



Outotec Edmeston SX – The Original



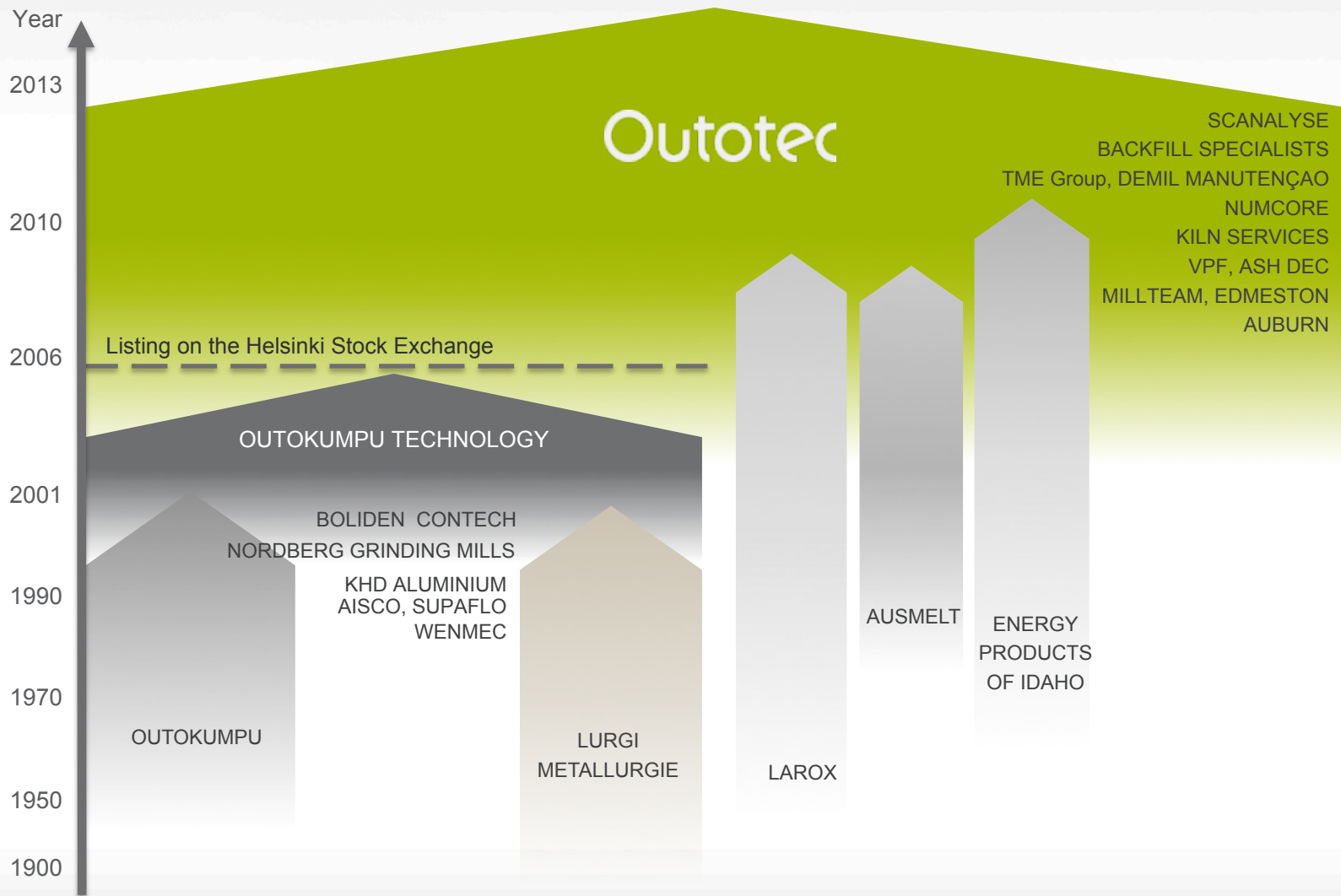
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Edmeston Product Center

Outotec

Agenda

- Outotec Edmeston History
- The SX material
- SX Equipment
- References
- Summary

We have been a technology leader for over a century



Edmeston Product Center

- Engineering Company established 1984 as part of the Sandvik Group



EDMESTON
Materials System Engineering

- Part of Outotec Group since 2010 as specialized product center

Outotec
EDMESTON PRODUCT CENTER

- Partner in Brazil:



Main Business Areas

- SX Alloy Sulphuric Acid Equipment
- Phosphoric & Nitric acid equipment

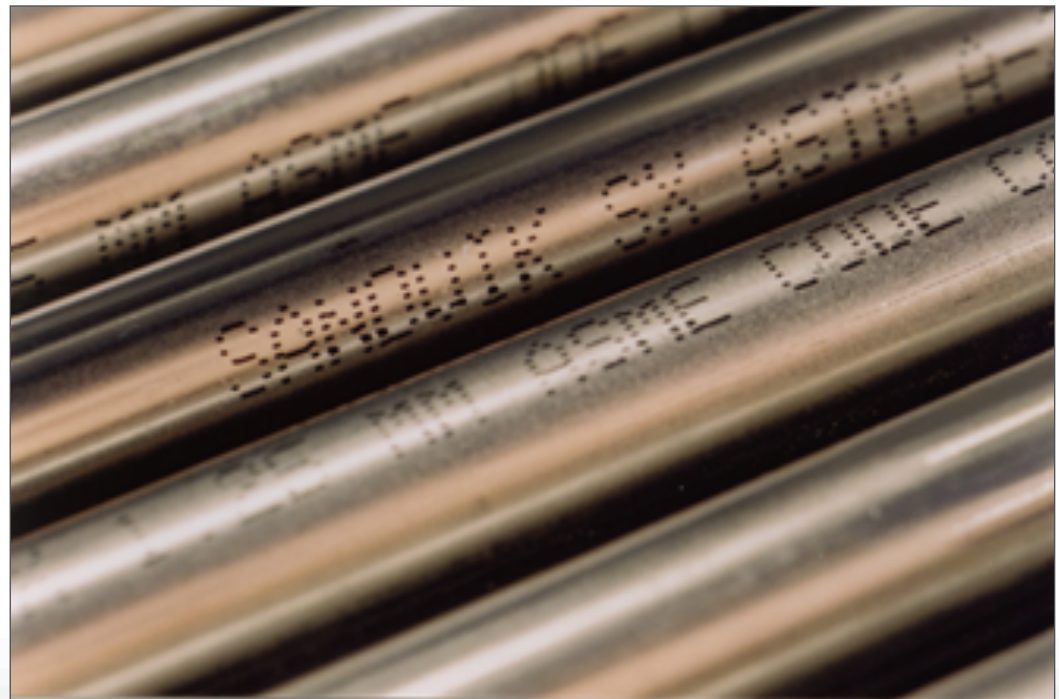


SX – Sulphuric Acid Steel

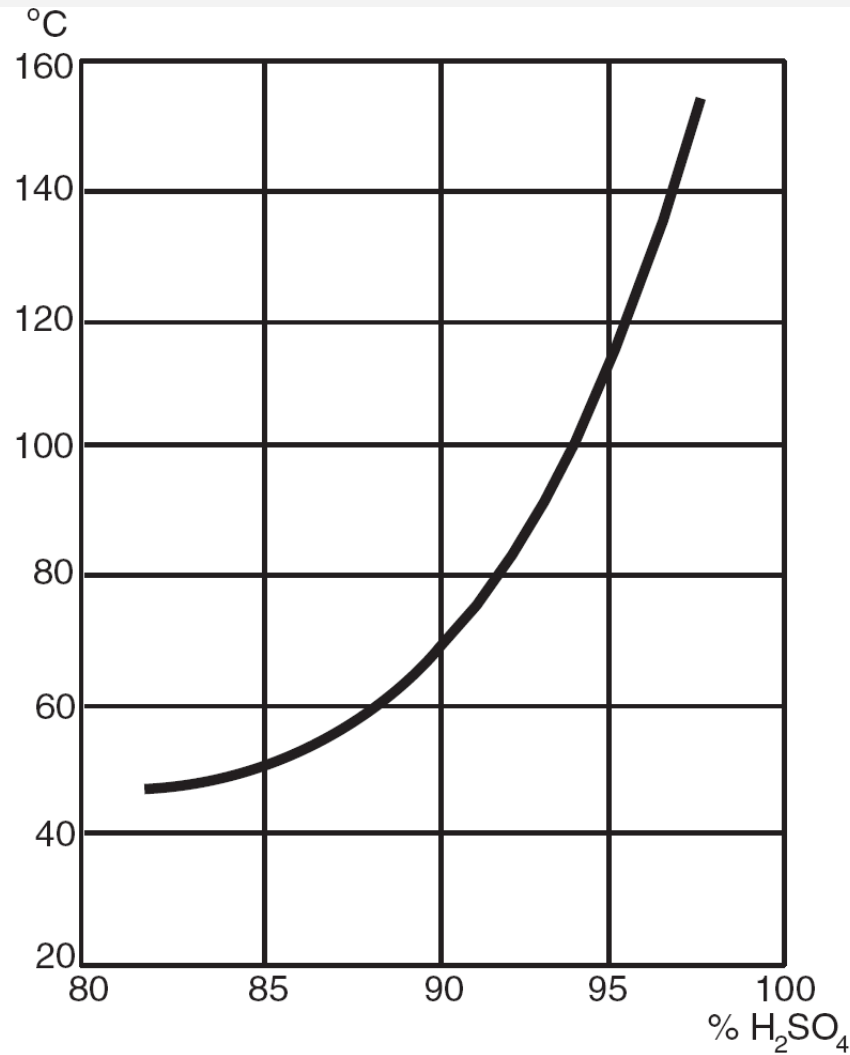
- An austenitic stainless steel developed by Swedish steel manufacturer Sandvik in the 70's, Introduced by Edmeston in 1984, now Outotec Edmeston Product Center.

- Chemical Composition:

Cr	16.5 – 19.5 %
Mo	0.3 – 1.5 %
Ni	19.0 – 22.0 %
Cu	1.5 – 2.5 %
C	0.07 %
Si	4.8 – 6.0 %
Mn	2.0 %



SX Isocorrosion Curve, 0,1 mm/year



Outotec Edmeston SX Systems

SX – Suitable for all applications in the absorption and drying acid circuits, e.g.

- Acid Piping
- Acid Distributors
- Acid Coolers
- Drying & Absorption Towers
- Pump Tanks
- Strainers, inserts etc.



Cast/Ductile Iron Piping

- High corrosion / erosion
- Flanged system, leaks
- Large and heavy
- Corrosion products
- Short lifetime for parts
- High maintenance
- Safety?



SX Piping

- Low corrosion / erosion
 - clean acid
 - no corrosion products
 - reduced pipe size
 - low weight
 - easy installation
- Welded system
 - flanges replaced by welds
 - potential leaks reduced
 - prefab possibilities
 - field modifications easy
 - eliminate spare inventory

Maximum safety & plant availability
Minimum maintenance & life cycle cost



How to keep down the investment

Balance between

- high investment cost to replace a complete piping circuit

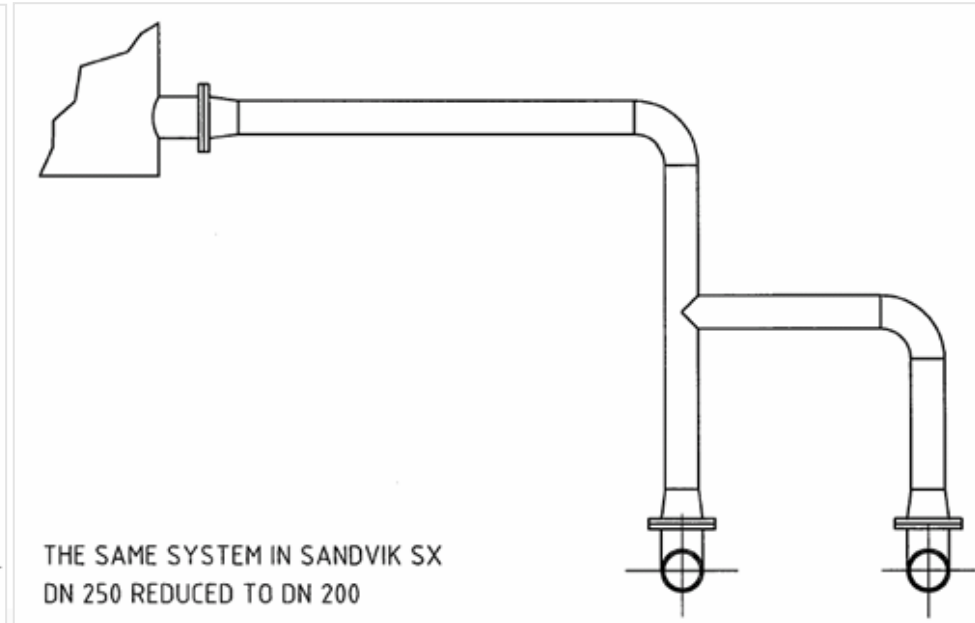
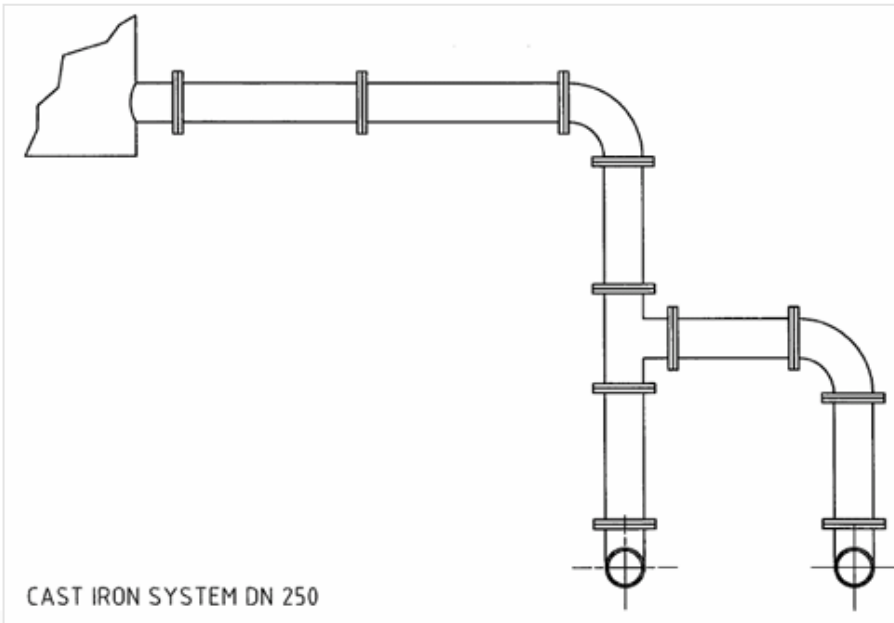
Against

- benefits missed whith only a few pipe spools replaced



For full benefit

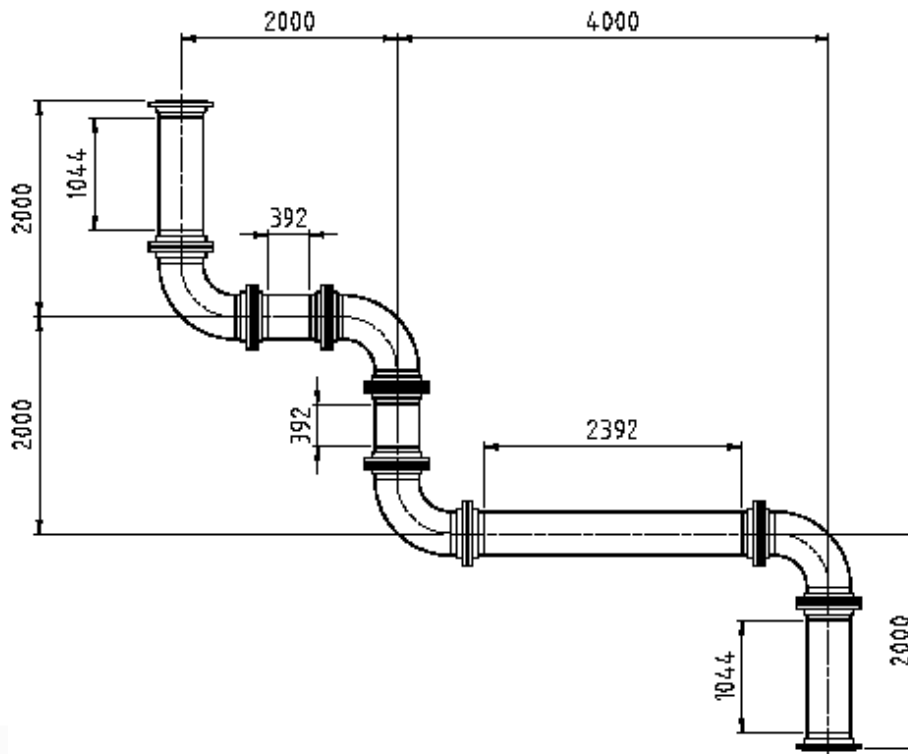
- Replace complete line, not spools
- Remove flanges
- Reduce pipe diameter (with decreased diameter for valves)
- Re-route efficiently



Replacement

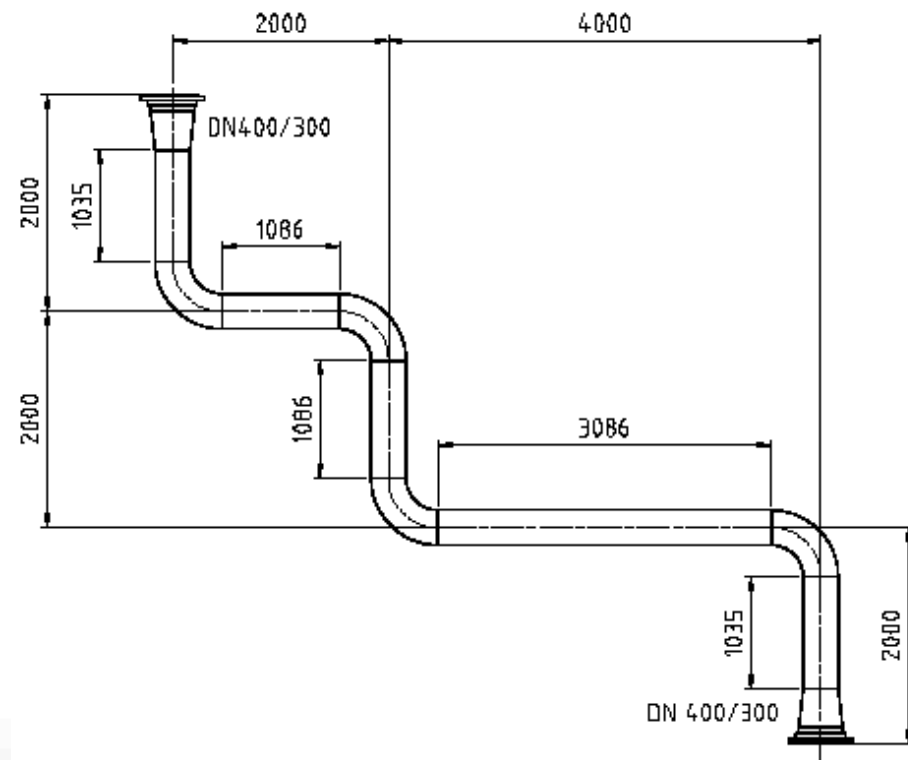
Piece by piece 16"

Acid velocity: 1 m/s



Re-designed to 12"

1,6 m/s

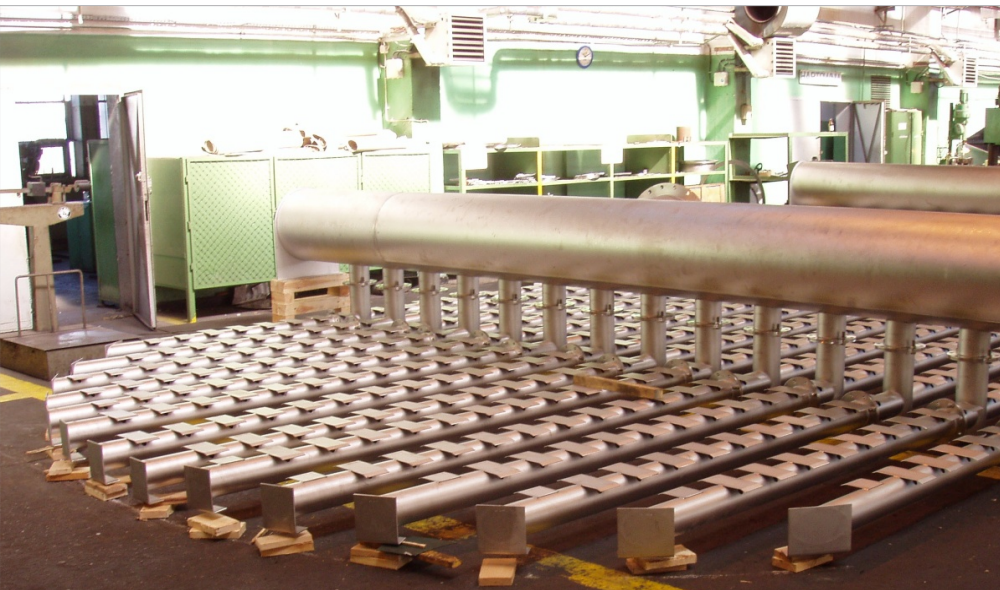
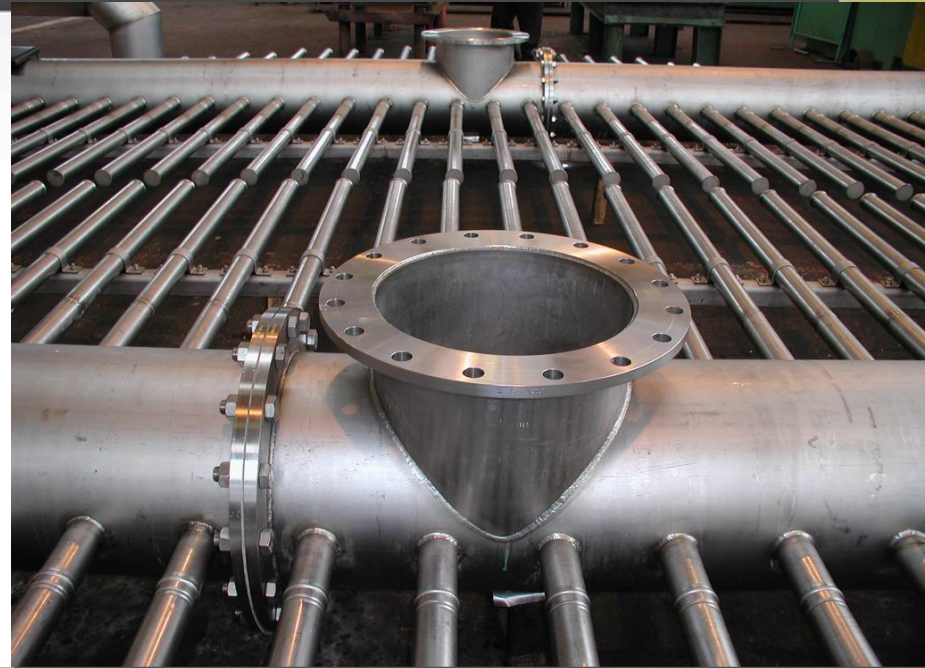


Cost Comparison

Euro	Piece by Piece, 16"	Re-designed to 12"
Straight Pipe	9 942	9 059
Elbows	10 056	7 964
Reducers	0	2 940
Stub Ends	20 628	2 292
Loose Flanges 150#	5 994	666
Gaskets, bolts & nuts	2 040	408
Welds	8 838	5 102
SUM €	57 498	28 431

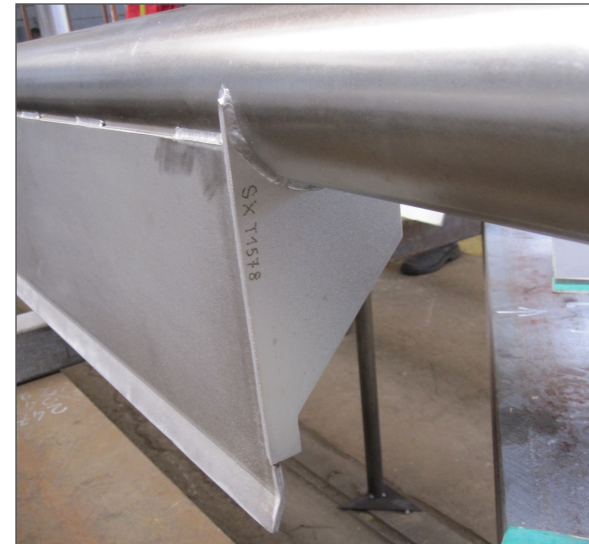
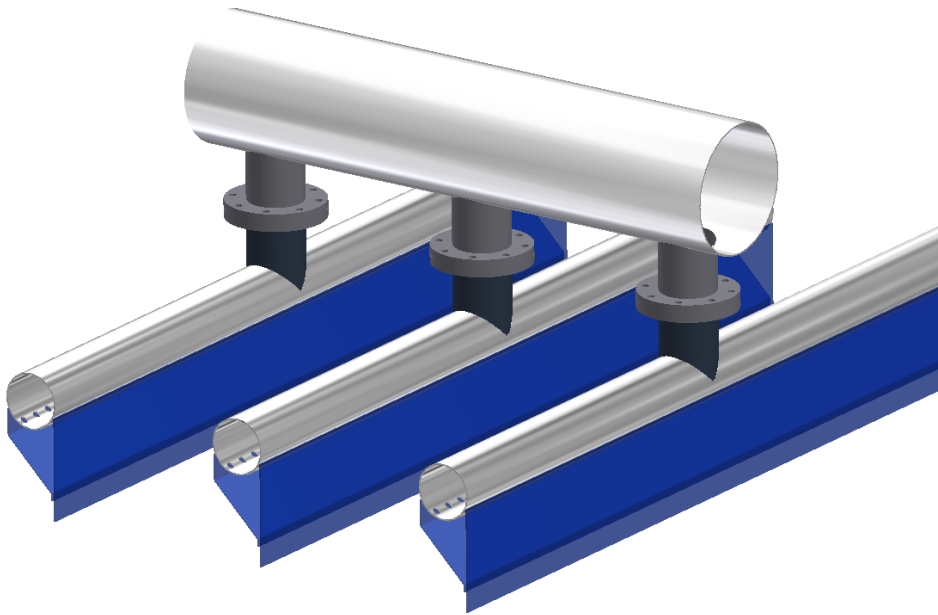
SX Acid Distributors

- Effective distribution
- Uniform distribution
- Low pressure drop
- No corrosion
- Light weight
- No maintenance
- Lifetime 20 years +



A new innovative irrigation system

- Low investment costs
- Minimized carry over
- Improved free gas flow area
- 20+ references in sulfuric acid plants



Outotec FiDi™



SX Acid Coolers

- No anodic protection
- Long reliable performance
- Low maintenance



Drying & Absorption SX Acid Coolers

Drying & Absorption Acid Cooler

- heat exchanged 14.5 MW
- surface 725 m²
- In operation since 20 years +



Sea/brackish water Acid Coolers

- More than 25 years experience
- Allows high chloride cooling water



BFW heaters & Closed Loop Acid Coolers

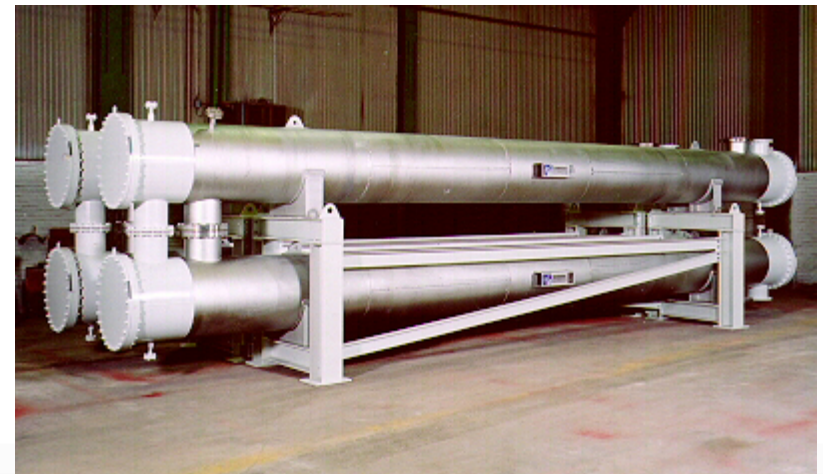
Multi-shell BFW heater in SX

- acid inlet 130 °C
- water outlet 117 °C
- heat exchanged 14.2 MW



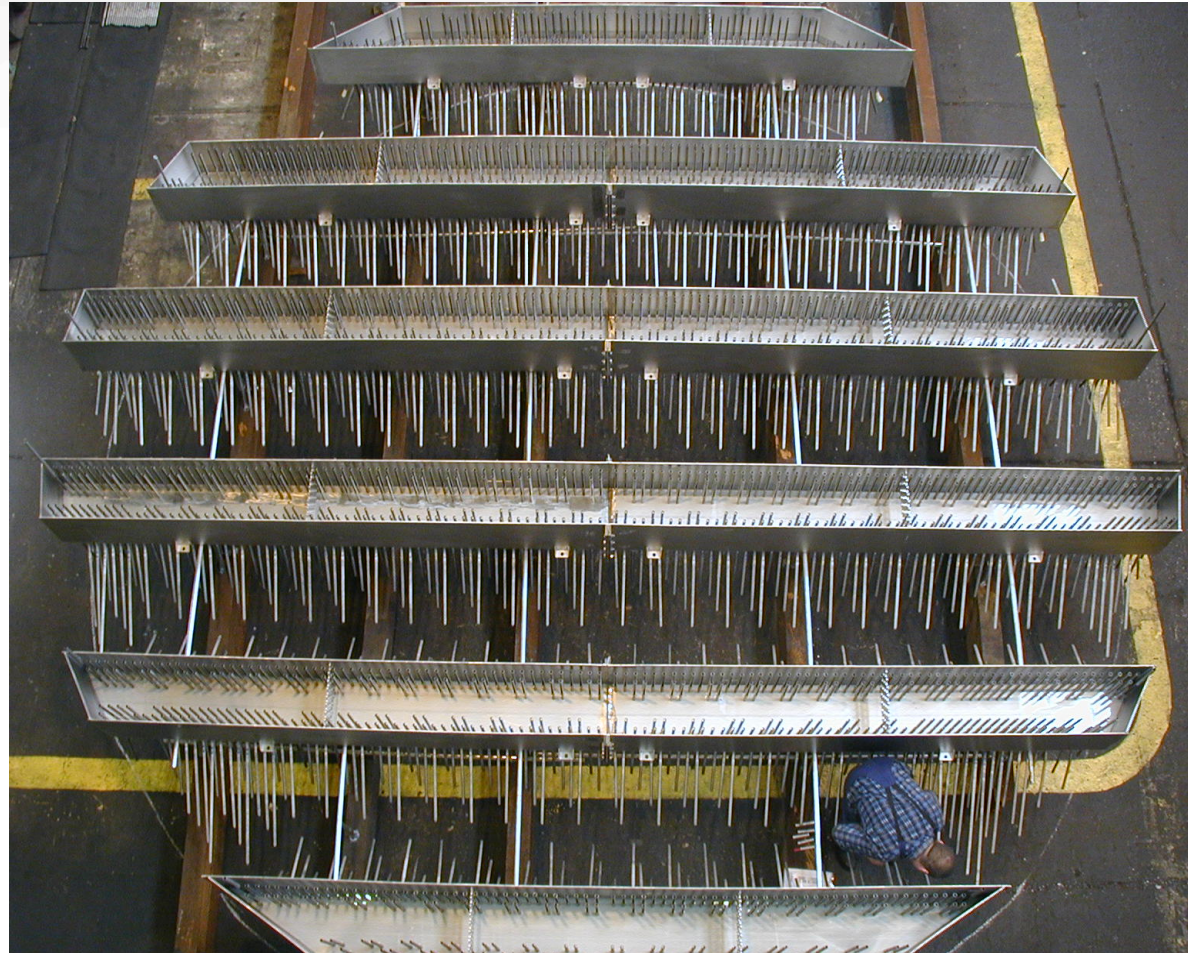
Closed water loop Acid Coolers

- Combined with fin fan air coolers
- No cooling water consumption



Outotec Edmeston SX References

Towers	50	
Coolers	100	
Distributors	300	
Tanks	40	
Pumps	>80	
Piping Systems	>500	>75 000 m
Misc.	>500	



Summary

- Low maintenance
- More than 20 years life time expectancy
- High stock level and fast deliveries
- 29 years of experience
- Over 500 references



FiDi





Manufacturing in SX

Bending and Forming:

- Similar to 316
- SX is harder but more ductile

Drilling and Machining:

- Similar to 316
- SX is harder, increase calculated drilling time



SX Welding

SX Welding is similar to welding normal stainless steel

- Increase calculated welding time 10-20% compared to 316

Applicable welding processes:

SMAW Covered Electrode welding

GTAW TIG welding

GMAW MIG welding

PAW Plasma welding

Considerations:

- Always use SX filler material
- Weld with low heat input
- Max interpass temp 60°C / 140 F



Alloy Elements

Alloy	Impact on steel properties
C	Increases the mechanical strength and the hardening properties of a steel. Decreases ductility, forging, welding and cutting properties. Has no impact on corrosion resistance to water, acids or hot gases.
Cr	Increases hardness and strength. Reduces ductility insignificantly. Makes steel corrosion resistant at levels over 12%. Forms wear resistant carbides.
Ni	Stabilizes austenite and makes Cr-Ni-steels ductile.
Mo	Provides good resistance to general corrosion in acid environments and good resistance to pitting corrosion.
Cu	Increases general corrosion resistance in acidic environments. Promotes passivation if the material has been activated
Si	Forms a very hard and acid resistant Silicon oxide layer on the material surface. Extremely efficient passivating properties.
Mn	Used for metallurgical purposes (reacts with sulphur)

Global Presence

Provides leading technologies and services for the sustainable use of natural resources

- Global leader in minerals and metals processing technology (84% of sales)
- Competence and R&D centers in 18 countries
- Sales and service centers in 26 countries
- Deliveries to 80 countries
- Global subcontractor/partner network



Reference Ma'aden SAP

3 x 4 500 tpd



SX Piping Class

Standard for Sulphuric acid piping available at:





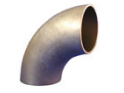





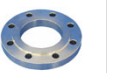
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SX PIPING SYSTEMS

Home **ISO standard** ANSI standard

			
DN 25 - 50 30-020 Straight Pipes, seamless	DN 80 - 600 30-022 Straight Pipes, welded	DN 100 - 200 30-023 Straight Pipes, welded, 6 mm	DN 25 - 80 30-030 Long Radius Elbows, seamless
			
DN 80 - 600 30-032 Long Radius Elbows welded	DN 100 - 200 30-033 Long Radius Elbows welded, 6 mm	DN 25 - 600 30-036 Concentric Reducers	DN 25 - 600 30-037 Eccentric Reducers
			

CONTACTS
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RELATED MATERIAL
[Outotec® Edmeston SX Piping Systems Table for Tees](#)

SX Vessels

- Drying Towers
- Absorption Towers
- Stripping Towers
- Pump Tanks



SX Vessels

- No brick lining
- Short installation time
- Prefab possible
- Minimised shut-down time
- Low weight



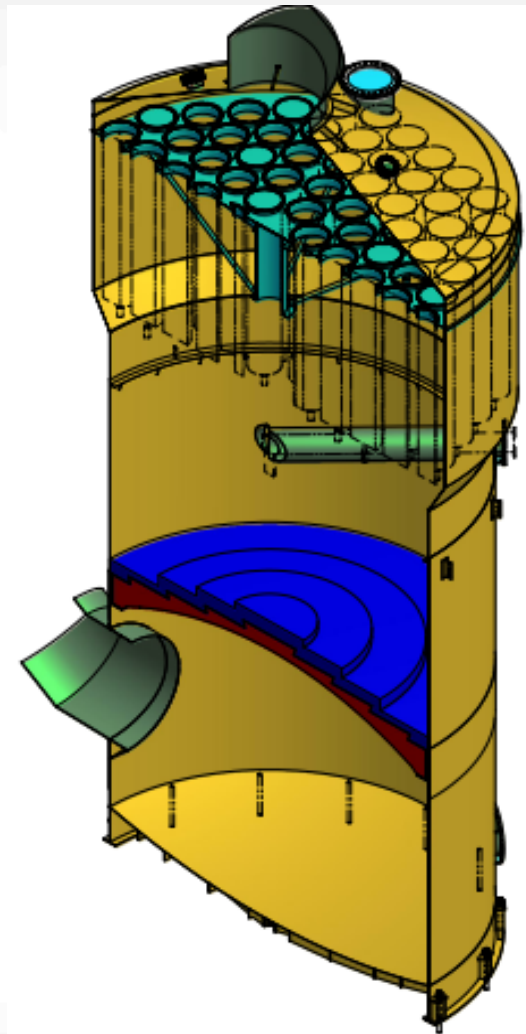
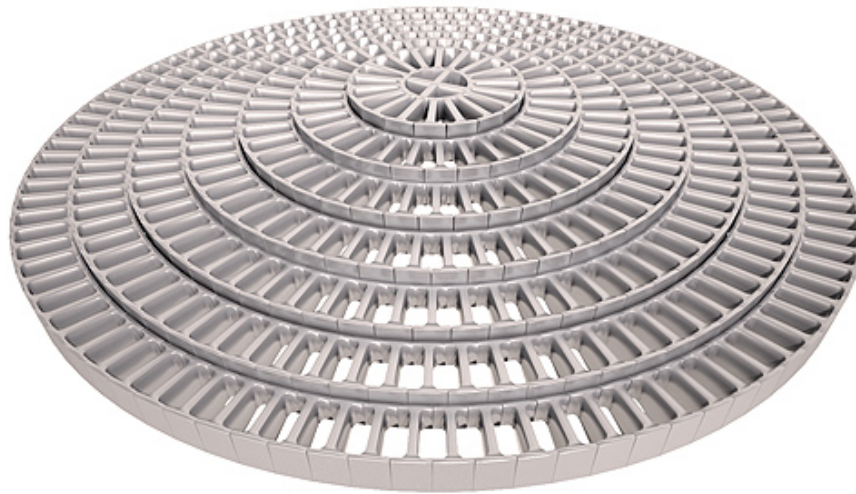
Traditional SX Towers

- SX shell without bricklining
- SX irrigation system
- SX packing support
- Low pressure drop & reliable design



Outotec's CorF SX Tower

- SX shell without bricklining
- SX FiDi irrigation system
- Ceramic self-supporting dome
- Cost effective reliable design



References



Knowledge grows



kemira

GlencoreXstrata



SX Acid Distributors

- Effective distribution
- Uniform distribution
- Low pressure drop
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- Lifetime 20 years +

