Overview of Siemens Water Technologies

December 6th, 2006
Siemens AG

- Headquarter in Munich, Germany, Siemens is the largest electrical and electronics equipment company in the world.
- 2004 sales were in excess of 75 million euros.
- We have production facilities around the globe
  - Over 430,000 employees
  - Activities in more than 190 countries
- Siemens invests more than €5 billion each year in R & D (7% of sales).
- 24% of Siemens workforce are scientist and engineers.
- Siemens has over 450 major production facilities worldwide.
- Main business areas include:
  - Information and Communications
  - Automation and Control
  - Power
  - Transportation
  - Medical
  - Lighting
  - Financing and Real Estate
Siemens completes acquisition of US Filter - Strategic $993 million acquisition in the growing water market

Effective July 31, Siemens completed its acquisition of the US Filter Corporation from the French parent company, Veolia Environnement, Paris. This $993 million acquisition positions Siemens as the market leader in the water and wastewater treatment business in North America. The worldwide product, system and service business of US Filter with its 5,800 employees and an annual turnover of $1.2 billion will now become a part of the Siemens Industrial Solutions and Services Group (I&S) in the form of the newly formed "Water Technologies" division.
Since July 2004 we have been transforming a set of unrelated business units into a process-driven organization.

Status in July 2004

New organizational setup since October 2005
We are a market focused organization. Our goal is to first understand our customers' needs and operations, and then provide custom designed solutions to economically meet their water needs.

Market Teams
- Oil and Gas Production
- Downstream Petroleum
- Chemicals
- Food and Beverage
- Pharmaceutical
- Metals and Mining
- Microelectronics
- Power
- Municipal
Wastewater Treatment in the Public Sector (Municipal)

- Screening/Grit Removal
- Primary Clarification
- Biological Treatment
- Secondary Clarification
- Tertiary Treatment
- Disinfection

Effluent Recycle/Reuse

- Solids Handling
- Odor Control
End User: Water Factory 21

Location: Orange County, CA

Scope: Microfiltration and Reverse Osmosis system for reuse of biologically treated municipal effluent.

Capacity:
- MF – 83 MGD
- RO – 75 MGD
End User: Beni Suef WWTP

Location: Beni Suef, Egypt

Scope: Biological Treatment by Oxidation Ditch using disc aerators with 4 x 60 HP disc aerators, Secondary Clarification with 4 x 25.0 m dia.

Capacity: 50,000 m³/day
End User: Honouliuli WWTP

Location: Hawaii, USA

Goal: Produces approx. 12 MGD of beneficial reuse water from effluent previously discharged into the Pacific Ocean. Process generates two grades of water, one grade is high purity for power and petro-refining companies and second grade is for irrigation purposes. Dramatically increase amount of available potable water for residential needs – an important aspect for an island surrounded by salt water.

Scope: Addition of effluent filters, microfiltration and reverse osmosis to a secondary WWTP.

Year: 2003
West Basin, El Segundo, CA

Flow: 24 MGD
Start-Up: 1995
Water Technologies offers technology and services for process water and wastewater treatment to petroleum and petrochemical customers worldwide.

- Product and systems: Separation, clarification, biological treatment, filtration and membranes, chemical feed systems, Electrocatalytic systems and components.

- Services and aftermarket: Parts, O&M, bulk waste treatment, hydrocarbon services, rebuilds and retrofit, build-own-operate, carbon and resin services, membrane cleaning.
Discharge or Reinjection for Water Flood

Produced Water

Solids Separation

Primary Produced Water Separation

Secondary Produced Water Separation

Tertiary Produced Water Separation

Advanced Treatment

Solids Handling

To Discharge, Reinjection or Reuse

To Disposal

Chemical Feed

VOC Control

Auxiliary Equipment

Waste Treatment in the Upstream Petroleum Industry (Produced Water Treatment)
End User: Suncor
Location: Fort McMurray, Alberta, Canada
Application: Steam Assisted Gravity Drainage
Scope: Design, supply and installation of a water reuse system consisting of IGF separators, walnut shell filters, warm lime softener, media filters and softeners.
Flowrate: 35,000 bbl/day bitumen extraction facility.
Year: 2003
Water Treatment in the Upstream Petroleum Industry (Water and Steam Flood)

- Well or Surface Water Feed
  - Coarse Screening/Strainers
  - Fine Solids Separation/Filtration
  - Deaeration
    - Sulfate Removal
    - Softening Systems
    - Solids Handling
  - To Injection
  - To Polymer Or Steam Flood
  - To Disposal

- Chemical Feed Systems
- Chlorine Generation/Feed Systems

Water Technologies 2006
End User: Saudi Aramco

Application: Shedgum and Kurais Oil Field Water Floods.

Location: Qurrayah Sea Water Filtration Plant, Saudi Arabia

Scope: Sea Water Media Filters (20 + 36) and Electrochlorination System

Flowrate: 2.5 million bbl/day and 4.0 million bbl/day

Year: 2004 and 2006
Water Treatment in the Downstream Petroleum Industry (Refining and Petrochemicals)


Cooling Tower → Solids Handling

Water Technologies 2006
Invista (DuPont)

Application: Boiler feed water treatment. Source is river water.

Location: Victoria, TX (facility produces 20% of the world's nylon intermediates).

Scope: Design, build, own and operate. Microfiltration, reverse osmosis and polishing softeners.

Flowrate: 14,170 m³/day

Year: 2002, 15 year contract.
Wastewater Treatment in the Downstream Petroleum Industry (Refining and Petrochemicals)

Raw Influent
- Screening/Grit Removal
- Primary Oil/Water
- Secondary Oil/Water
- Biological Treatment
- Biological Clarification
- Tertiary Treatment

Process Unit Wastewater
- In Process Treatment
- Solids Handling
- Oil Recovery
- Oil Recovery / Reuse

Effluent Recycle / Reuse

Water Technologies 2006
End User: Oryx GTL Ltd.

Application: 34,000 bbl/day GTL Plant.

Location: Ras Laffan Industrial City, Qatar

Scope: Complete wastewater treatment system for reuse as irrigation water. Includes oil/water separation, biological treatment, effluent filtration and sludge thickening/dewatering.

Flowrate: 4,900 m3/day

Year: 2004
## Petroleum Refinery WW Reuse System

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Wastewater</th>
<th>CT Makeup Water Quality</th>
<th>RO Water to Boilers</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH, SU</td>
<td>6-9</td>
<td>6-9</td>
<td>6-9</td>
</tr>
<tr>
<td>Chloride, mg/l</td>
<td>480</td>
<td>480</td>
<td>24</td>
</tr>
<tr>
<td>Sulfate, mg/l</td>
<td>160</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>Phenols, mg/l</td>
<td>20</td>
<td>0.1</td>
<td>0.005</td>
</tr>
<tr>
<td>TDS, mg/l</td>
<td>2000</td>
<td>2000</td>
<td>100</td>
</tr>
<tr>
<td>TSS, mg/l</td>
<td>100</td>
<td>5</td>
<td>ND</td>
</tr>
<tr>
<td>Oil &amp; Grease, mg/l</td>
<td>40</td>
<td>2.5</td>
<td>ND</td>
</tr>
<tr>
<td>BOD, m/l</td>
<td>300</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>COD, mg/l</td>
<td>600</td>
<td>60</td>
<td>2</td>
</tr>
<tr>
<td>Alkalinity as CaCO₃, mg/l</td>
<td>300</td>
<td>150</td>
<td>2</td>
</tr>
<tr>
<td>Silica as SiO₂, mg/l</td>
<td>40</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>TOC, mg/l</td>
<td>150</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Hardness, as CaCO₃, mg/l</td>
<td>80</td>
<td>30</td>
<td>1.5</td>
</tr>
<tr>
<td>Fluoride, mg/l</td>
<td>0.04</td>
<td>0.1</td>
<td>0.001</td>
</tr>
<tr>
<td>Calcium, mg/l</td>
<td>40</td>
<td>0.02</td>
<td>1.0</td>
</tr>
<tr>
<td>Iron, mg/l</td>
<td>0.5</td>
<td>0.1</td>
<td>0.01</td>
</tr>
<tr>
<td>Magnesium, mg/l</td>
<td>4</td>
<td>0.002</td>
<td>0.2</td>
</tr>
<tr>
<td>Sodium, mg/l</td>
<td>360</td>
<td>400</td>
<td>20</td>
</tr>
<tr>
<td>Strontium, mg/l</td>
<td>1</td>
<td>0.5</td>
<td>0.05</td>
</tr>
<tr>
<td>NH₃, ppm</td>
<td>7</td>
<td>&lt;10</td>
<td>&lt;10</td>
</tr>
</tbody>
</table>
Polifin, Ltd. – South Africa  
VCM Plant  
Wastewater Reuse

<table>
<thead>
<tr>
<th>Parameter</th>
<th>mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Oxygen Demand (COD)</td>
<td>2,180</td>
</tr>
<tr>
<td>Total Organic Carbon (TOC)</td>
<td>950</td>
</tr>
<tr>
<td>Total Kjeldahl Nitrogen (TKN)</td>
<td>&lt;0.73</td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>7</td>
</tr>
<tr>
<td>Total Solids</td>
<td>51,100</td>
</tr>
<tr>
<td>Total Ash</td>
<td>20,700</td>
</tr>
<tr>
<td>Alkalinity</td>
<td>3,400</td>
</tr>
<tr>
<td>pH</td>
<td>10</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>&lt;0.09</td>
</tr>
<tr>
<td>Copper</td>
<td>*</td>
</tr>
<tr>
<td>Aluminum</td>
<td>*</td>
</tr>
<tr>
<td>Specific Organic Compounds</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Raw Wastewater</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>TOC, mg/l</td>
<td>400 - 500</td>
</tr>
<tr>
<td>COD, mg/l</td>
<td>800 - 1000</td>
</tr>
</tbody>
</table>
Polifin, Ltd. – South Africa
Wastewater Reuse

Waste Stream

Influent Tank

PACT Bio-reactors

Effluent Tank

UV Treatment

Hydro-Clear Filter

To Chlorine Plant

To Cyanide Plant

Incinerator Waste Stream
Water Technologies provides high purity water and wastewater treatment technologies and services to major customers in food & beverage, steel and biopharm markets.

- Products and technologies: RO, continuous deionization, chemical feed systems, controls, filtration, biological treatment.

- Services and aftermarket: Service DI, parts, O&M, carbon and resin services, retrofits and rebuilds, build-own-operate, membrane cleaning
Kranji, Singapore

**Flow**
- **City**: 1,840 gpm
- **Kranji, Singapore**: 7,290 gpm

**Start-Up Phase 2**
- **2000 2002**
McKinley Paper

Plant: McKinley Paper, USA
Flow: 350 gpm
Start-Up: 1994
New smaller economical systems for small communities, satellite treatment

- New pre-engineered systems for drinking water applications
  - MEMCOR® AXIA™ submerged membrane system
  - MEMCOR® AXIM™ pressurized membrane system
- New pre-engineered systems for wastewater/water reuse applications
  - MEMCOR MemJet® Xpress Membrane Bioreactor
Customer

Problem Identification

- Integrated Systems & Service project approach
- Comprehensive offering
  - Widest range of technologies
  - “Bundled” product offering where appropriate
  - Lower life-cycle cost with services
- Control versus ownership in value chain
  - Ownership of all elements lowers ROI and increases risk
  - Control is exerted through purchasing power and industry know-how

Solution

- Treatability Analysis
- Process Design
- Engineering
- Financing
- Equipment Supply and Service
- Equipment Manufacturing
- Construction
- Operation
- Start up
- Service
- Aftermarket
Local Office Information and Contact:

Siemens Saudi Arabia
PO Box 719
31952 Al Khobar
Tel: + 966 - 3 - 8826506
Fax: + 966 - 3 - 882-6963

Mr. Ali Hamdani
Vice President - Industrial Solutions & Services
ali.hamdani@siemens.com

Mr. Liaqath (Shary) Baig
Sales Engineer – Industrial Solutions & Services
liaqath.baig@siemens.com
Thank you!