Field Experience in PUE- Equipment for CMP and Ultrapure Cleaning

Presented by Dr. Laszlo Fabry
Puerstinger Company Profile

Puerstinger Co. Ltd. is a

- Supplier of distribution systems and for
- Piping in UHP systems made of
  - PFA (Perfluoro vinylpropylether-Polytetrafluoro ethylene copolymer)
  - PVDF-HP (Polyvinyledene fluoride polymer)
  - ECTFE (Ethylene chlorotrifluoroethylene polymer)
  - Stainless Steel orbital welding & electropolished
- Wet Chemical Process Equipment
- Special machine building industry

Where are Puerstinger sites?

- Two in Germany (Burghausen, Dresden)
- Austria (Pettenbach)
- Singapore
- Malaysia
- Represented by subcontractors in the USA
With experience and international know-how Puerstinger grew up in a short time to a global player with permanent locations in Austria, Germany and South East Asia.
Sectors of Industry:

- Nanotechnology
- Semiconductor industry
- Solar industry
- Pharmaceutical industry
- R&D

etc.
Outline

Levitronix pumps in

1. Distribution systems
2. UHP High-End Equipment
3. Suitability of Levitronix pumps
Puerstinger Company Profile
Welded PFA Distribution
IR-Welded PVDF Distribution
Cleaning Systems

The company Puerstinger provides tools for the transition from the manual process of development in the automated manufacturing process.

The systems include a programmable recipe management including data storage.

They are suitable for the processing of wafers up to 300mm and silicon for the solar industry.
Systems Engineering
High-End-Equipment

Distribution Systems

- Modular buildup (mixing-, transfer-, service tank- and distribution-module)
- Further extensions are optional
Mixing occurs by selective / concerted addition of educts during replenishing. Based on the turboid principle, replenishing occurs gently. Additional agitation or other auxiliary energy e.g. a stirrer is not necessary. Saving time and energy by complete mixing (100%) during replenishing.

Replenishing and metering are carried out by applying overhead weighing cells that is advantageous in a havary situation. Deviations from replenishing and metering targets lie below 0.1 %. Best case achieved ≤0.002%.

Make-ups up to 1500 L. For larger make-ups auxiliary energy is necessary.

Applying the overhead weighing cells the equipment configuration allows facile reclaim and dynamic mixing processes such as mixing used and fresh slurries.

An enclosed High-/Lowflow-System is optional when balanced air-inlet / outlet was required. HEPA (high-efficiency particulate air) filter is also optional.

The equipment is designed for continuous operation, 24 h x 365 d.

Equipment availability is higher than 98.5%
Wet chemical process equipment
Systems Engineering
High-End-Equipment
Systems Engineering
High-End-Equipment

- Our layout includes a balanced laminar airflow with optional air recycling.

- The workpieces such as wafers, optical glasses etc. are taken carrierlessly from station to station, whenever it is feasible, with or without batch compacting. Carrierless transfer reduces carryover of media and contaminants.

- Modular layout of optional extension by adding processing modules. Handling systems are also modular, thus, extendable *ad infinitum*. Uncomplicated change of process sequences is viable without changing modules.
• Optimized period of time between stopping and resuming operation after re-adjustment of bath conditions

• Partial bath renewals are viable in order to save chemicals and process media

• Flow rates are variable during bath renewal in order to optimize replenishing times
Contamination:

Qualification of high-end equipment is a complex and comprehensive process.

The user requires equipment
  o without contamination sources and
  o detrimental effects on the process.

Levitronix pumps must provide the user with additional advantages.
Advantages of Levitronix Pumps in Comparison to Diaphragm Pumps and Sleeve Bearing Centrifugal Pumps

<table>
<thead>
<tr>
<th></th>
<th>Levitronix</th>
<th>Centrifugal pump</th>
<th>Diaphragm pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media effect on the surface</td>
<td>Impeller and casing, in small surface contact with the media</td>
<td>Bearing, shaft and casing with larger contacting area in the media</td>
<td>Driving mechanics, diaphragm, casing, check valve in large surface contacts with media</td>
</tr>
<tr>
<td>Wear and tear parts</td>
<td>None</td>
<td>Bearing and shaft</td>
<td>Diaphragm and check valve</td>
</tr>
<tr>
<td>Control</td>
<td>Continuously variable</td>
<td>Continuously variable</td>
<td>Complex, continuous variability uneconomical</td>
</tr>
<tr>
<td>Self priming</td>
<td>None</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td>Pulsation in bath</td>
<td>None</td>
<td>None</td>
<td>Pulsation generates striations and stains</td>
</tr>
<tr>
<td>Pulsation on filter</td>
<td>Without Pulsation</td>
<td>Without Pulsation</td>
<td>Additional particulates due to pulsation</td>
</tr>
</tbody>
</table>
# Breakdown Potential of Levitronix Pumps in Comparison with Diaphragm Pumps and Sleeve Bearing Centrifugal Pumps

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<tr>
<td>Protection against dry run</td>
<td>Unnecessary</td>
<td>Necessary</td>
<td>Unnecessary at short dry run necessary when duration uncontrolled</td>
</tr>
<tr>
<td>Protection against icing</td>
<td>Unnecessary</td>
<td>Unnecessary</td>
<td>Necessary</td>
</tr>
<tr>
<td>Unit complexity (Vulnerability)</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Savings</td>
<td>Flow rate meter, dry run protection are unnecessary</td>
<td>None</td>
<td>Dry run protection, when duration controled</td>
</tr>
<tr>
<td>Maintenance costs</td>
<td>Low</td>
<td>Higher</td>
<td>Higher</td>
</tr>
</tbody>
</table>
Advantages of Levitronix Pumps in Comparison to Diaphragm Pumps and Sleeve Bearing Centrifugal Pumps

Summary

Our field experience has demonstrated

• that the dynamic control i.e. adjustment is facile in case of Levitronix pumps because many recipes are saved in the controlling system and readily available,

• therefore, variable flow rates e.g. are viable during process changes or bath replenishing and

• an increased process stability at lower running costs
Acknowledgements

Thank you for your attention and interest in our field experience with Levitronix pumps in UHP applications. Please feel free to ask us more or just visit our website: www.pue-systems.com

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Mit freundlicher Genehmigung von Levitronix

Quelle: www.youtube.com