxite bricks*
- Andalusite bricks*
- Silica bricks*
- Silicon carbide bricks*
- Corundum, Chromecorundum bricks*

Non formed materials

- Chemical bonded fire proof mortars*
- Ceramic bonded fire proof mortars*
- Masses and Fibres*

STEULER

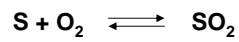
Sulphuric Acid plant based on S-burning



STEULER

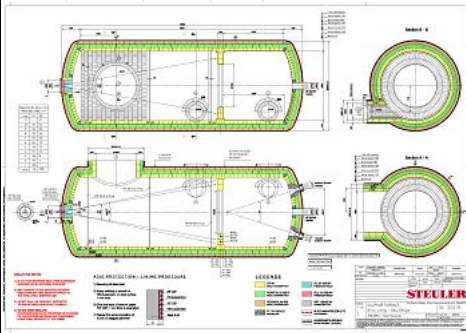
Sulphuric acid production

Incineration of elemental sulphur at around 1200 °C – 1600 °C



Problem:

- high operation temperature
- corrosive atmosphere of SO₂
- dew point
- discontinuous operation



STEULER

Example:

Replacement of a sulphur combustion furnace. To reduce lost in production capacity the bricklining job takes place beside the plant while the existing furnace is still under operation



Site preparation

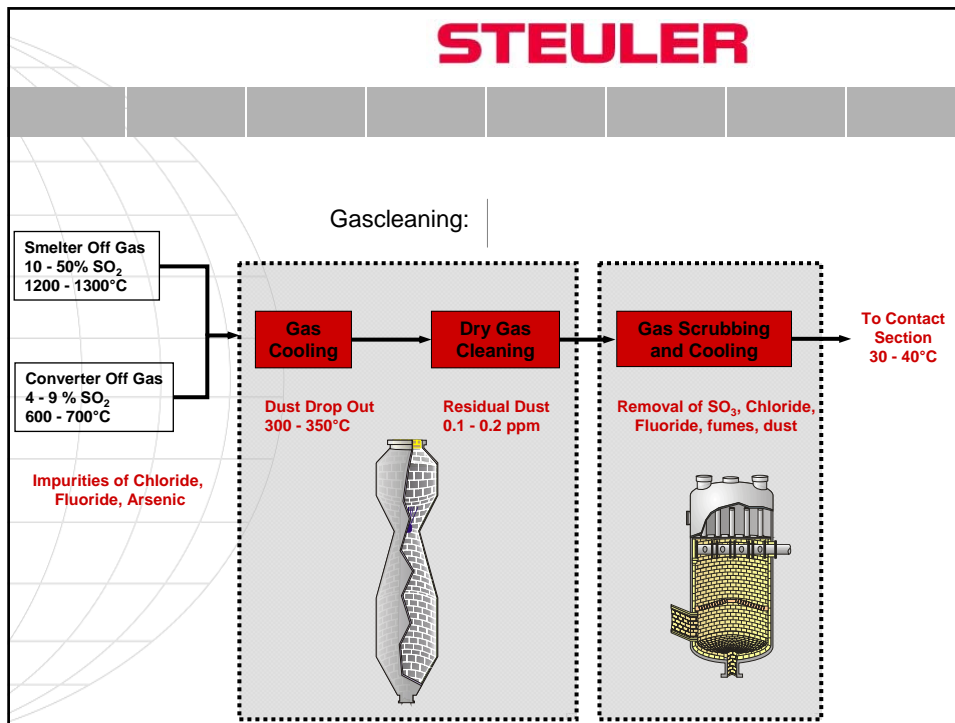


Bricklining under process

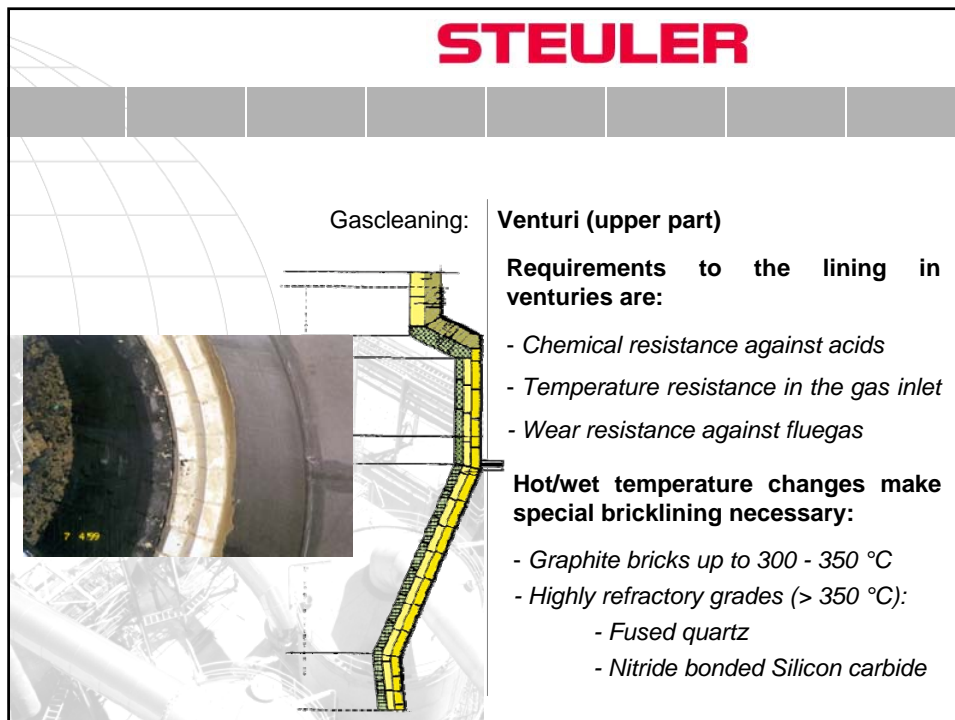


Bricklining job finished

STEULER



STEULER



STEULER

Example: *In the upper part of a venturi the mortar joints were damaged by unexpected high operating temperatures. In a very short shut down of 48 h all the joints in the nozzle roof area should be renewed*



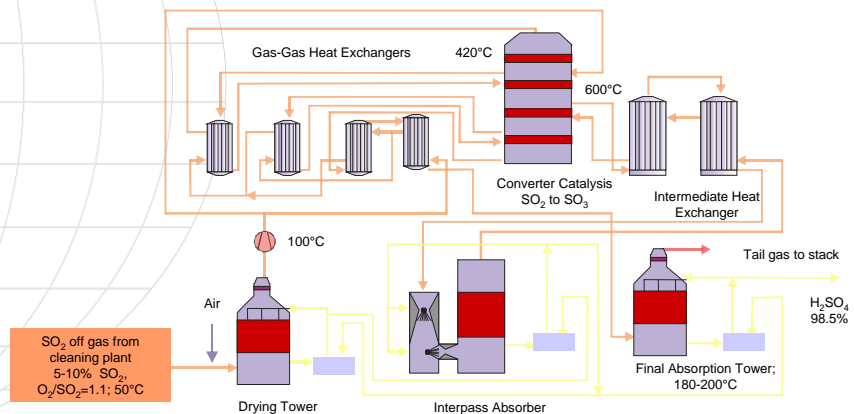
Damaged joints in a venturi



After repairwork

STEULER

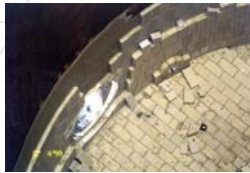
Sulphuric acid production | Double catalysis



STEULER

Examples:

Erection of a new drying tower while the production process is still going on. After finishing 50 % of the corrosion protection job including self supporting dome, the tower was set by crane on the final position



Bricklining work under process



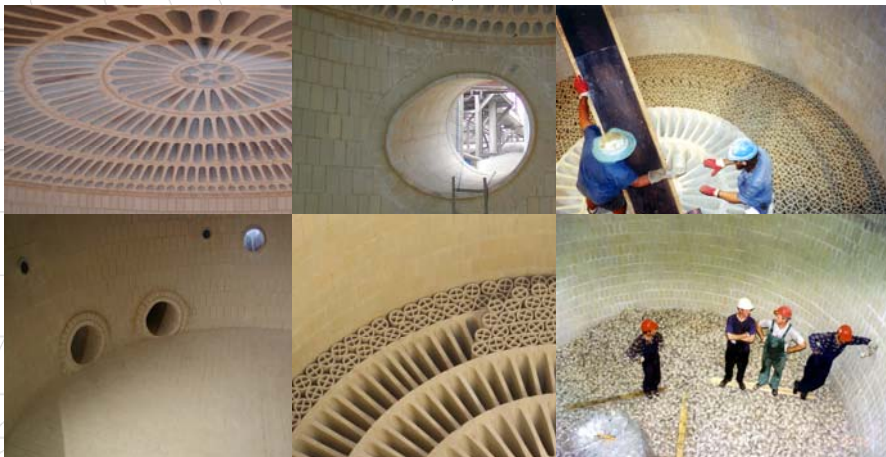
Installation of the self supporting dome



„Flying“ DT

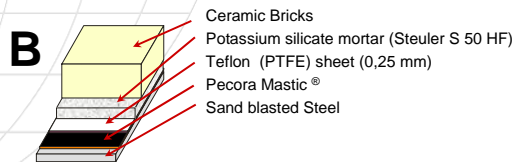
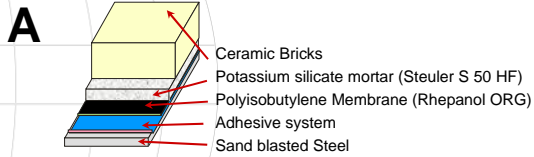
STEULER

Examples:



STEULER

Sulphuric acid towers: *Different lining designs*



STEULER

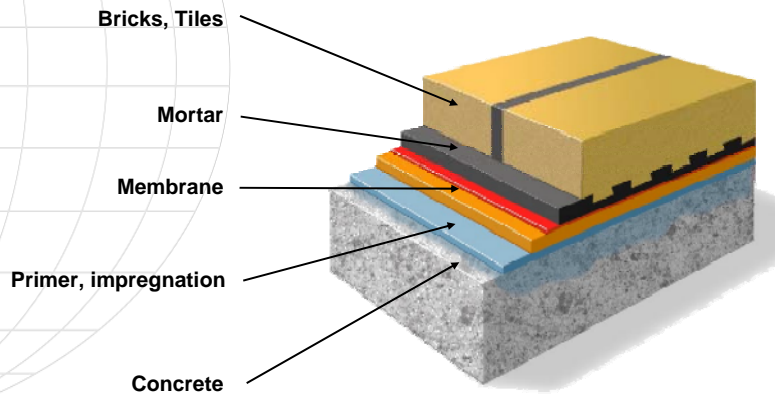
Acidproof tilings: **The requirements to the lining on floor surfaces in all areas are similar:**

- Resistance against H_2SO_4 up to 98 %
- Temperature resistance up to 100 °C
- Resistance against mechanical attack
- Crack bridging characteristics



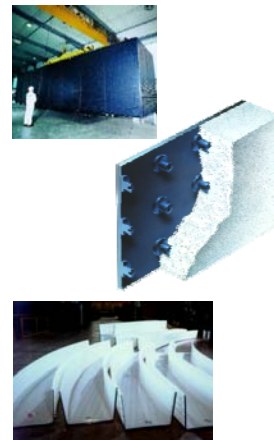
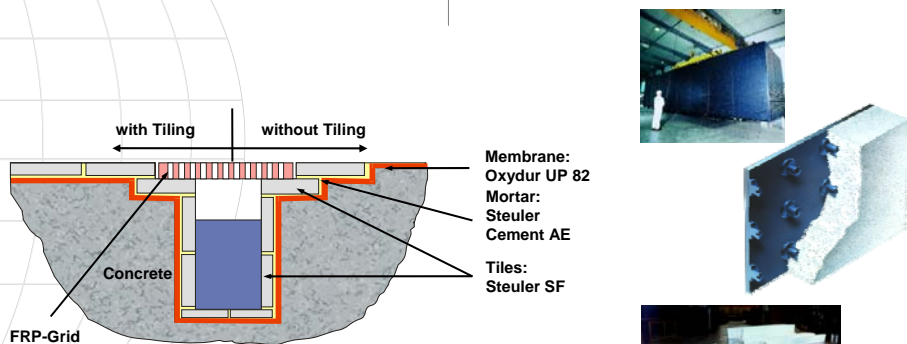
STEULER

Acidproof tilings: *Floor area H₂SO₄-plant*



STEULER

Acidproof tilings: *Sumps, pits and drains H₂SO₄-plant*



Mechanically anchored thermoplastic linings

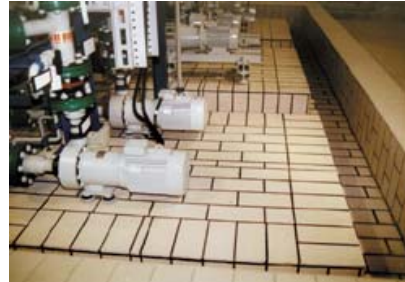
STEULER



Examples: *Floor areas which were under operation for several years without any service make extensive maintenance work necessary*



Damaged concrete areas



Areas after shutdown

STEULER

I would like to thank you for your attention

Industrial Corrosion Protection

Steuler Industrieller Korrosionsschutz GmbH
Georg-Steuler-Str.
56203 Hoehr-Grenzhausen
Germany

Surface Protective Systems
Refractory Systems
Plastics Engineering

We master aggressive media