

Global Wastewater Challenges Place Pressure on Aging Infrastructure

Pumps & Systems

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Part 6 of 6

Shifting trends in water use and a changing sewage composition cause complex problems for the world's sewer systems.

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Last of Six Parts

The previous articles in this series (Pumps & Systems, November 2015, December 2015, January 2016, March 2016 and May 2016) discussed some of the main challenges that modern wastewater composition places on sewer systems. The articles presented ways to minimize the associated risk.

As mentioned in this series, the production of so-called “non-woven products” has grown tremendously in recent years, and the problem is likely to remain. Not all of these non-woven products end up in the world's wastewater transport systems.

The most dangerous items are “disposable” wipes. Because these products' labels imply that they are harmless to sewer systems, most users dispose of them by flushing them down the toilet. This habit is particularly problematic for nurseries, retirement homes and other similar facilities where dischargers are connected to the municipality sewerage.

In certain ranges and fields, measures are in place to minimize the risk of improper disposal into the sewerage. Unfortunately, many of these measures are not yet fully effective.

Various fields are working on improvements to this worldwide infrastructure challenge.

Non-Woven Products

The update certificate that categorizes certain products as “flushable” is based on a test that is not optimized for the whole way through the sewer, even if the toilet does flush the product.

Better and more realistic tests are being developed to identify wipes that are truly flushable and that will not create difficulties for the sewer and the system. The intended goal has to be very similar to toilet paper. The research and development is focused on developing products that are resistant and durable, yet easily disintegrate after use.

Municipalities

Many municipalities and operation companies have campaigns in place to educate the discharger and residents about the consequences and long-term costs of disposable wipe use on sewer systems. The cost increase has to be balanced by higher payment from all residents and the discharger.

In some cases, operating companies work hard to remove clogged wipes, dry them and identify the brand in order to hire a lawyer and give the invoice to the wipe manufacturer—especially if the product is labeled “flushable” and evidence shows that it is not.

This process is costly and could be avoided if people understood the dangers of these products.

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In some cases, the increase in the disposal of wipes and similar loads in limited areas was so extreme that finding the cause required visiting homes. In severe cases, penalties resulted.



Image 1. A bar screen is loaded with “flushable” products. (Images and graphics courtesy of KSB Inc.)

Engineering

Many skilled engineers understand the risk of clogging and are designing advanced pumping stations and pump sumps to better deal with the new composition of sewerage. In the case of variable frequency drive

(VFD) operation, the minimum velocity is considered more carefully to enable the wipes to be flushed out of the pipes.

Pump Industry

The pump industry has come out with new developments in hydraulics that are designed to meet these challenges. However, hydraulics still cannot guarantee an absolute clog-free operation for the system because of extreme conditions in the system or pump station, even if sometimes they are temporary. The screens and pipe systems, including valves and the sump, can be affected.

Potential solutions can come from new technologies. For example, the F-max impeller can handle all kinds of raw sewage and transport everything through without chopping and a hackle. The F-max’s asymmetrical blade arrangement offers wide free passages, ensuring that even larger, rigid solids pass easily and are reliably handled by the pump.

A further focus for the engineers when designing the F-max’s blades was their ability to create a swirl in the hub area. This swirling effect shifts fibers away from the impeller hub and transports them to the outside.

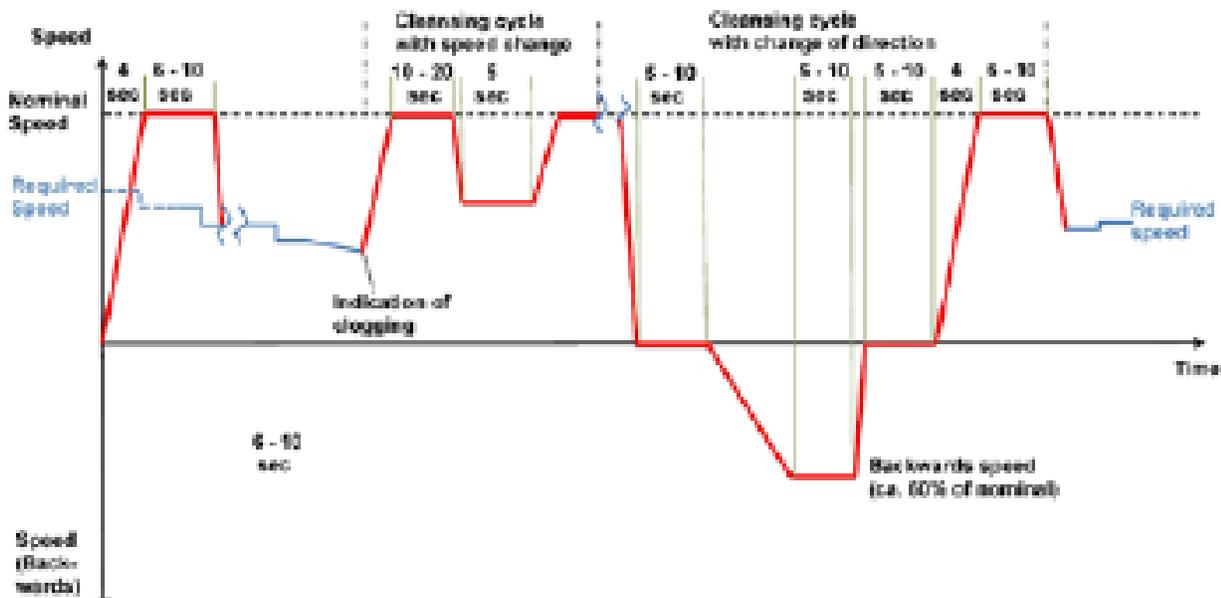


Figure 1. This graph shows the sequences for de-ragging speed over time.

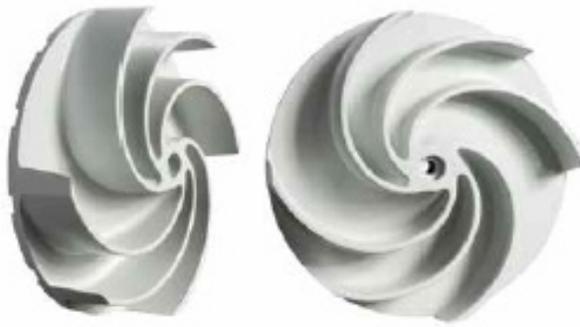


Image 2. The F-max impeller's asymmetrical blade arrangement offers wide free passages, ensuring that even larger, rigid solids pass easily and are reliably handled by the pump.

When they rotate, free-flow impellers develop a strong swirl that keeps the solids in the pump casing suspended and, in combination with the inclined suction area, generates an additional flushing action. This significantly reduces the risk of clogging in the impeller's center caused by long fibers, particularly wet wipes.

Control Equipment Supplier

Control equipment suppliers already offer solutions for particular systems. One example is a VFD with the de-ragging feature, which has been used successfully at some stations.

Conclusion

To eliminate the worldwide challenge of the extended use of wipes, residents must be educated about the long-term dangers and costs of non-woven materials in sewer systems. Because the spread of this knowledge takes time, facilities and municipalities must use all other means to minimize the risk in the meantime. There is no simple answer, but if everybody does their part, the problem can be minimized.

Horst Sturm is vice president of business development at KSB Inc. He has a degree in engineering with a

specialization in energy technology. He has more than 30 years of engineering experience in pumps and systems technology in water and wastewater. For more information on wastewater challenges, visit campaign.ksb.com/global-wastewater-challenges-download.