The new Paul Wurth developed Automatic Bottom Unheading Valve combines the advantages of existing classical concepts in an innovative way.

Wolfgang ZINGSEM, Sales Manager Paul Wurth Oil & Gas
New Bottom Unheading Valve – Plate/Disc Combination

Plate/Disc Combination
Compact and robust design

Typical Figures:

- Typical Size 60"
- ca: 9.500mm x 2.900mm x 1.100mm
- Weight abt. 42.000 kg
- Typical operating Temp. up to 550°C
- Typical Operating Pressure up to 10bar(g)
- Actuation hydraulic or electric
New Bottom Unheading Valve – Plate/Disc Combination

- Gate-Plate
New Bottom Unheading Valve – Plate/Disc Combination

- Gate-Plate
- Disc
New Bottom Unheading Valve – Plate/Disc Combination

- Gate-Plate
- Disc
- Guide-Plate
New Bottom Unheading Valve – Plate/Disc Combination

- Gate-Plate
- Disc
- Guide-Plate
- Floating lower Seat
New Bottom Unheading Valve – Plate/Disc Combination

- Gate-Plate
- Disc
- Guide-Plate
- Floating lower Seat
- Valve Body
New Bottom Unheading Valve – Plate/Disc Combination

- Gate-Plate
- Disc
- Guide-Plate

- Floating lower Seat
- Valve Body
- Seating Arrangement

Valve in closed position
New Bottom Unheading Valve – Plate/Disc Combination

- Gate-Plate
- Disc
- Guide-Plate
- Floating lower Seat
- Valve Body
- Seating Arrangement

Valve in open position
New Bottom Unheading Valve – Plate/Disc Combination

- Gate-Plate
- Disc
- Guide-Plate
- Floating lower Seat
- Valve Body
- Seating Arrangement
- Upper and lower Bonnets

View from the bottom
New Bottom Unheading Valve – Plate/Disc Combination

View from the top

© Paul Wurth 2017
PLATE / DISC COMBINATION

Valve in closed position

Floating lower seat ring

Seat released (hydraulic)
Seat engaged (belville springs)

Fix upper seat (scraper)

Valve in open position
Plate/Disc Combination – Seating Arrangement

- Floating lower valve body seat
- gasket
- bushing
- Actuator pin

Fix upper valve body seat

Plate
Disc
Plate/Disc Combination – Seating Arrangement

Seating force generated by belleville-spring-package in OPEN and CLOSE valve-position

Seating force released by hydraulic pressure during opening / closing of valve (travel)

Insolation ring
To protect hydraulic cylinders against process heat

Removable at installed Valve
Thermal Deflection Calculation - Simulated Coking Cycle

- Temperature levels: 500°C, 250°C, 100°C, 20°C
- Time intervals: 1 hour (3600s), 2 hour (7200s), 3 hour (10800s), 4 hour (14400s), 5 hour (18000s)
- Stages:
  - Step 1: Medium
  - Step 2: Steam
  - Step 3: Ambient

© Paul Wurth 2017
Simulated Coking Cycle, contact of upper seat to gate plate

- 500°C for 3600s
- 500°C for 7200s
- 500°C for 14400s
- 500°C for 18000s
Simulated Coking Cycle, contact of lower seat to disc

- 500°C for 3600s
- 500°C for 7200s
- 500°C for 14400s
- 500°C for 18000s

© Paul Wurth 2017
New Bottom Unheading Valve – Plate/Disc Combination

STEAM PURGE SYSTEM

Purge steam pressure between gate-plate and disc provides sealing force additional to seating arrangement.
STEEAM PURGE SYSTEM

Bonnetts and valve-body forming one common cavity.
– free distribution of purge steam and condensate disposal
Plate/Disc Combination – Seat Purge

Additional seat-purge area

Separate inlet nozzle for seat purge
Plate/Disc Combination – Design Features Summary

- Combination of a Gate-plate with additional disc

- Fix upper valve-body seat / scraper
  → provides a positive scraping / tightening force with gate-plate surface

- Disc fitted into the gate-plate by means of a spherical segment
  → Self adjusting, independent sealing element
  → redundant sealing system providing double isolation functionality

- Floating lower valve-body seat
  → Seat is not subject to deformation caused by any thermal or pressure effects

- External, mechanical seating system, hydraulically released
  → high tightness in open and closed valve position
  → low friction during opening and closing

- light weight

- small footprint

- Only few moving parts within the valve body
Thank you very much for your attention and please visit our stand in the exhibition hall.
Oil & Gas Division

- Attachment to the Presentation -
Company Information for reference:
### Paul Wurth history

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870</td>
<td>Eugène Muller builds a <strong>boilermaking facility</strong> in Luxembourg Hollerich, known as &quot;Kesselfabrek&quot;.</td>
</tr>
<tr>
<td>1890</td>
<td>Business is taken over by Paul Wurth. The firm specialises in <strong>metal erection works</strong>, especially the construction of metal bridges and blast furnace shells.</td>
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<tr>
<td>1951</td>
<td>Paul Wurth acquires from a British firm the licenses needed to supply <strong>complete blast furnaces</strong> with all the accessories.</td>
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<tr>
<td>1954</td>
<td>Construction of a <strong>first blast furnace</strong> at Seraing in Belgium.</td>
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<tr>
<td>1969</td>
<td>Invention of the <strong>Bell Less Top</strong>® charging system, which revolutionizes iron &amp; steel industry the world over.</td>
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<tr>
<td>1977</td>
<td><strong>First subsidiary</strong> (Brazil) – development of sales &amp; engineering network.</td>
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<tr>
<td>2003</td>
<td>Creation of <strong>TMT Tapping – Measuring – Technology</strong>.</td>
</tr>
<tr>
<td>2004</td>
<td>Fabrication activities transferred to Arcelor Dommeldange. Paul Wurth becomes a <strong>pure engineering company</strong>.</td>
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<tr>
<td>2004</td>
<td>Integration of <strong>Didier - M&amp;P Energietechnik</strong> specialised in hot blast stove technology and refractory &amp; lining concepts (<strong>Paul Wurth Refractory &amp; Engineering GmbH</strong>).</td>
</tr>
<tr>
<td>2005</td>
<td>Take-over of the blast furnace, coke making and direct reduction activities as well as the staff from <strong>SMS Demag S.p.A.</strong> and creation of <strong>Paul Wurth Italia S.p.A.</strong></td>
</tr>
<tr>
<td>2009</td>
<td>50.4% shareholding in <strong>CTI Systems</strong>, specialised in automated intralogistics systems. In 2011, stake increased to 75.2%. In 2013, stake brought to 100%.</td>
</tr>
<tr>
<td>2012</td>
<td>Creation of <strong>Paul Wurth IHI Corp., Ltd</strong> in Japan.</td>
</tr>
<tr>
<td>2012</td>
<td>Paul Wurth becomes part of the <strong>SMS group</strong>, Germany.</td>
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<tr>
<td>2014</td>
<td>Construction license for <strong>Midrex®</strong> direct reduction plants</td>
</tr>
<tr>
<td>2016</td>
<td>Foundation of Oil and Gas Division</td>
</tr>
</tbody>
</table>
Global Player

- **About 1,500** qualified staff
- **27 Group members** in 15 countries, incl. 19 operational entities
- Joint ventures: TMT, Paul Wurth IHI, VCL, P&A Industrial Engineering, Paul Wurth Kovrov, Amova
- Other countries covered by Representations
Services workshops **around the world** to support our customers and abt. 320 specialized personnel ready to attend any requirements.

**North America**
- Locations: PW INC, Valparaiso

**Europe**
- Locations: Luxembourg, Italy, Germany, Czechia

**South America**
- Locations: PW Brazil, Belo Horizonte

**China**
- Locations: Shanghai, Beijing

**India**
- Locations: New Delhi, Bhubaneswar

**Certifications**
- ISO 9001: Quality Management System
- VCA/SCC: Safety Management System
- EN 1090-1: Factory Production Control
Heavy duty valves - for refineries and petrochemical plants

- Paul Wurth is the world market leader for metallurgical plants like blast furnaces and innovative equipment around these processes.

- For more than 20 years, Paul Wurth has been designing and supplying a complete spectrum of specialized heavy duty valves for highly severe operating conditions for metallurgical plants.

- Since Jan. 2016 Paul Wurth has established its Oil & Gas Division in order to offer heavy duty valves to the refineries and petrochemical industry.

For this business segment, we have the support of a Sales & Engineering team of abt. 60 experienced and qualified engineers in Germany, Czech Republic and Luxembourg.