Development of a low cost desludging pump in Uganda

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Introduction

• Water for People-SaniHub: “manages and drives forward the development of improved sanitation technologies to a point where they are adopted and owned by private sector operators.”

• The extraction/emptying devices include Gulper I and Gulper II (Rammer)

• Gulper II; outer casing slides up and down, forcing sludge into the cylinders without using suction
15% of kaolin clay & 85% of top soil was mix with 2.2 litres of water to form a simulant mix.

Water (100 to 200 ml) was added at intervals.

Slump was measured for respective water added.
Shear Strength verses Water content

Shear strength from slump reading (Pa)

Water content = 1-TS (%)
Pump test of Gulper I and Gulper II
## Pump test of Gulper I and Gulper II

<table>
<thead>
<tr>
<th></th>
<th>Gulper I</th>
<th></th>
<th></th>
<th>Gulper II</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Priming time (s)</td>
<td>Mass pumped in 30s (kg)</td>
<td>Ave. flow rate (l/s)</td>
<td>Priming time (s)</td>
<td>Mass pumped in 30s (kg)</td>
<td>Ave. flow rate (l/s)</td>
</tr>
<tr>
<td><strong>100pa</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person 1 (60kg)</td>
<td>16</td>
<td>17.5</td>
<td>0.53</td>
<td>16</td>
<td>37.3</td>
<td>1.13</td>
</tr>
<tr>
<td>Person 2 (80kg)</td>
<td>19</td>
<td>18.6</td>
<td>0.56</td>
<td>15</td>
<td>45.4</td>
<td>1.38</td>
</tr>
<tr>
<td>Individual</td>
<td>18</td>
<td><strong>18.1</strong></td>
<td><strong>0.55</strong></td>
<td>16</td>
<td><strong>41.4</strong></td>
<td><strong>1.25</strong></td>
</tr>
<tr>
<td>Dual operators</td>
<td>11</td>
<td>27.6</td>
<td>0.84</td>
<td>10</td>
<td>50.7</td>
<td>1.54</td>
</tr>
<tr>
<td><strong>500pa</strong></td>
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<td></td>
</tr>
<tr>
<td>Person 1 (60kg)</td>
<td>Failed</td>
<td>Failed</td>
<td>Failed</td>
<td>25</td>
<td>22.5</td>
<td>0.63</td>
</tr>
<tr>
<td>Person 2 (80kg)</td>
<td>Failed</td>
<td>Failed</td>
<td>Failed</td>
<td>20</td>
<td>29.4</td>
<td>0.82</td>
</tr>
<tr>
<td>Individual</td>
<td>Failed</td>
<td>Failed</td>
<td>Failed</td>
<td>23</td>
<td><strong>26.0</strong></td>
<td><strong>0.72</strong></td>
</tr>
<tr>
<td>Dual operators</td>
<td>Failed</td>
<td>Failed</td>
<td>Failed</td>
<td>17</td>
<td>33.8</td>
<td>0.93</td>
</tr>
</tbody>
</table>
Training operators to use Gulper II
Field test on strong sludge
Why Gulper II is superior to Gulper I

- It pumps thick/strong sludge
- Delivers sludge to receptacle in a sanitary manner
- Extendible to 3 meters
- Less energy to operate since it has a lever arm
Challenges in pit emptying

• Most pits are filled with detritus materials
• Some pits are substandard; squat hole small, low roof and door height
Conclusion and recommendations

- 50mm butterfly: all pit sludge with less rubbish
- 50mm gate valves: strong sludge with rubbish
- Marketing and Legalizing use of gulper II for pit emptying
- Ask house holds not to dump detritus material into pits
Thank you for listening