



Experior as an Energy Savings Solution for Wastewater Lift Stations

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Xylem

Did you know?



Municipal water and wastewater systems...

- Consume 3% of all U.S. energy - 100 billion kWh annually
- Represent up to 35% of municipal energy use
- 52,000 water systems produce 51 billion gallons of water per day
- 16,320 wastewater treatment facilities treat 34.8 billion gallons per day

Information from US Consortium of Energy Efficiency Industrial Programs
National Municipal Water and Wastewater Facility Initiative

Greatest Energy Consumers



- Water Treatment

#1 Pumps

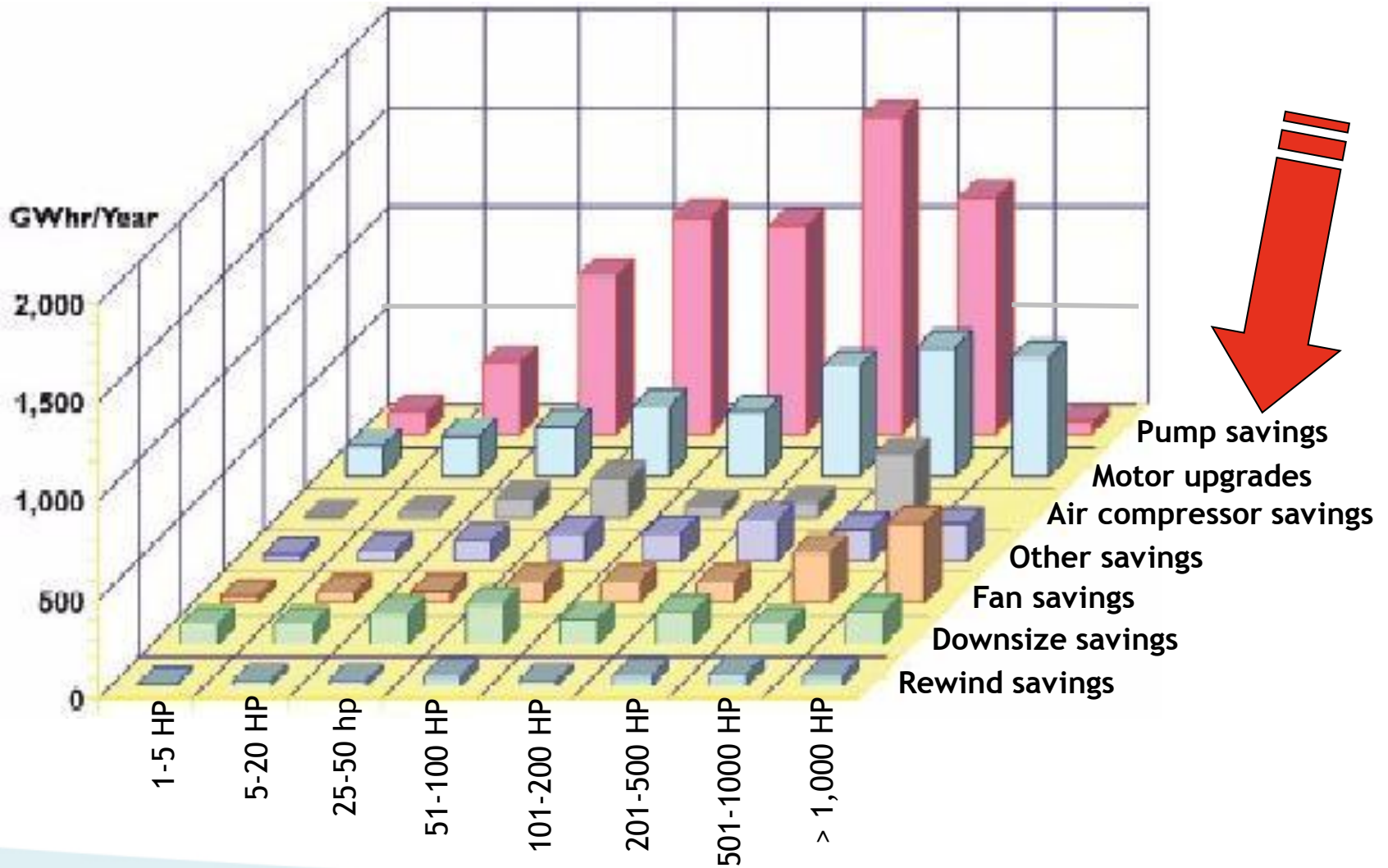
- Wastewater Treatment

#1 Blowers

#2 Pumps

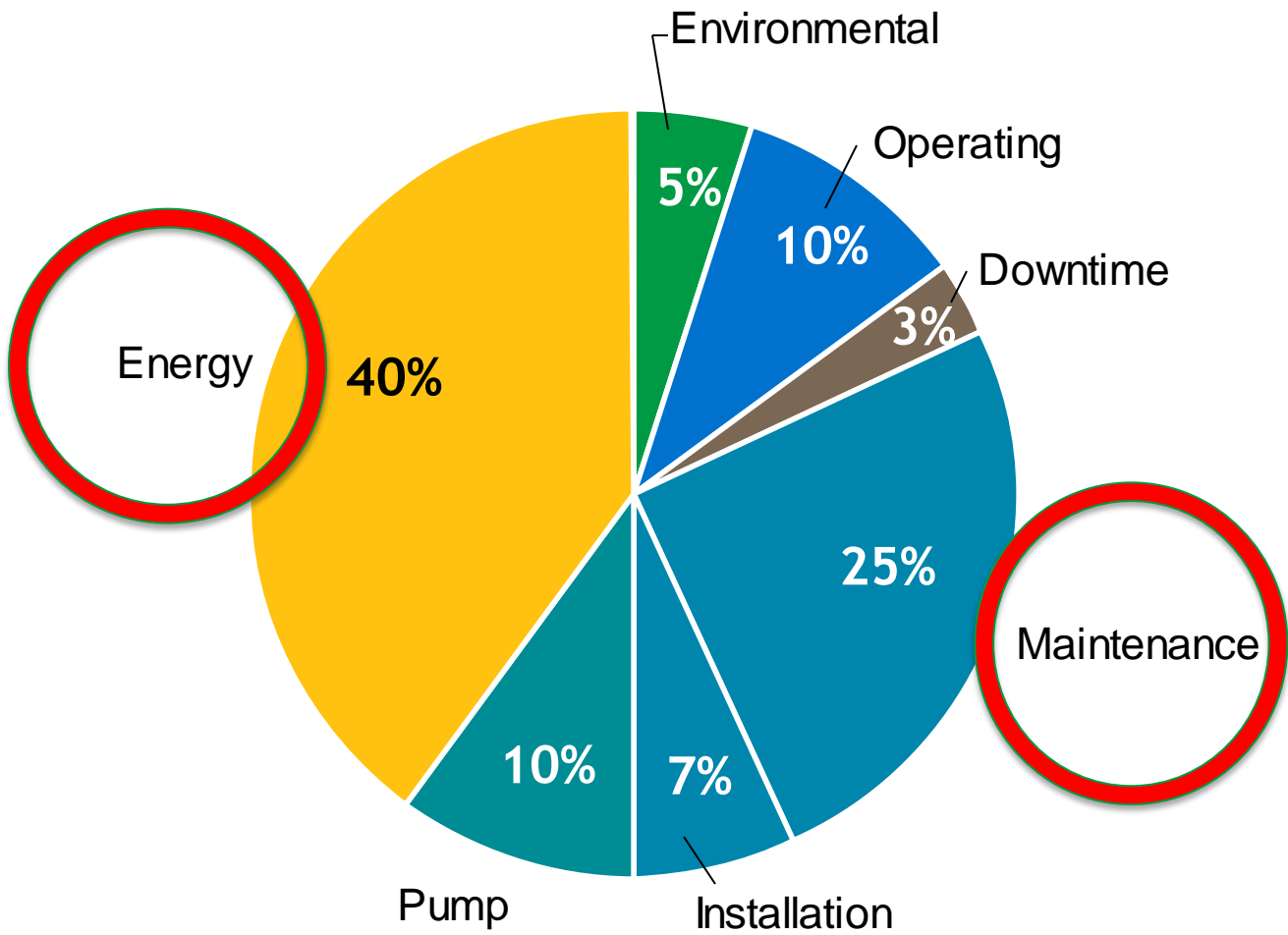
#3 Sludge Handling Equipment

Potential energy savings in WWTP



By motor HP and application (Source: WEF)

Energy savings: Typical life cycle cost for a pumping system



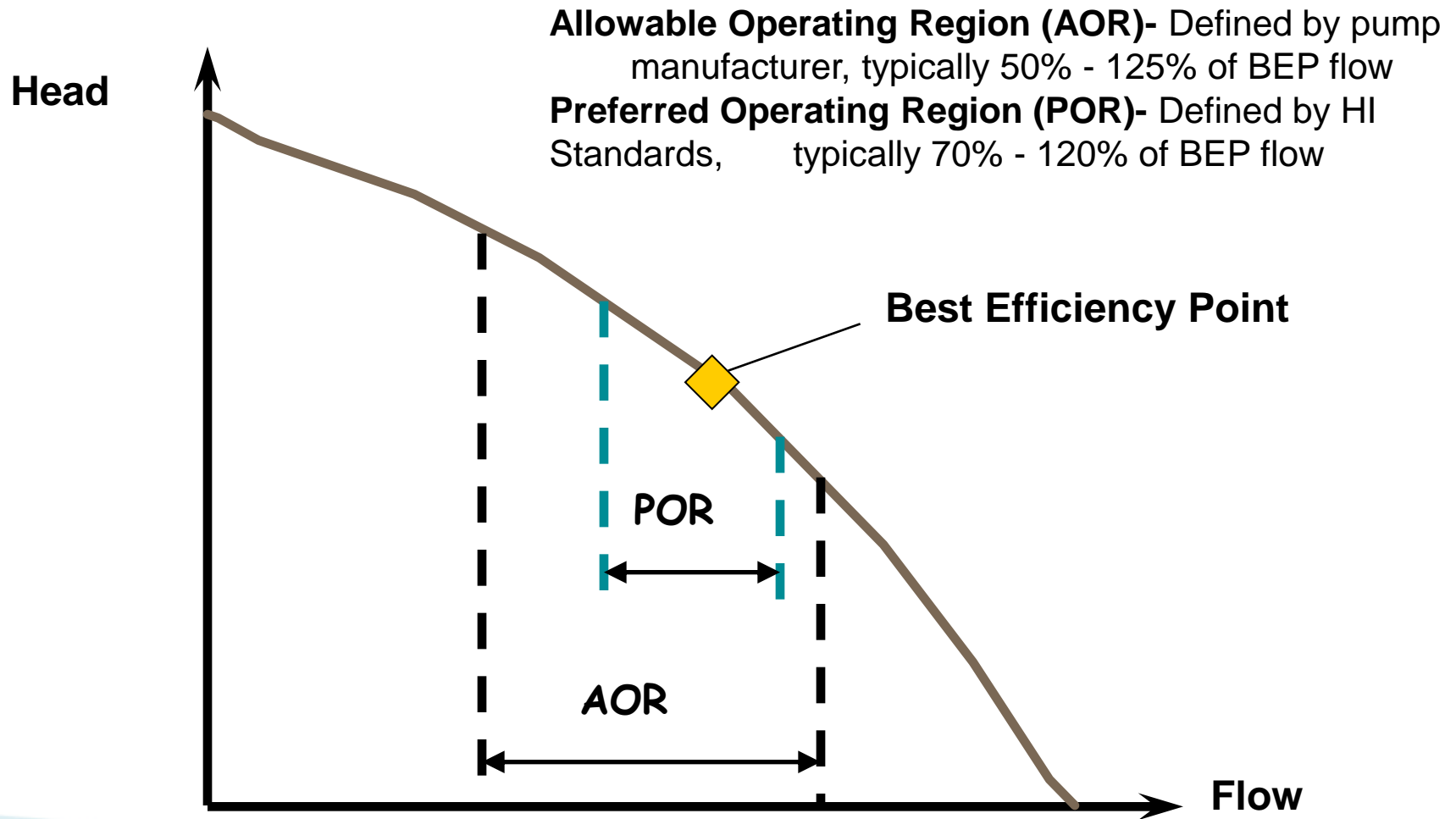
Source: EPA

Ways to save energy

- **Wire to Water Efficient Pumps**
- **Variable Frequency Drive**
- **Preprogrammed wastewater algorithms**



VFDs help Optimize Pumping Station



VFDs help Optimize Pumping Station



- As Total Head changes in the system VFDs can be adjusted to compensate for these changes and still achieve BEP
- “Soft Starting” ramp up and ramp down effects reduce wear on electrical system and piping system, reducing maintenance costs in these areas

Effects of Operation outside BEP

- Cavitation
- Vibration
- Reduced bearing and seal life
- Increased cost of operation
- Increased down time for maintenance and repair



Achieving Energy Savings



Most efficient pumping is only achieved when premium efficiency motors are combined with superior hydraulics and cutting-edge intelligent controls.

With Flygt Experior you can optimize your pump station reliability and save 50% on your energy bill.



Intelligent controls

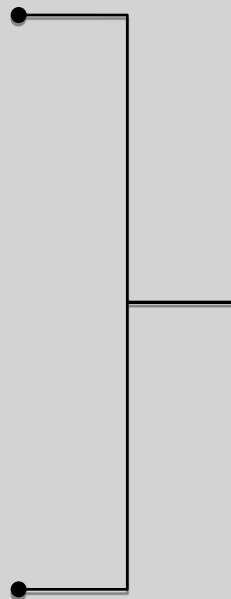
SmartRun™

Motors

Premium Efficiency Motors

Hydraulics

N-technology/Adaptive N



N-technology

- » Clog-free performance
- » 25% energy savings
- » Wide product range



Flygt Exuperior™

N-technology



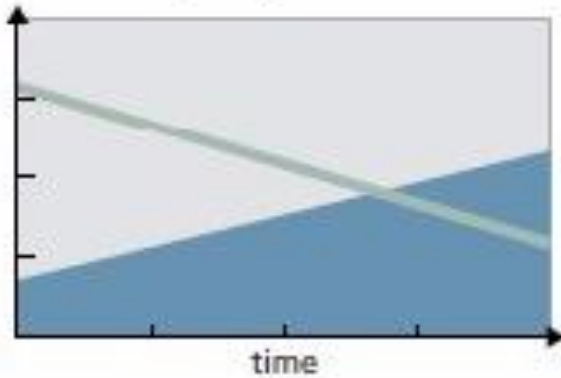
- Well proven technology with 300,000 installations worldwide
- Self-cleaning, clog resistance impeller design
- Sustained high efficiency –reducing energy costs by 25%
- Impeller choices of cast iron, Hard-Iron™ or chopper design
- Minimized unplanned maintenance costs
- Self cleaning functionality operates independent of rotational speed – suitable for VFD

Wastewater Pumping

Energy consumption

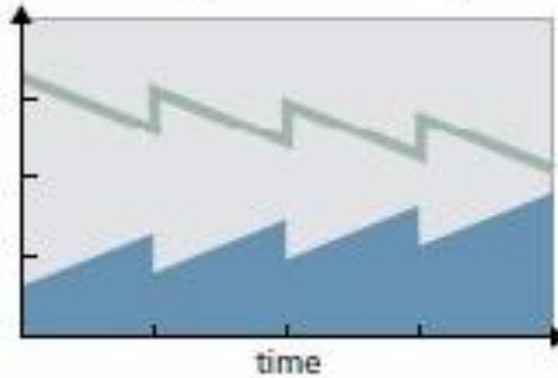
Constant duty

A. Conventional wastewater pump



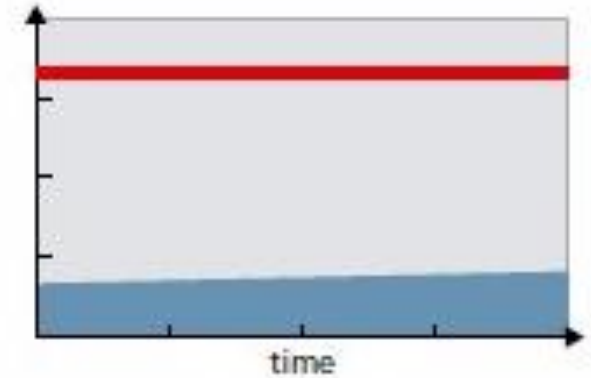
Typical lift station

B. Conventional pump running intermittently



Self-cleaning type

C. Flygt N-pump

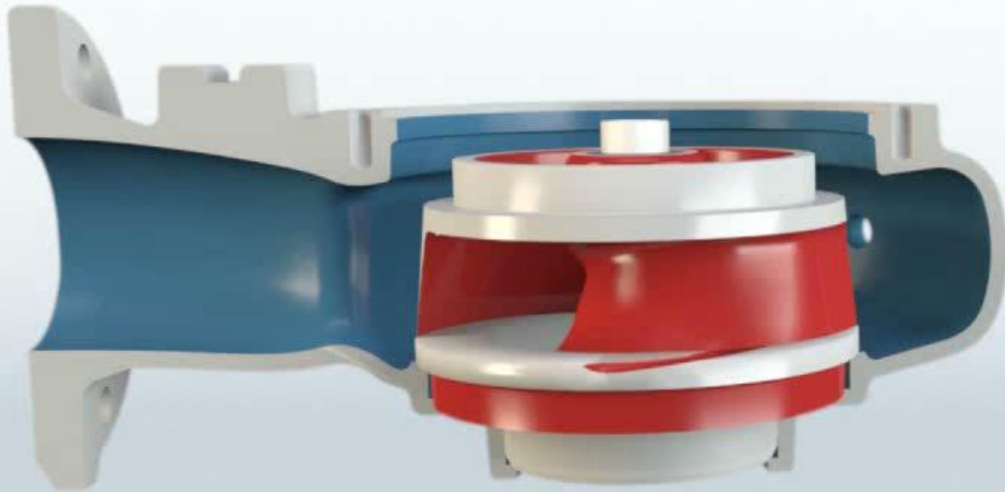


— Hydraulic efficiency

■ Energy consumption

— Sustained high efficiency

Adaptive N: How it works

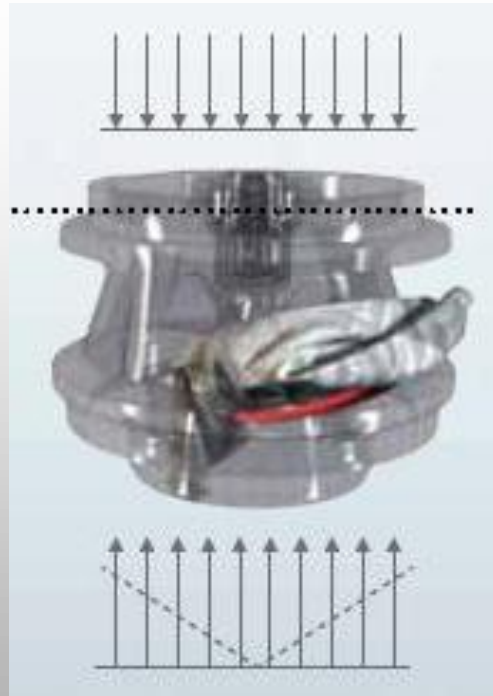


Adaptive N: Force distribution



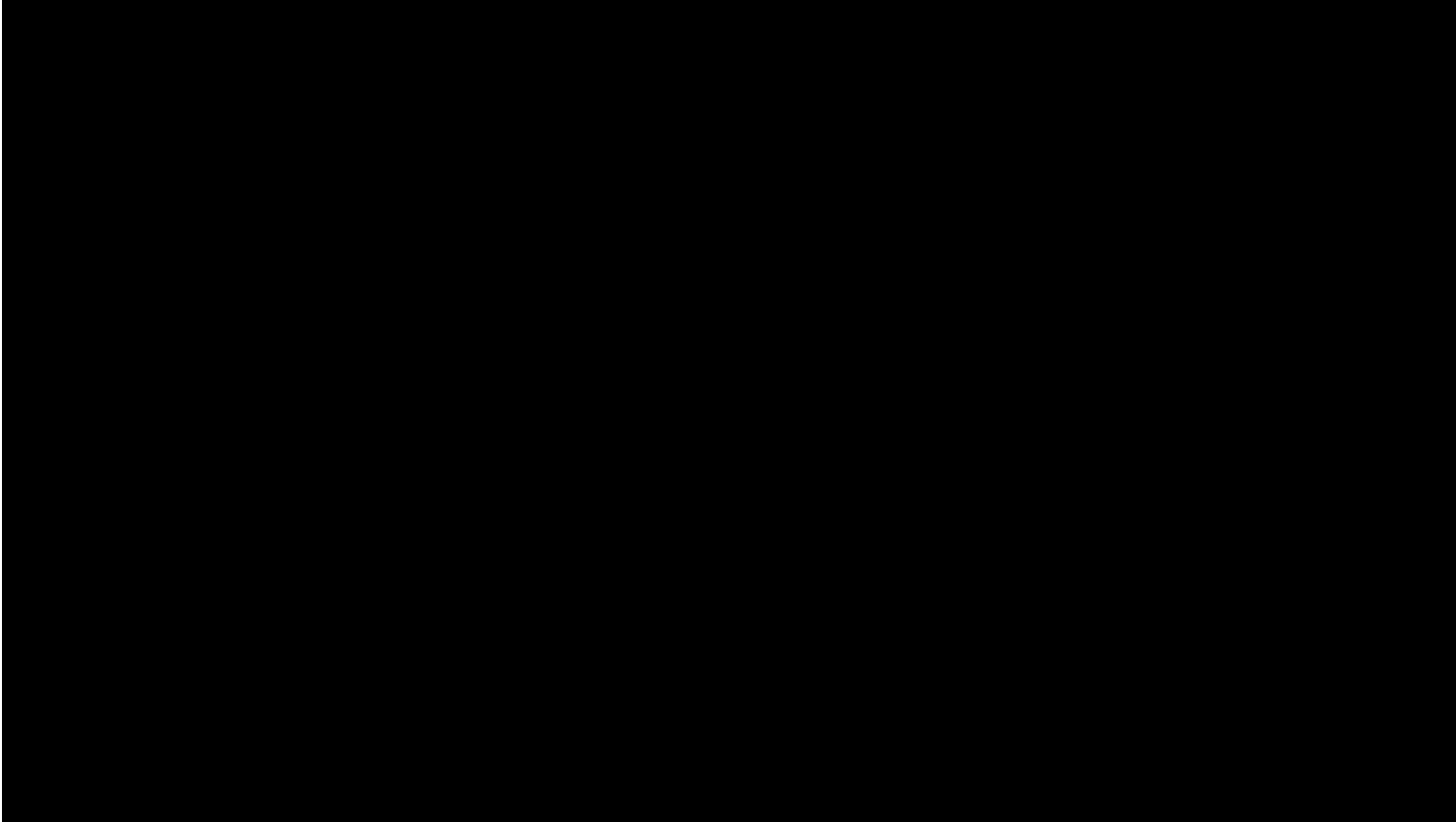
1. Hydraulic force distribution
in normal operation

Adaptive N: Force distribution



2. Force distribution when debris enter the impeller

Proven Performance



Adaptive N

Adaptive N-range N3085, N3102 and N3127



2011 Innovative Technology Award

- Innovative Technology Award from the WEF, Water Environment Federation

Provides Customer Value

- Improved reliability
- Sustained high efficiency
- Reduced number of service call outs

Premium efficiency motors

- » Premium efficiency
- » Maintained efficiency at reduced speed
- » Starts with or without a drive



Flygt Exuperior™

Standards



IEC 60034-30 Standard Premium efficiency (IE3)

- IEC unifies motor testing standards
- Sets global standard of efficiency classes
- IEC 60034-2-1 applies to:
 - 1 and 3 PH, 50 and 60 Hz motors
 - 2, 4 and 6-pole motors
 - Rated power output: 0.75kW to 375 kW
 - Rated voltage up to 1000 V
 - Ambient temperature up to 40° C



NEMA Premium™ efficiency program

- Submersible motors are under the category of “Definite Purpose motors”
- Definite Purpose motors are currently not covered under Premium Efficiency requirements



Typical Methods to Achieve IE3 for Induction (Asynchronous) Motors

- Improve motor copper winding quality
- Utilize thinner motor stator laminates
- Improve motor laminate metal quality
- Use copper rotor bars in lieu of aluminum bars
- Optimize motor geometry
- Higher winding filling factor by increasing copper in the stator
- Use larger motor and de-rate nameplate rating



IE3 Line Start Permanent Magnet (LSPM)



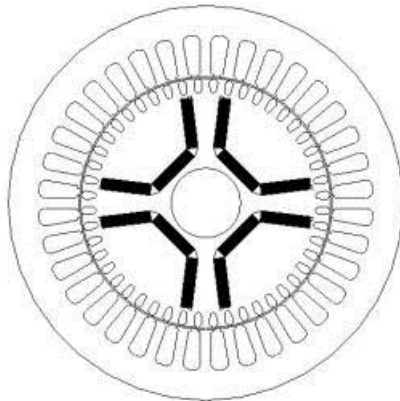
- 4% higher efficiency than the nominal International standard
- Provides lower motor temperature prolonging motor and bearing life time
- High sustained efficiency at lower speeds results in 3% additional energy savings as compared to induction motor
- Requires smaller breakers and smaller cables so when upgrading the pump station, control panel does not need to be modified



Premium Efficiency motors (IE3)

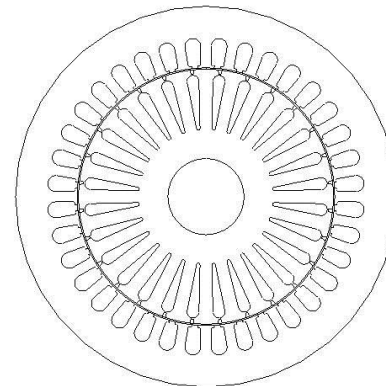
Line started permanent magnet (LSPM) motor

- Permanent magnets create magnetic field
- No magnetizing current is needed from stator
- No rotor losses due to synchronous duty
- All starting methods available (no VFD needed)



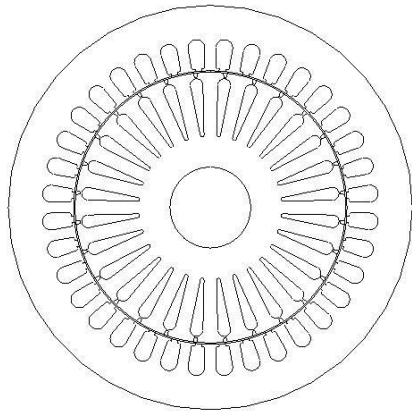
Induction motor

- Induction duty
- Conventional technology
- Asynchronous duty

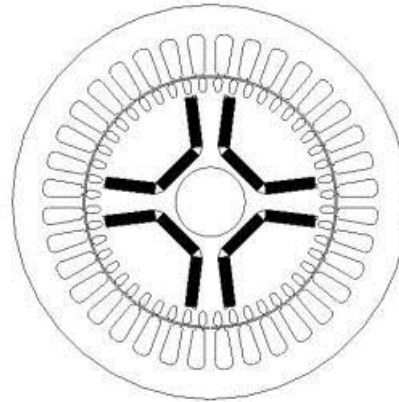


Motor technologies

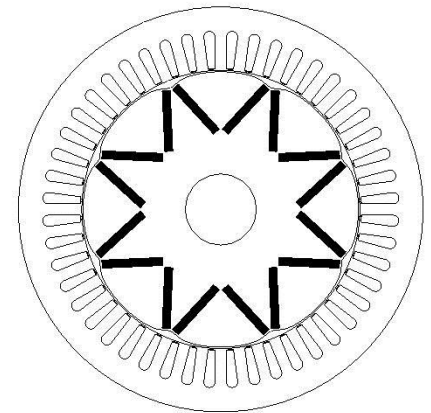
Induction motor
Asynchronous duty



LSPM

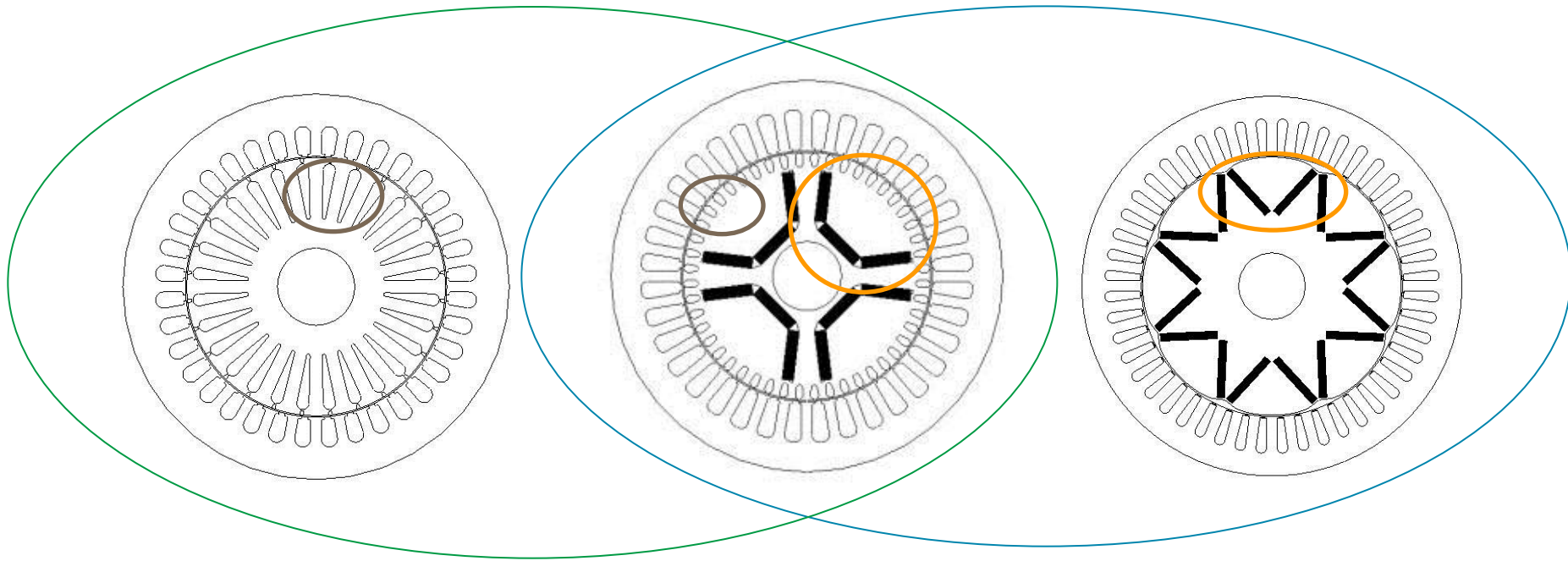


PMSM
Permanent Magnet
Synchronous Motor



LSPM

Works like a permanent magnet motor in steady state
Starts like an asynchronous motor by squirrel cage



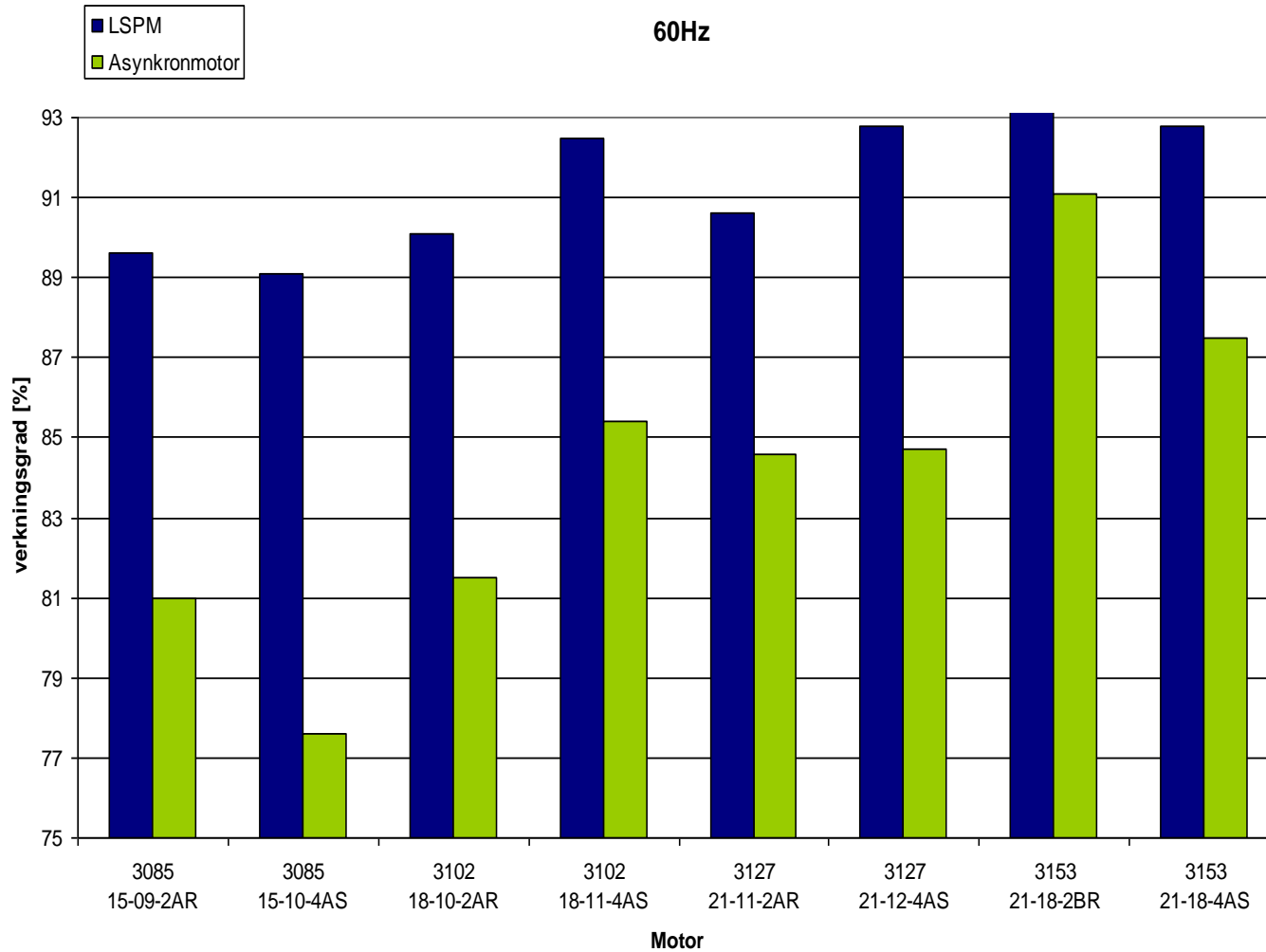
DOL start possible

High efficiency

High power factor

Lower current

LSPM motor efficiency vs Std Induction



Control Consideration

- » Pre-programmed and easy to use
- » 30% reduced energy consumption
- » Sump and pipe cleaning



Flygt Exuperior™

Variable Speed Drives

Current Challenges for Customers

- Costly maintenance is common when variable speed drives are installed.
- Parameters are often complicated to set for wastewater pumping station.
- Results in clogging, low efficiency ratings and ultimately not getting the best out of the pump.



Flygt SmartRun™ - new intelligent control



- Pre-programmed intelligent control for wastewater pumping
- VFD can reduce the energy consumption in a normal pump station by ~30% compared to a conventional on/off control.



Energy and cleaning functions

- Energy minimizer
- Pump cleaning
- Pipe cleaning
- Sump cleaning
- Pump and drive protection
- Soft start and stop
- External fieldbus communication



Energy minimizing function



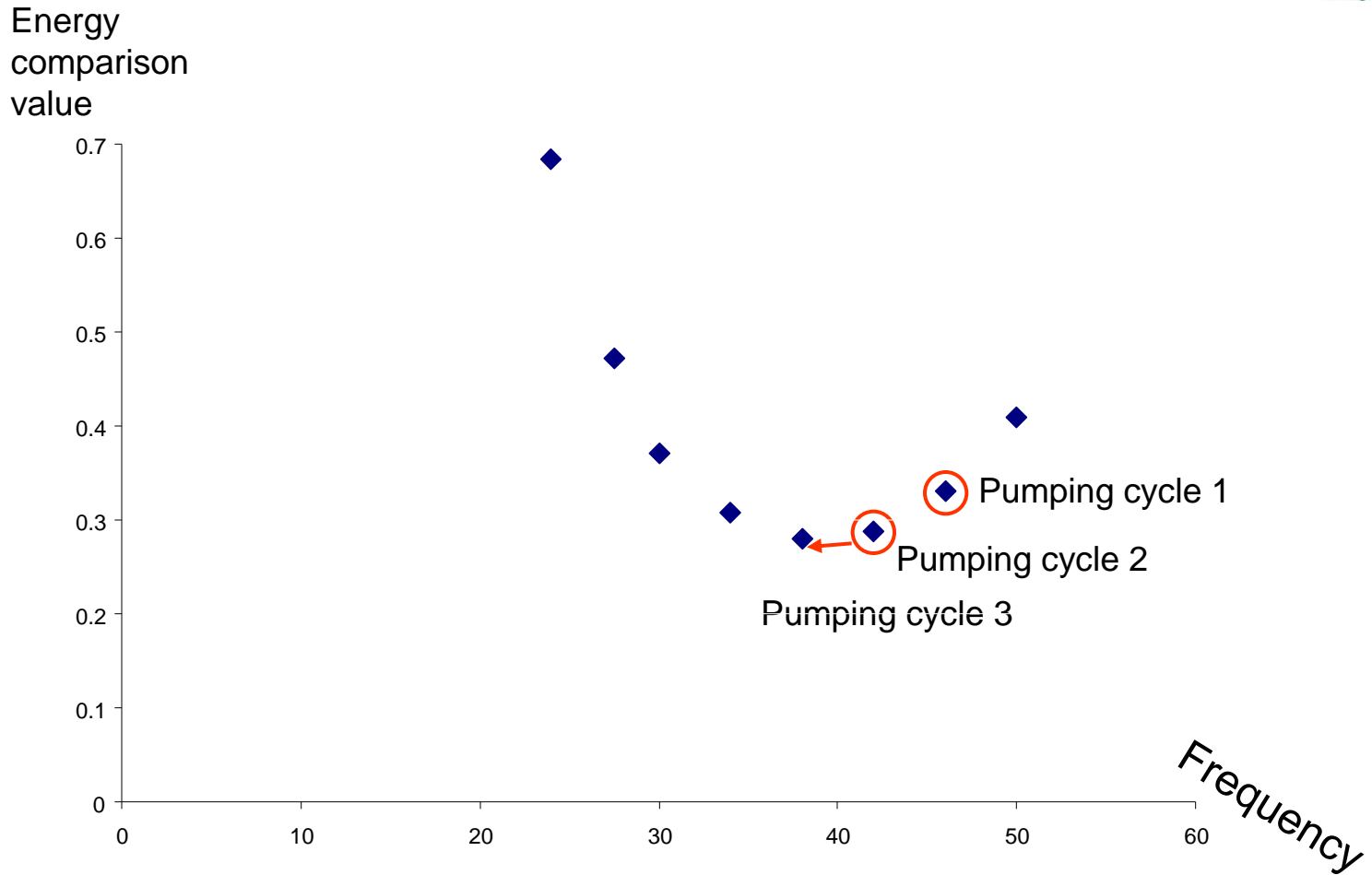
HOW IT WORKS:

Steadily secures speed to optimal energy level without the use of a flow meter or any other external measurement equipment

CUSTOMER VALUE - EFFICIENCY

Cost savings with reduced energy consumption.

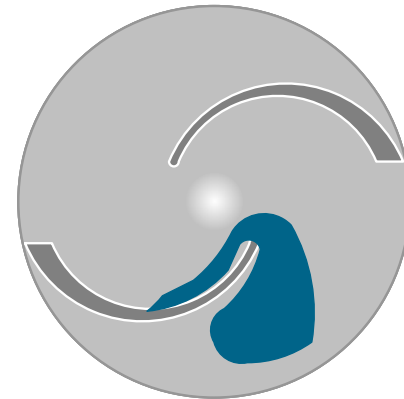
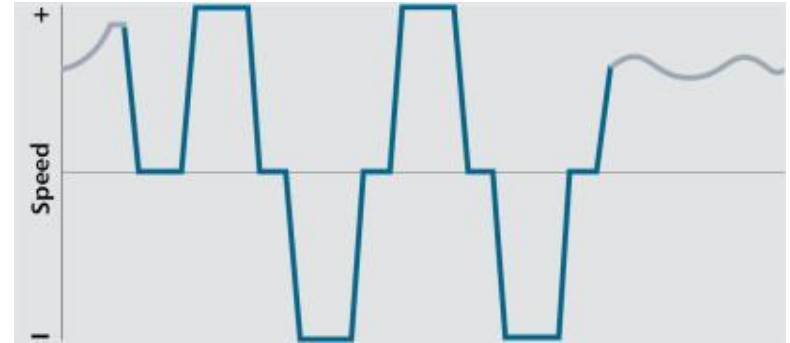
Energy optimization-patent pending



Every pump cycle a new speed is being calculated based on the energy efficiency of the last cycle

Pump cleaning

- Integrated logic monitors the pump for signs of clogging
- Pump automatically stops and runs in reverse rotation to remove blockage
- SmartRun maximizes the starting torque to release clogged material



Pipe cleaning



HOW IT WORKS:
Regular full speed flushing of the pipe system.
Twice a Day for a Duplex
Randomized based on start

**CUSTOMER VALUE -
RELIABILITY**
Less sedimentation in the pipes
and therefore less wear and tear
leading to prolonged service calls
and reduced maintenance costs.

Sump cleaning

Sump cleaning cycles

- Pumps down to snoring level
- Removes floating debris from the sump
- Reduces odor
- Reduces sedimentation
- Reduces clogging



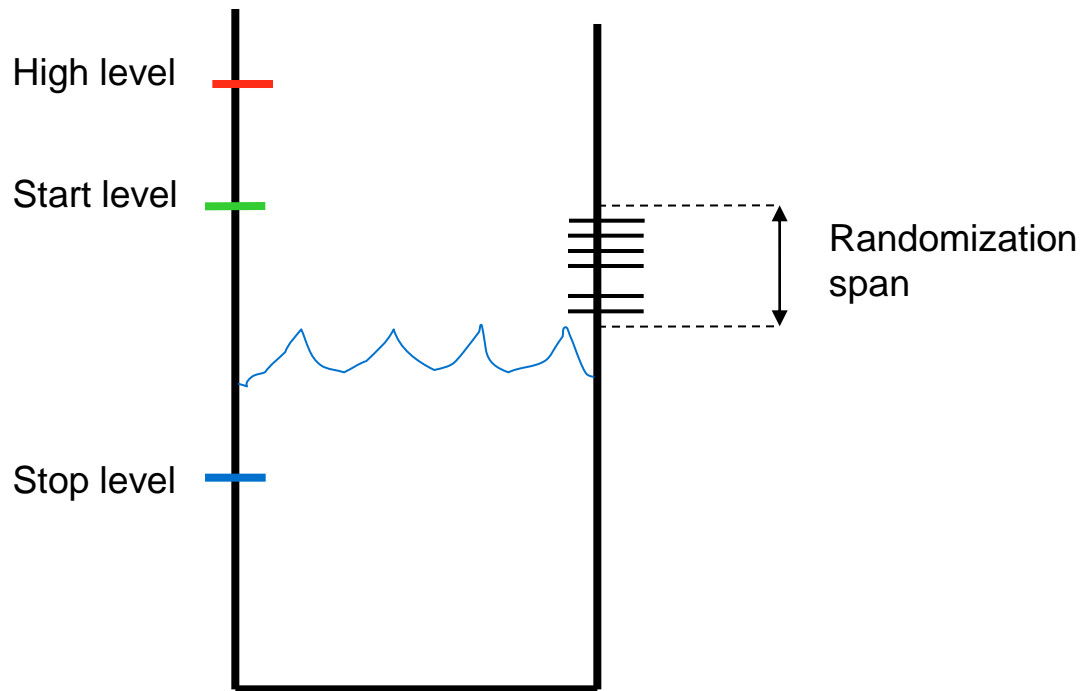
Pump & drive protection

Alarm handling Challenges

- Dry contact available
- Alarm handling without adding extra devices
- Fieldbus communication to higher level systems



Randomization Span



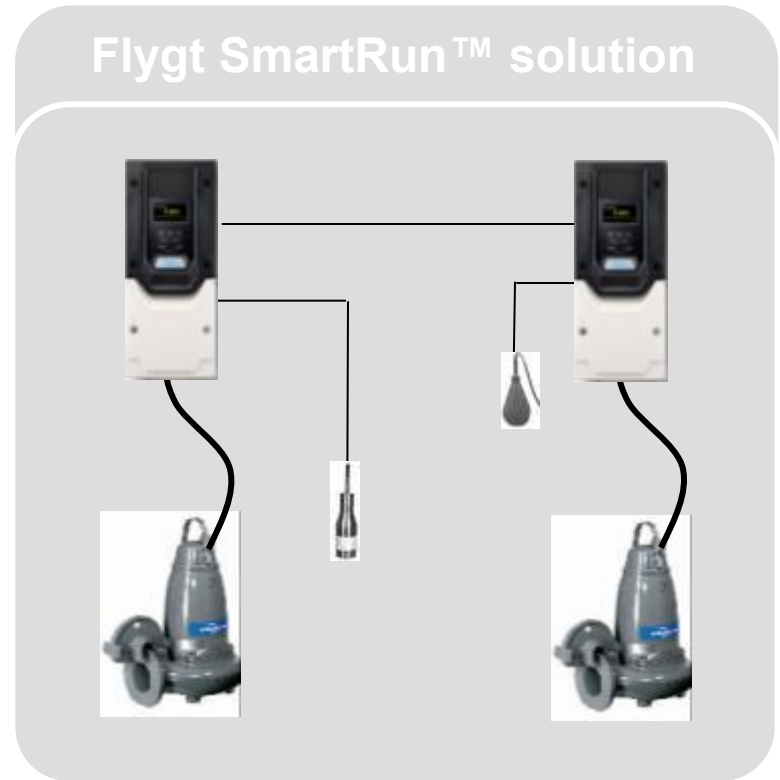
After new start levels
are randomized

Decreases the risk of grease ring build up

The packaged solution

- Two Pumps
- Two VFD Controls pre-programmed for wastewater
- One Float and One Pressure Transducer
- Now available in Triplex configuration

Flygt SmartRun™ solution



Energy savings calculator

Energy savings calculator

Energy Savings Calculator

With Flygt Exporior™ you achieve major savings on your electricity bill. Compare your existing pump system with Flygt Exporior™ and explore your potential energy savings. The comparison is made to an on/off regulated station with two pumps, one duty and one standby.

Enter your existing pump system data

Rated power: hp

Station operating time: Hours/Year

Energy cost: \$/kWh

Static head / total head: %

Pumped media:

Impeller type:

Motor efficiency class:


Total Energy Savings with Flygt Exporior™

N-technology Premium efficiency motor SmartRun™

Calculated savings: **66%**

Energy cost savings: 2670 \$/year

Breakdown of calculated savings



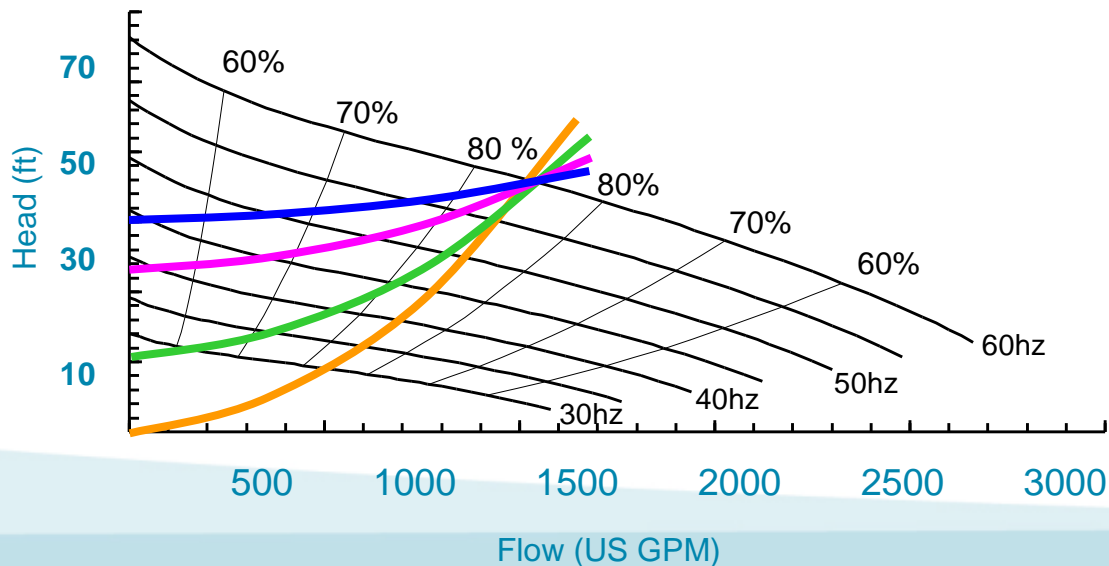
Technology	Percentage
N-technology	60%
Premium efficiency motor	3%
SmartRun™	37%

[Disclaimer](#)

Flygt Exporior™

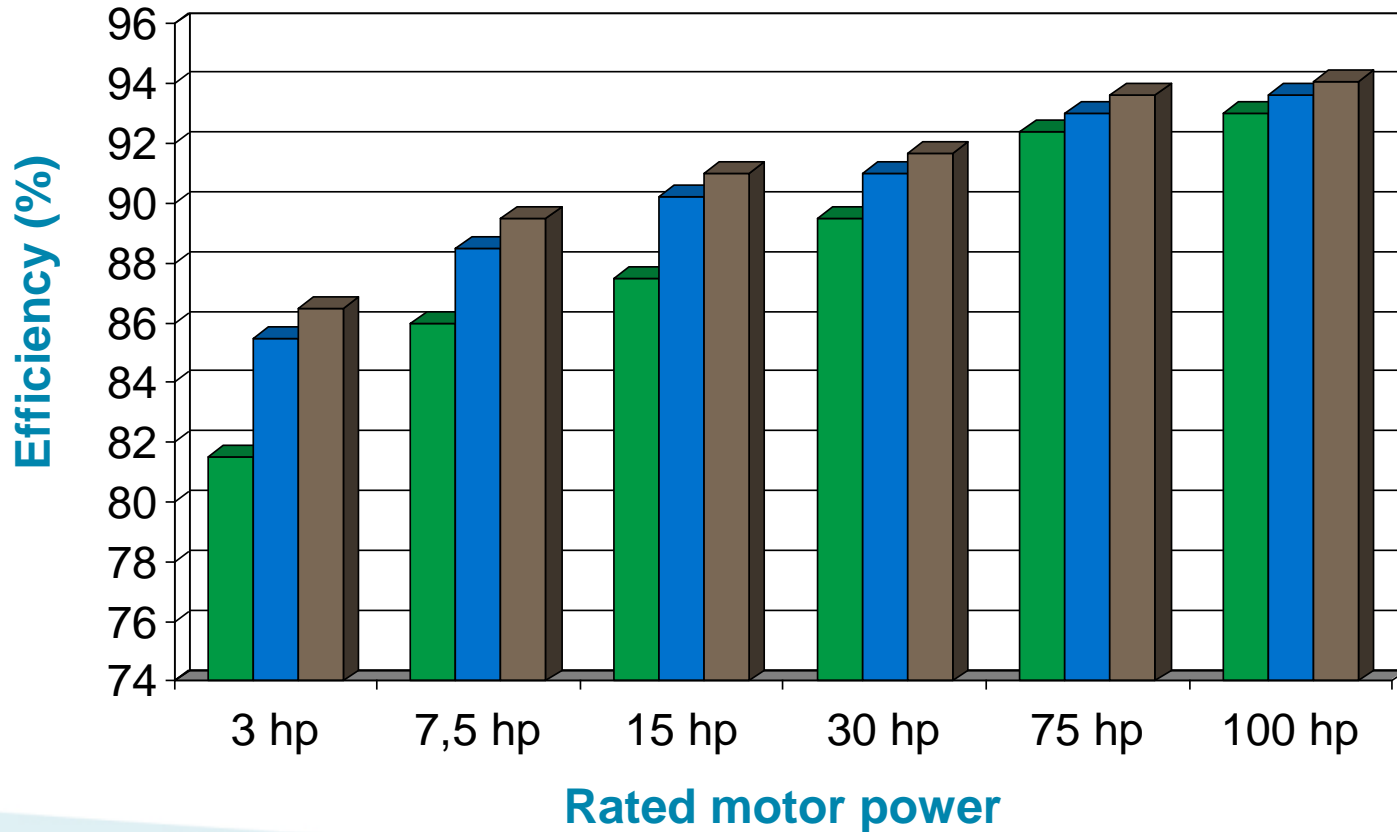
VFD- Energy savings

System curve	Savings
50 ft @ 1400 US GPM static head 40 ft	11%
50 ft @ 1400 US GPM static head 30 ft	30%
50 ft @ 1400 US GPM static head 13 ft	56%
50 ft @ 1400 US GPM static head 0 ft	63%



Motor efficiency

- Standard efficiency
- High efficiency
- Premium efficiency



Standard of the motor efficiency classes IEC 2 pole motors at 60 Hz

Efficiency with different types of pumps



Impeller type:	Vortex	Open single vane	Closed single vane	Closed two vane	Screw	N-technology Back-Swept Vane
Clean water	55%	75%	75%	80%	72%	80%
Fine screened sewage	50%	65%	65%	60%	60%	80%
Unscreened raw sewage	45%	60%	60%	50%	55%	80%

Experior Case Story - Jefferson Parish

Showcasing New Orleans installations

Jefferson Parish plagued by poor soil conditions, rain events and chronic clogging

- 15 mile wide corridor
- 1500 miles of gravity sewer lines
- 200 miles of force main lines
- Over 500 lift stations



Case Story - Jefferson Parish

Experiment:

Four troublesome duplex Lift Stations with competitors' pumps were replaced with (8) N3102 Flygt Adaptive N pumps in April/May of 2012

Three of the stations also had SmartRun™ controls installed



Case Story - Jefferson Parish

Flygt Adaptive N Pumps and SmartRun™ controls installed

One station had clogged competitor's pumps. Flygt pumps installed and emptied the sump immediately



Case Story - Jefferson Parish

Problem:

Chronic clogging due to “modern trash” such as non-woven consumer products is aggravated by inflow and infiltration due to rain events and poor soil conditions that surcharge the system



Case Story - Jefferson Parish

Installations:

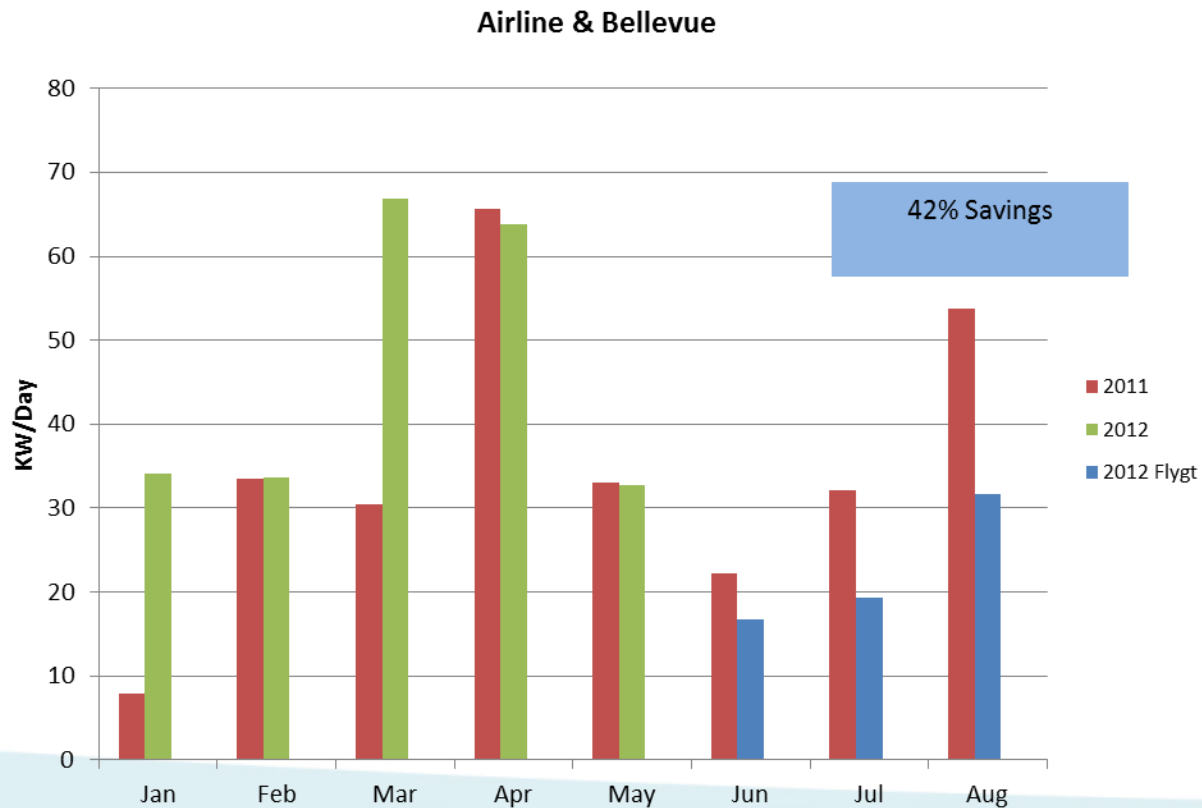
SmartRun variable speed controls adjusted the speed of one installation down from 60 Hz to 38 Hz in just two days



Case Story - Jefferson Parish

Results

Station with only Adaptive N pumps had savings over 40%!



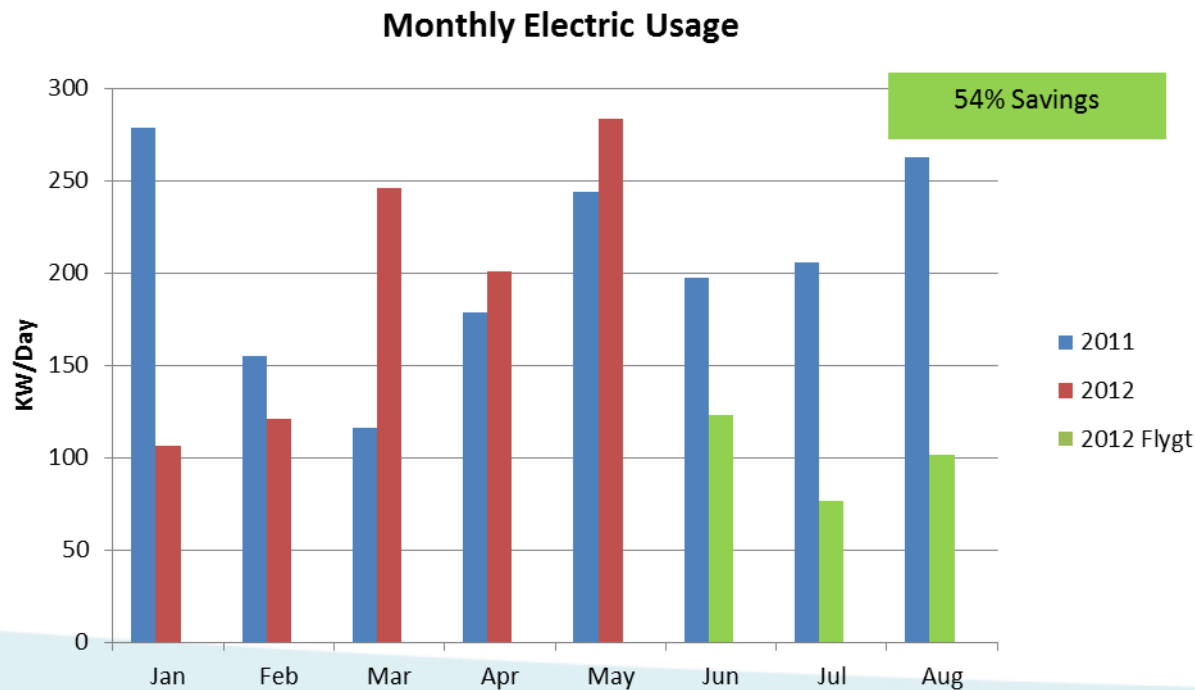
Case Story - Jefferson Parish

Overall Results:

Reliability: Not one clogged pump since the Flygt pumps have been installed

Efficiency: Overall Energy Savings of exceeding 50%

Simplicity: Retrofit installation and start up completed in a day



25% Energy Savings... Guaranteed!



Energy Consumption Reduced, Money Saved.

GUARANTEED SAVINGS OF 25% OR MORE.

Flygt N-Pumps are guaranteed to save 25% or more on energy consumption!

Municipalities across the country are saving energy, money and hassles by replacing their old pumps with Flygt N-Pumps. The self-cleaning Flygt N-Pumps not only make clogging and breakdowns all but obsolete, they increase productivity. And since our N-Pumps are guaranteed to save at least 25% on energy consumption, you might also qualify for government Green Stimulus funds**. In some states, local utilities have received grants providing Flygt N-Pumps for free! Check with your state officials to maximize your benefits and start saving now. Guaranteed!

Call 203-380-4826 or visit flygtus.com



*See back for details.

**As specified by the federal government's American Recovery and Reinvestment Act (ARRA) of 2009.

Guarantee FLYGT BRAND N-PUMPS TERMS AND CONDITIONS

Replace a competitor's non-clog, solids-handling pump with a Flygt N-Pump and you will use a minimum of 25% less energy for pumping. We guarantee it.

This guarantee applies to all retrofit applications (lift stations and treatment plants) with solids-bearing liquids. If you do not see at least 25% in pump energy savings, we will refund the difference between the actual pump energy savings and the expected 25% savings for a 3-year period of operation. This offer is valid for Flygt brand N-Pumps delivered in 2009 and 2010 for retrofit applications only.

Validating Savings In Lift Stations.

After installing all new Flygt brand N-Pumps, record utility energy meter readings before and after a 3-month operational period. To calculate your energy savings, compare these readings to the energy usage at that station for the same 3-month period in a previous year. For an accurate comparison, the energy consumption of base load/ancillary equipment (including non-upgraded pumps) must be quantified. No process changes are permissible during the evaluation period.

Validating Savings In Treatment Plants.

Before installing new Flygt brand N-Pumps, use a recording energy meter to record the energy consumption of the pump(s) you are replacing for a period of one month. After installation, record the energy consumption of the new pump(s) for one month. Comparing the two month-long readings will determine your energy savings. No process changes are permissible during the evaluation period.

How To Submit A Claim.

If your validated energy savings is less than 25%, you can request a refund of the difference between the actual pump energy savings and the expected 25% savings for a 3-year period of operation. To submit a claim, send back-up documentation of the information outlined in the "Validating Savings" section above along with your name, contact information, name of your local Xylem salesperson, project name and address to the "Claims" address below. Also, include the manufacturer, model number, discharge size, rated motor horsepower, design flow and head of both the replaced pump(s) and your new Flygt brand N-Pump(s).

Data collection and presentation is the responsibility of the claimant. All claims must be submitted within 180 days from the installation of the new Flygt brand N-Pump. Any claims submitted after 180 days from the date of installation of the new Flygt brand N-Pump will not be considered.



Flygt is a brand of Xylem, whose 12,000 employees are addressing the most complex issues in the global watermarket.

www.xyleminc.com

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Flygt Experior™ benefits



Adaptive N-hydraulics further improves the **clog-free and energy-saving** pump performance

N-technology is suited for speed regulation, as self-cleaning functionality operates independently of rotational speed

SmartRun™ control is pre-programmed to meet specific wastewater customer requirements

Up to **4% higher motor efficiency** than the nominal premium efficiency motor standard

Single supplier to deliver the optimum pumping solution.
This includes the pump, motor, and intelligent control

Not the Pooh we were expecting





Experior as an Energy Savings Solution for Wastewater Lift Stations

Stop By the Flygt Booth and Trailer

Lisa Riles
NA Marketing and Business Development
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