Stainless Steel in Filtration

Filtration is part of our daily life ...

Solid from liquid or gas filtration

... and stainless steel is the material of choice for filtration.
A wide panorama of stainless steel usage in filtration applications

<table>
<thead>
<tr>
<th>Fibers (5 to 50 microns)</th>
<th>Oil and gas</th>
<th>Water</th>
<th>Air</th>
<th>Food and beverage</th>
<th>Automotive</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Wires</td>
<td>Oil drilling</td>
<td>Water desalination</td>
<td>Air filters</td>
<td>Wine filtration</td>
<td>Exhaust line</td>
<td>Printer screen</td>
</tr>
<tr>
<td>Wires (round and shaped)</td>
<td>Water extraction</td>
<td></td>
<td></td>
<td>Air bags</td>
<td>Oil filters</td>
<td>Air filters</td>
</tr>
<tr>
<td>Bars (cold, hot)</td>
<td>Waste Water Treatment</td>
<td></td>
<td></td>
<td>Honey distiller</td>
<td>Air filters</td>
<td>Belt tensioner</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Drainage grating</td>
</tr>
</tbody>
</table>
Stainless Steel in Filtration

That generate a 1 billion Euro market yearly demand

Filtration represents ... % of the World Demand (in tons)

<table>
<thead>
<tr>
<th>Type</th>
<th>%</th>
<th>Tons</th>
<th>Million Euros</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bars</td>
<td>4</td>
<td>120 000</td>
<td>430</td>
</tr>
<tr>
<td>Round Wires</td>
<td>1.5</td>
<td>12 000</td>
<td>70</td>
</tr>
<tr>
<td>Shaped Wires</td>
<td>80</td>
<td>12 000</td>
<td>280</td>
</tr>
<tr>
<td>Fine Wires</td>
<td></td>
<td>40 000</td>
<td>140</td>
</tr>
<tr>
<td>Fibers</td>
<td>20</td>
<td>20 000</td>
<td>80</td>
</tr>
</tbody>
</table>

Filtration breakdown per type of Stainless Steel long products

About 200,000 in tons

About 1 billion in million euros
Automotive: Some filtration applications
**Stainless Steel in Filtration**

**Oil, gas, air filtration in automotive**

Automotive: various filters

**Objective:**
to stop dangerous particles for mechanical parts in order to protect passengers and environment

**Stainless steel filter characteristics:**
- Woven wire
- Retention level: standards between 1 to 10µ

**Competing material:**
Woven fabric made from polypropylene, polyester and paper

**Why stainless steel?**
- Chemical inertia
- Cleanable
- Pressure resistance
- Superior efficiency
- Fashioning

**Oil filter (bikes)**

**Filter for injectors**

**Air filter: Standard ▲ Custom ▼**

**Old**
Exhaust line applications have their own filtration systems

Automotive: in exhaust system
Objective:
To have a good substrate for catalytic beds operating at high temperature

Stainless steel filters characteristics:
- Woven wire
- Wool

Why stainless steel?
- Chemical inertia
- High temperature resistance
- Pressure resistance
- Quicker achievement of operation temperature
- Recyclability

Catalyst wire mesh
Filtration is also part of car safety devices

Automotive: Safety
Objective:
To stop the dusts after the blast and remove dangerous particles in oleo dynamic circuits

Stainless steel filter characteristics:
- Woven wire
- Wool

Why stainless steel?
- Chemical inertia
- High temperature resistance
- Pressure resistance
- High efficiency
Stainless Steel in Filtration

Oil and gas filtration within the refining process

Stainless steel for catalytic beds applications
Objective:
to remove contaminants from the reactor bed, in order to avoid catalyst damages

Stainless steel characteristics:
- woven wire,
- slotted, defined pore or perforated stainless steel wire mesh
- retention level: standards between 5 to 10µ

Why stainless steel?
- Resistance against acid, alkali and corrosion
- Heat resistance
- Fatigue and pressure resistance
- Life cycle cost better than that of carbon steel
Stainless Steel in Filtration

Oil and gas filtration within the refining process

Stainless steel for slurry oil filtration

Objective:
To assure a filtered stream quality sufficient to be sold or reintroduced into the Fluid catalytic cracking unit, and to remove particles to avoid equipment erosion.

Stainless steel filters characteristics:
- woven wire,
- slotted, defined pore or perforated stainless steel wire mesh
- retention level: as low as 2 micrometer

Why stainless steel?
- Resistance against acid, alkali and corrosion
- Fatigue and pressure resistance
- Abrasion resistance

Tubular cleanable backwashing systems
Oil and gas filtration within the refining process

Stainless steel for amine filtration (gas separation)

Objective:
To remove the problem causers, to secure the unit’s capacity and protect the system against corrosion, erosion, wearing, plugging, amine foaming...

Stainless steel filters characteristics:
- wire mesh, slotted, defined pore or perforated stainless steel

Competing material:
- Woven fabric made from polypropylene and polyester

Why stainless steel?
- High corrosion resistance
- Abrasion resistance
- Pressure resistance

High volume amine filtration system

Stainless steel wire mesh pleated filter cartridge
Oil and gas filtration within the refining process

Stainless steel for sand control applications

Objective:
To optimise productivity and maximise quality filtration to keep the well in good working order

Stainless steel filters characteristics:
- wire wrapped
- wire mesh ↔ expandable sand screens
- metal mesh

Why stainless steel?
- High corrosion resistance, even to H₂S
- Abrasion resistance
- Pressure resistance
- High temperature resistance
Stainless Steel in Filtration

Stainless steel filtrates most of our daily food and beverage

Honey, potato related product, shrimp, ...

Objective:
- to remove particles (ex: pulps) from food products

Stainless steel filter characteristics:
- fine wires, stainless steel wire mesh
- slotted, defined pore or perforated stainless steel wire mesh

Why stainless steel?
- Resistance against corrosion
- Heat resistance
- Fatigue and pressure resistance
- Life cycle cost better than carbon steel
- Hygiene and cleanability
Stainless Steel in Filtration

**Stainless steel filtrates most of our daily food and beverage**

Dairy, Fruit, Juice, Beer, Wine, Coffee, ...

Objective: to remove particles (ex: pulps) from beverages

Stainless Steel filter characteristics:
- fine wires, stainless steel wire mesh
- slotted, defined pore or perforated stainless steel wire mesh

**Why stainless steel?**
- High resistance against corrosion
- Heat resistance
- Fatigue and pressure resistance
- Life cycle cost better than carbon steel
- Hygiene and cleanability
Stainless Steel in Filtration

Various stainless steel filtration applications to get drinkable water

Water treatment: various applications
Objective: to remove contaminants from the water, in order to get drinkable water

Stainless steel filter characteristics:
- fine wires, stainless steel wire mesh
- screening, stainless steel bars
- tubes and pumps in stainless steel
- easy handling
- good balance cost/benefits

Why stainless steel?
- Resistance against micro bacteria attacks and corrosion
- Heat resistance
- Fatigue and pressure resistance
- Life cycle cost better than carbon steel
Stainless Steel in Filtration

Various stainless steel filtration applications to get drinkable water

Stainless steel for water filtration
Objective: to assure high quality filtered water and to avoid equipment corrosion

Stainless steel filter characteristics:
- Corrosion resistance
- Pressure resistance

Why stainless steel?
- Resistance against micro bacteria attacks and corrosion
- Safety maintenance
- Life cycle cost better than carbon steel
Stainless Steel in Filtration

Various stainless steel filtration applications to get drinkable water

Stainless steel for sea water filtration
Objective: to remove salt and contaminants from the seawater, in order to get drinkable water

Stainless steel filters characteristics:
- Fine wires, stainless steel wire mesh
- Screening, stainless steel bars

Why stainless steel?
- Resistance against corrosion
- Heat resistance
- Fatigue and pressure resistance
- No product contamination
Various stainless steel filtration applications to get drinkable water

Waste water plants applications
Objective: to remove contaminants from the water, in order to avoid damages in other processes or to send treated water to the environment

Stainless steel filter characteristics:
- screening, stainless steel bars
- woven wire
- slotted, defined pore or perforated stainless steel wire mesh

Why stainless steel?
- Good resistance against corrosion
- Fatigue and pressure resistance
- Life cycle cost better than carbon steel
Stainless Steel in Filtration

And stainless steel filtration at home

Sanitary
Objective: remove particles from potable water and drain waste waters

Stainless steel filters characteristics:
- Woven wire
- Reps
- Grating

Why stainless steel?
- Good resistance against corrosion
- Aesthetics
- Hygienic
- Easy to clean
- Durable
Stainless steel is selected as a material of choice in filtration because of its properties

<table>
<thead>
<tr>
<th>Stainless steel major properties...</th>
<th>Most of the time</th>
<th>Often</th>
<th>Sometimes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosion resistance</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abrasion resistance</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hygiene and cleanability</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High temperature properties</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strength and toughness</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy absorption</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aesthetics</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnetic properties</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical properties</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cryogenic/low temperature</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>✓</td>
<td></td>
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</tbody>
</table>
The stainless steel industry is ready to support decision makers in new development in filtration.

- Stainless Steel Long Product Makers
- Filter Manufacturers
- Component/Equipment Manufacturers
- End-users (Oil & Gas Companies, F&B companies, Car makers, ...)
- Universities
- Stainless steel development associations
- Trade organizations
## ISSF Members producing stainless steel long products

<table>
<thead>
<tr>
<th>Company</th>
<th>Website</th>
</tr>
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<tbody>
<tr>
<td>Acerinox S.A.</td>
<td>acerinox.com</td>
</tr>
<tr>
<td>Aichi Steel Corporation</td>
<td>aichi-steel.co.jp</td>
</tr>
<tr>
<td>Böllinghaus Steel GmbH</td>
<td>boellinghaus.de</td>
</tr>
<tr>
<td>Cogne Acciai Speciali S.p.A.</td>
<td>cogne.com</td>
</tr>
<tr>
<td>Daido Steel Co. Ltd.</td>
<td>daido.co.jp</td>
</tr>
<tr>
<td>NIPPON STEEL Stainless Steel Corporation</td>
<td>stainless.nipponsteel.com</td>
</tr>
<tr>
<td>North American Stainless</td>
<td>northamericanstainless.com</td>
</tr>
<tr>
<td>Outokumpu Oyj</td>
<td>outokumpu.com</td>
</tr>
<tr>
<td>SeAH Changwon Integrated Special Steel Corp.</td>
<td>seahss.co.kr</td>
</tr>
<tr>
<td>Schmolz+Bickenbach Group</td>
<td>schmolz-bickenbach.com</td>
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