Cause of Blockages and The Effect They Have On Different Assets In Waste Water Applications

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Agenda

• Current Industry Situation – The Problem
• How Pump Blockages Occur
• Different Blockage Types
• Preventative Methods
• Impact of Rags on Pumping Performance
• Process Optimisation by Rag Alleviation
• Questions
The Problem

In the Daily Mail* an article headline reads:

“Wet Wipes are causing an ecological disaster”

The article explains that in the UK wet-wipes are leading to 366,000 sewer blockages each year which cost £88 million to clear (£240 per block).

(This cost per block may be significantly under-estimated)

*(Wednesday 26th June, 2016)
The Problem

All 12 UK WATER UTILITIES CONFIRM THESE FINDINGS
How Big Is The Problem?

• Severn Trent - 48,900 blockages per year
• Anglian Water - 30,000 blockages per year
• Thames Water - over 80,000 blockages per year.
• Scottish Water – 40,000 blockages per year
• All costing around £7 Million per water authority

Money spent cleaning “avoidable” sewer blockages caused by fats, oils, greases, sanitary waste and wipes

PUMPS ARE BLOCKING EVERYWHERE

DERAGGER II
ELIMINATING PUMP BLOCKAGES
THE SOLUTION IS CLEAR
Where Do The Blockages Occur?
Current Industry Situation

- Traditionally, lift and manually unblock pumps
- Reactive response
- High risk of pollution
- Significant Increase in Power Consumption

Typical blockage
How Pump Blockages Occur
How Pump Blockages Occur

• Rags build Up In The Pump Itself

• Rotating Action Of The Pump “Knits” Rags

• Each Wipe “Knits” To Form Mop Head

• Mop Heads Can Fall Off Impeller When Pump Off And Float In Well
How Pump Blockages Occur
Different Blockage Types
Impact on Pumping Performance

Biggest Impact Is On Dry Pit Pumps – R.A.S

- Sludge settlement
- Rag build up
- Restriction in Pipes
- Flowrate Drops

Blockage on the suction side

THE SOLUTION IS CLEAR
Dry Well

Blockage in the elbow or inlet to pump

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ELIMINATING PUMP BLOCKAGES

THE SOLUTION IS CLEAR
Wet Well

- Leading Edge
- Wear Ring
- Centre
- Volute

Blockage

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Wet Well

Packed in between vanes

Leading Edge

Cap

Blockage

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Preventative Measures
Mechanical Solutions

- Macerators
  - Large installation
  - Designed for large debris not wet wipes
  - Consume a lot of power

- Chopper Pumps
  - Pulps the rags up
  - Blades go blunt over time
  - Pulp can still build up in volute
Mechanical Solutions

- Screens
  - Great Way To Remove Debris
  - Consume A lot Of Power
  - Need Storage For Rags
  - Great at Treatment Works
Electronic Solutions

• VFD’s
  – Perform Reverse Rotation On Start
  – Program To Reverse Pump On Time Basis
  – High Current Setpoint
  – Can’t Detect Initial Build Up

• PLC’s
  – Program To Reverse Pump On Time Basis
Deagger II
Timed Vs Real Time?

Timed Clean
Real time

24hr window

The solution is clear
Deragger II
Timed Vs Real Time?

Timed Clean

Real time

3hr 40min window
DeRagger II
Purpose Built Anti Ragging Devices

4"

1"

DERAGGER II
ELIMINATING PUMP BLOCKAGES

THE SOLUTION IS CLEAR
Deagger II

- Monitor The Pump In Real Time To Prevent Blockages Before They Form
- Work Along Side Existing Starter
- Eliminates All Types Of Blockage
- Retrofit into existing control panels
- Provides standard pump protection
- 0 – 800A rated
Typical Results

Before
Typical Results

Clean impeller after 2 months of Deragger operation
Impact on Pumping Efficiency Caused By Running A Partial Blockage
Power Savings

- Trip Point
- Winding Damage
- Bearings/Seals Damage
- Wasted Energy

DERAGGER II
THE SOLUTION IS CLEAR

ELIMINATING PUMP BLOCKAGES
Typical Results – City of Dade

[Graph showing average current (Amps) over time]
Power Savings

Start: 16/02/2015 13:03:41
End: 09/03/2015 09:50:49
Energy Start: 26856
Energy End: 27833
Energy Used: 677 kWh
Time: 00.07.26.05
Average running current (A): 163.92
Average running time(s): 00:34:18.84
Number of runs: 13

DERAGGER II
Eliminating Pump Blockages

THE SOLUTION IS CLEAR
Impact on Running Other Assets With A Partial Blockage
Surface Aeration

- Rags Catch On The Blades Of The Aerators
- Aeration Efficiency Drops
- DO Levels Drop

- Install A Deragger II Efficiency Of Aeration Increases
- Can Reduce Speed or Switch of Aerators
Anox Mixer

• Rags Catch On The Blades Of The Mixers
• Vibration significant
• Seriously Effect Mixer Mounts

• Install A Deragger II Eliminate Dangerous Vibration
• Significant Energy Savings
## Anox Mixer

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**DERAGGER II**

**THE SOLUTION IS CLEAR**

**ELIMINATING PUMP BLOCKAGES**
Summary

• Blockages Huge Problem

• Best Way To Stop Pumps Blocking Is Detect Blockage Before It Forms Into Rag Ball

• Running A Clean Pump Can Significantly Improve The Pumping Performance By Up to ~50%
Questions