The Right Tools to Wipe out the Wipes Crisis

JWC Environmental

Agenda:
1. What’s Up With Wipes?
2. Pathways to a Solution
3. New Approach
What’s Up With Wipes?

Introduces in early 2000’s for cleaning and bathroom use

Wipes Fill a Need
• Hygienic
• Convenient
• High Performance

All at an attractive Price Point
5.5% Annual Growth Rate

- $14 Billion per year business in 2016

Consumer & Industrial Wipes Sales 2016-2021 ($ millions)

Projected CAGR: 5.5%


- Consumer
- Industrial
Adoption of Low-Flow Toilets

- New toilets are limited to a maximum of 1.6 gallons per flush, instead of the legacy 3.5 to 5 gallons.

- Since the efficiency standards became law, research shows the United States saves 7 billion gallons of water a day.

- Low-Flow toilets have led to higher proportions of solids in the wastewater stream, leading to a potentially harmful effect on downstream pumps and equipment.

- Solid waste concentration will increase as residential toilets continue to become more efficient.

### Toilet Flush Volume Changes Over the Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Current Flush Volume</th>
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</thead>
<tbody>
<tr>
<td>198</td>
<td>3.5 gpf (13.5 Lpf)</td>
</tr>
<tr>
<td>199</td>
<td>1.6 gpf (6.0 Lpf)</td>
</tr>
<tr>
<td>201</td>
<td>1.28 gpf (4.8 Lpf)</td>
</tr>
<tr>
<td>Future</td>
<td>1.1 gpf (4.2 Lpf)</td>
</tr>
</tbody>
</table>

**PRE-1980s TOILET**

**HIGH-EFFICIENCY TOILET TODAY**

1.6 gpf (6.0 Lpf) vs. 1.28 gpf (4.8 Lpf)
How Big is the Problem?

- Increased maintenance - $20-30k/year/station
- Increased electrical costs - $30k/year/station for Vancouver, WA
- Seattle spends $500,000/year removing wipes from pump stations
Disposable vs. Flushable vs. Dispersible

- Early Wipes Technology – Spunlaced Nonwovens
  - Rayon, Polyester, Nylon with Cellulose
  - Described by some as “Indestructible pieces of plastic”

Disposable
- Designed for single use

Flushable
- Will not clog you toilet & plumbing?
  - or
- Will not harm septic or municipal system?

Dispersible
- Will breakdown in sewer…..
- Like toilet paper?
- Some time in the future?
What’s Causing the Clog?

40% paper towels
20% baby wipes
15% cleaning wipes
14% feminine products
8% “flushables” wipes
50% of Baby Wipes Purchased by Households With No Children
How Will We Prevent This?
Lift Station Equipment Solutions for Wipes

Option 1
Pump Wipes to Headworks

Solids Handling Pump
Chopper Pump
Grinder with Pump

Option 2
Remove Wipes

Screens & Augers
Solids Handling Pumps

How they work
- Screw-type impeller uses the leading edges to shear the solids
- Vortex-style impeller pushes the solids toward the discharge with little contact to impeller (Hydromatic, Fairbanks, Wilo)

Considerations
- Moves the problem to downstream equipment
  - Required to change out all pumps
- Rated to pass a spherical non-compressible 3” solid (a baseball)
- Inefficient hydraulically (vortex)
  - Requires more energy to move the same amount of water
- Potential for reweaving
Chopper Pumps

**How they work**
- Operate at High speed/Low cutting torque
- Blades and wear plates chop like a macerator

**Considerations**
- Pumps and Chops in a single unit
  - Not optimized for both
- Not able to handle tougher solids
  - Speed to pump reduces torque to cut
- Higher energy costs
  - Needs larger motor
- Typically used in lower flows
- Potential for reweaving of cut wipes
Pumps Are Trying to Change

Multiple Impeller options
- Vortex, Chopper, Screw-Type

But...
- Does it fit hydraulically?
- What else has to be upgraded?
- Is it efficient?
- What is “normal sewage”?
Grinder with Pump

**How they work**

- Two rotating cutter shafts operate at low speed with high torque to macerate solids
- Solids small enough to be pumped on to headworks

**Considerations**

- Can be utilized with existing pump systems
- Must have space for installation in wet well or install manhole system upstream
- Some two shafted grinder systems produce long strips which can reweave into ragballs
Reweaving

- Whole and cut wipes can “Reweave” in the collections systems
  - Form “mats” in wet wells
  - Form “ropes” in piping

- Problem is worse when combined with FOG and hair

- “Ragballs”, “mats” and “ropes” can not be pumped once they form
Re-Engineering
Sewage Grinders
17 Tooth Serrated Cutters

- Cuts 2 directions
- Works against knurled spacer
- Shafts Operating at different speeds
- 51% Reduction in Long Strips
Long strips cut in 1 direction

Cut in 2 directions w cuts 2 ways

2 direction cutting = No Reweaving
Grinders Can Fit Almost Anywhere
Lift Station Equipment Solutions for Wipes

Option 1
Pump Wipes to Headworks

Option 2
Remove Wipes

Solids Handling Pump
Chopper Pump
Grinder with Pump
screens & Augers
Capture/Cut/Remove at Lift Station
Better Sewer Technologies - Finescreens
In-Channel Grinder Success

Case Study
Santa Margarita WD
Orange County, California

“This upgrade cost significantly less than new pumps. Plus, this solution will completely eliminate the pump clogging problems we were having.”
- Plant Superintendent

Sliced Annual Pumping Energy Costs by $78k
Don’t be a Fatberg – Let’s Solve this
Questions & Answers