Usage of Stainless Steel in Process Industry and its Future Prospects

**Stainless Steel in Refinery, Petrochemical Applications**

Sanjay PV | November 7, 2014
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Sulzer Today

Processing Crude Oil in Refinery

Corrosion and Stainless Steel

Future Prospects

Summary

Q&A
### Sulzer Today

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**Main markets served:**
- Oil and gas
- Power
- Water

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**Customer and people oriented, making sure that we act excellently**
Sulzer at a glance

Focus on three key markets and the general industry
- Oil and gas
- Power
- Water
- General industry

Excellent products and services
- Pumps technology and solutions
- Repair and maintenance services for rotating equipment
- Separation, mixing and service solutions

Global footprint
- Over 150 production and service sites worldwide
- More than 40% of sales in emerging markets
- Close to our customers
Sulzer Chemtech at a glance

- World leader in separation and mixing technology
- Global operations – engineering and manufacturing hubs
- Specialises in and supplies column internals, static mixers, basic engineering of distillation applications and field services

Materials used
- Stainless Steels, Duplex/Super Duplex
- Others – Alloy Steels
- Carbon Steel
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Mass Transfer Technology
Market Leader in Mass Transfer Equipment

Packed or Tray Column
- Distributors
- Packings
- Collectors
- Rings
- Supports
- Trays
- Gas inlets

Gas/Liquid Separator
- KnitMesh
- Shell Swirltube
- Mellachevron
- Gas inlets
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Stainless Steel and Corrosion types

- There are a total of 57 separate and distinct compositions that are recognized by American Iron and Steel Institute as standard stainless steels. Of these 57 types, 18 are being used for petroleum refining applications.

- The chemical compositions of the elements Chromium, Nickel, Carbon, Manganese, Phosphorus, Sulfur, Silicon, Others (Aluminum, Molybdenum, Titanium, Copper, etc.) are listed in the relevant ASTM standards.

- Metallurgical Structure:
  - Austenitic: Containing chromium and nickel (300 series); containing chromium, nickel, and manganese (200 series) types;
  - Ferritic: Straight-chromium (400 series) types;
  - Martensitic: Straight-chromium (400 series) types

- Corrosion: (Metallurgical condition, tensile stress, damaging environment, time)
  - Textbook: Uniform; Pitting; Crevice; Inter-granular
  - Complex: Phenomenon of stress-corrosion cracking and high-temperature effects; polythionic, naphthenic acid, sulfidation and oxidation.
  - In addition, embrittlement and carburization
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Summary – current status and outlook

- Stainless steels most widely used in petroleum refining – corrosion resistant
- In addition to AISI types, some proprietary stainless steels are also candidate materials for petroleum refining applications
- Many of these are commercially available; however, a few are still being developed for commercial use

Proper materials selection will further enhance overall performance in petroleum refining
- Those still being developed are mentioned because they show up well in laboratory tests for corrosion and elevated-temperature resistance and should be considered for some of the more aggressive refinery applications

will continue to be used in petroleum refining

well positioned for a strong performance in future
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