



Serving the Pacific Northwest

PumpTech Pipeline

Providing Knowledgeable Solutions

Impact of EISA 2007 on Pumps & Pumping Systems

The Energy Independence and Security Act (EISA) passed by Congress in 2007 expands upon the Energy Policy Act (EPACT) that dates back to 1992. EPACT took effect in October of 1997 and mandated that most general purpose AC motors from 1 to 200 HP meet the efficiency levels stated by NEMA MG1, Table 12-11. In the industry these motors were defined as "Energy Efficient" or "EPACT Efficient". The more costly "Premium Efficiency" motors of the era exceeded the EPACT requirements. EISA requires that all motors

manufactured after 12/19/10 meet the efficiencies outlined in NEMA MG1, Table 12-12.

What this means is that all motors that were subject to EPACT must now meet premium efficiency standards. But it does not stop there. Many motors that were not subject to EPACT requirements will now be forced to meet the more stringent EISA standards. These include 201 to 500 HP models, close coupled pump motors (JM & JP), C-face & D-flange

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Canby Facility—Manufacturing & Service

It is hard to imagine the impact of an additional 7,500 square feet of production and service space until you have had the chance to experience it!



PumpTech's old facility in Portland had just 2,500 square feet of shop space and could be overwhelmed when just four or five projects were in production. When a tractor trailer truck pulled in for a delivery or pick up, production often came to a halt.



Some skids had to be assembled in the parking lot and seven day work weeks were often necessary to make room for new projects.



Now we have our new Canby facility with 10,000 square feet dedicated to production and service. We no longer

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Scappoose Filter Lift Station

By: Gary Carter, PumpTech Canby



In December of 2010 PumpTech provided a packaged pump station not quite like anything we have built in the past. We love a challenge! The City of Scappoose in Northwestern Oregon had an upgrade for their wastewater treatment plant. The consulting engineers, Kennedy Jenks, required a pump station that would maintain a continuous, variable flow from their existing clarifiers and maintain a level control range of one foot when pumping to a new filter station.



Furthermore, due to geological restraints the only available site was a narrow space between an existing road and previously installed process equipment. PumpTech proposed a version of our model 421 used for submersible pumps and buried below grade. The wetwell and integral valve vault are made from fiberglass and include an aluminum lid with access hatches. Because the station was only partially buried we included handrails around the top



perimeter for operator safety and a jib crane for equipment removal inside the station. The package was completely assembled in our Canby facility and delivered to the jobsite in one piece. The contractor, Pease and Sons, provided an excellent installation.

The station had to meet all required local seismic and wind shear requirements as well as hydraulic loading on the buried part of the package. In addition it needed ultraviolet protection for the fiberglass exposed above grade. Three ABS submersible pumps are controlled by variable frequency drives



that receive input from an ultrasonic level monitor located inside the wetwell. Each pump is capable of delivering from 400 GPM to 1300 GPM at a head range of 3.5' to 7'. The control panel relies on a PLC to interface with the drives and allows for pump alternation as well as the level control with easy operator surveillance of overall system operation.



You can contact Gary at gcarter@pumptechnw.com

Grundfos DME Dosing Pumps Offer Greater Range of Flow & Viscosity

The Grundfos DME series of diaphragm metering pumps offer several advantages that are not available with solenoid pumps. Unlike the solenoid pump the DME pump utilizes a stepper motor that keeps stroke length constant while varying the time required for the stroke. This provides for a more consistent flow regardless of the flow rate. Once calibrated, the DME allows a turn down ratio of 1000 to 1 while maintaining flow accuracy.



Solenoid pumps require changes in both stroke length and stroke cycle time and must be recalibrated for each change in flow. As a result, the turn down ratio is typically limited to 100 to 1.

The DME pumping process also increases its flexibility over that of the traditional solenoid pump. For example, the constant stroke length provides for an extremely wide range of flows and viscosities.

CESCO SOLUTIONS is located in Bellevue, WA and services the petrochemical, food processing, pulp & paper, transportation and water treatment industries throughout the US. Their mission is to provide innovative chemical solutions to their customers.

The metering skid shown here was built for CESCO to meter defoamers of varying viscosities at various

flow rates. Paul Aegerter, VP Sales and Marketing, says the DME pump is a far better solution than the traditional solenoid pump. A much greater flow range and the ability to handle viscosities up to 1200 cps allows a single DME pump to meet the same conditions that may require two or more solenoid



pumps. **METERMAN** packaged metering systems offer a turnkey approach to your dosing applications. All are UL-QCZJ listed and thoroughly tested prior to shipment.

If you would like to learn more about CESCO SOLUTIONS visit: www.cescosolutions.com

Product Spotlight—Opti-Float

Did you know that there is finally a non-mechanical float switch that contains no mercury or lead? How about one that is automatically intrinsically safe? If you did not, meet the **Opti-Float®**.

The design of the **Opti-Float** level detector is amazingly simple. Using fiber optic cable, it transmits a beam of light from an LED in a panel mounted transceiver down to the float, where the beam makes and breaks depending on the tilt of the float. When the transceiver detects the presence or absence of light, it activates a relay in the transceiver, which can then operate other devices. A completely assembled retro kit provides for easy integration into existing panels.

The plastic fiber optic cable, created specifically for the **Opti-Float** level detector, requires no special tools for connection. And while it looks similar to other float cables, there is one huge exception: No electrical wires and inherently safe! So now, for the first time, floats can be used directly without special equipment

in hazardous locations. The light eclipser located in the float is mounted in a liquid “shock absorber” that totally eliminates chattering.

The **Opti-Float** is available in standard 30 and 60 foot lengths and custom lengths up to 100 feet. It is pressure tested to 300' of water. The **Opti-Float** comes with a standard three year warranty and has a minimum expected life of 1,000,000 operations. Its cost is the same or less than standard intrinsically safe floats. For more information or a demonstration, contact your nearest PumpTech branch or go to:



<http://www.coxresearch.com>

EISA Impact (continued)

footless designs, U-frame & Design C motors and eight pole (900 RPM) motors. Additionally Vertical Solid Shaft, normal thrust motors must also conform.

Some models will remain unaffected by EISA. These include submersible motors, single phase, DC, Design D, intermittent duty, integral gear or brake motors, fractional HP 48 & 56 frames and inverter duty motors that cannot be started across the line.

EISA does not apply to lower efficiency motors manufactured prior to 12/20/10 and these may be sold in the US until inventories are depleted. It also does not apply to the repair or rewinding of older motors that are currently in service. They are not required to be replaced with EISA compliant motors. Finally, EISA does not apply to exports and any minimum efficiency will be determined by the importer.

Testing procedures for full load nominal efficiency are

the same used for EPACT ratings and, like EPACT, EISA requires that efficiency be included on the motor nameplate. A revised standard for 841 severe duty, premium efficiency motors (petroleum & chemical industries) raised the efficiency level to comply with Table 12-12.

So, when should you consider upgrading an existing motor to an EISA design? Download the "Wire to Water Energy Calculator" from the "[Resources](#)" page of PumpTech's web site. It will perform a simple payback analysis based upon your operational conditions, electrical costs and replacement motor cost.

Thanks to John Malinowski, senior product manager for AC motors at Baldor Electric Company, for much of the information contained in this article. John is a senior member of IEEE and is chairman of the NEMA MG1 section.

Maintenance Tips

PREMATURE MECHANICAL SEAL FAILURE

By: Ed Smith, PumpTech Moses Lake

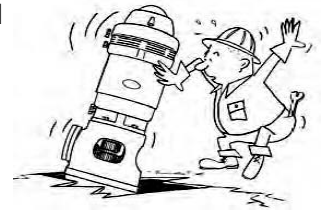
Are you experiencing premature mechanical seal failures but do not see any telltale signs? Static misalignment, abrasives and poor lubrication are three typical causes of premature seal failure but, there is a fourth that is often overlooked. Excess shaft deflection will also increase seal wear and failures.

Mechanical seal faces are designed to rotate about one another in a true circular fashion. If there is excess shaft deflection during rotation, that circular motion changes to an "orbital" motion. Increased shaft deflection can be caused by impeller imbalance or excessive radial thrust.

Impeller imbalance can be due to mechanical imbalance or vane blockage due to solids. Vane blockage is often more severe because it consists of both mass (solids) and hydraulic (flow) imbalance which can result in a large increase in shaft deflection. Mechanical imbalance is typically due to metal erosion caused by abrasives, chemicals and cavitation and will also increase shaft deflection.

Impellers should be checked for proper balance and rebalanced if needed.

Multivane impellers are usually dynamically balanced but single vane impellers may require a certain amount of unbalance in air in order to achieve hydraulic balance in water. Check with the manufacturer for the proper balancing procedure.



Unbalanced radial thrust occurs when pumps are operated to the left of the performance curve and is directly proportional to the operational head, impeller diameter and vane width including the shrouds. Unbalanced radial thrust can cause an extremely large increase in shaft deflection and in a "worst case" situation can even lead to shaft breakage. Higher head wastewater pumps are especially prone to increased shaft deflection due to the impeller width necessary to accommodate large solids. Visit the "[Resources](#)" page of the PumpTech web site and download our Radial Thrust Calculator (Excel). It will help you determine if unbalanced radial thrust is contributing to premature seal wear.

<http://www.PumpTechnw.com>

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Pump Ed 101– Suction Specific Speed & Suction Energy Calculators

By: Joe Evans, Ph.D PumpTech Canby

Impellers can be designed for a lower NPSHr by increasing the eye diameter. NPSHr decreases as the ratio of impeller eye diameter to peripheral diameter increases but, an unexpected byproduct can be a reduction in a pump's stable window of operation. Flows to the left and right of BEP in large eye impellers can result in a partial reversal of flow towards the suction pipe. The vortices that are created during this reversal can lead to the onset of suction recirculation cavitation.

Igor Karassik developed the equation for Suction Specific Speed (S) during his tenure at Worthington Pump. Its purpose was to evaluate the aggressiveness of an impeller's eye design and provide some measure of its range of cavitation free operation. It uses the same values as Specific Speed except that H is replaced by NPSHr. Lower values of S indicate a wider range of operation while higher values predict a narrower range. The example below is a wastewater pump with an 18.5", two vane impeller. The chart below the calculator shows the window of operation at various values of S. This

particular impeller could begin suction cavitation as flow reduction approaches 80% of BEP flow or exceeds 105% of BEP flow.

The Suction Energy (SE) equation shown in the calculator below was developed by A.R. Budris and is another indicator of potential suction recirculation. SE is a measure of a liquid's momentum at the impeller eye and is a function of mass and velocity. Pumps with high SE will experience vibration and minor cavitation damage when operated in the suction recirculation flow range. Pumps with very high SE will experience major cavitation when operated in the same range. Both calculators predict problems with off BEP operation of the pump used in the examples.

For more information on this topic read my Feb 2010 Pumps & Systems magazine article. The article and the Excel spreadsheet below can be downloaded from the "[Resources](#)" page at the PumpTech website or my educational site PumpEd101.

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Suction Specific Speed (S or Nss)

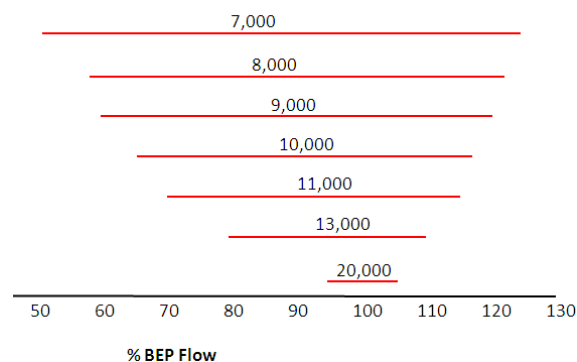
$$S = N \sqrt{Q} / \text{NPSHr}^{0.75}$$

Enter the required data in the highlighted cells

Pump RPM (N)	1185
BEP Flow (Q)	5000
NPSHr @ BEP	10

$$S = 14,901$$

Values of S greater than 9,000 may require a greater NPSH margin.
 Refer to the chart below for acceptable operating ranges.



Suction Energy (SE)

$$SE = D_e \times N \times S \times SG$$

Enter the required data in the highlighted cells

Impeller Eye Diameter " (De)	10
Pump RPM (N)	1185
Suction Specific Speed (Nss)	14901
Specific Gravity (SG)	1

$$SE = 176,576,850$$

Pump Type	High Suction Energy	Very High Suction Energy
2- Vane Sewage	100,000,000	150,000,000
End Suction	160,000,000	240,000,000
Double Suction	120,000,000	180,000,000
Vertical Turbine	200,000,000	300,000,000

Instructions:

If the impeller eye diameter is not known it can be approximated as follows:
 End Suction Pump - Suction nozzle diameter x 0.90
 Horizontal Split Case Pump - Suction nozzle x 0.75

The example used in both calculators is a dry pit non-clog with a 12" suction and a two vane, 18.5" impeller. BEP flow is 5000gpm @ 105' and requires a NPSH of 10 feet.

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Canby Facility — Production & Service (continued)

have to deal with a cramped work space and shipping and delivery interruptions. The pictures on page 1 show the shipping and delivery side of the building and one of the service and repair areas. PumpTech is the authorized warranty and repair center for all of the manufacturers we represent.

The Canby facility manufactures a wide range of HYDRONIX and METERMAN products. All of these packaged systems are UL-QCZJ listed and electrical controls are listed as either UL508 or UL698A. The pictures on this page show just some of the products that are manufactured in Canby.



Hydronix 180 and 421 Series Lift Stations



MeterMan Skids Ready for Shipment



Food Processing Skids

PumpTech's Canby service and manufacturing staff have many years of experience in the various disciplines needed to build our packaged systems. All TIG and ARC welding is done in house as well as most of the metal cutting. All piping and fittings are installed and tested prior to shipping. A full time controls technician assembles and tests all UL listed controls.

Some functions are contracted out to local companies who specialized in specific products. For example, our proprietary fiberglass wet wells and valve vaults are manufactured by Miles Fiberglass to our specifications. They are then transported to Canby for piping, valve and cover installation. Also Blazer Industries manufactures our pump houses and delivers smaller ones to Canby for pump, piping and electrical installation. For large pump houses that are built in more than one section, PumpTech sends our technicians to the Blazer facility for installation and testing prior to shipping.



Packaged Pump House Exterior & Interior



Wet Wells & PD Pump Skid

PumpTech PumpChat

From the President's Desk

Winter 2011 – A new year!

Even though we are in the middle of winter there are the inevitable signs of spring just around the corner -- a small amount of additional daylight in the afternoon, daffodil bulbs pushing up through the ground (and in some cases snow) and of course the bidding activity on municipal projects and the startup of fall and winter projects in preparation for the summer pumping season.

This winter issue of the PumpTech Pipeline highlights our manufacturing of packaged pump stations. During this winter PumpTech has been active in manufacturing and delivering several of our fiberglass packaged pump stations and one - for the city of Scappoose, Oregon - is highlighted in this issue on page 2. The article shows the close working relationship PumpTech fosters with consulting engineers to find innovative solutions to complex pumping station issues. With our experienced and knowledgeable sales consultants combined with our in house engineers and fabrication expertise, PumpTech is able to offer solutions for the most complex scenario. Presently staff is working on designs for several retrofits of existing lift stations using a technique that is similar to slip lining of pipe. This retrofitting is a very cost effective and efficient manner to gain the benefits of a new station without the cost of demolition or deep excavation and our staff would be glad to discuss this option with you.

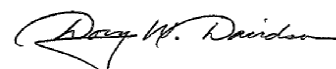
Our Canby, Oregon facility proved its worth this fall and winter with its additional 7500 square feet of shop space. With the size of the projects getting larger and larger and more of them at a time the additional space was invaluable in providing a safer more productive environment for the technicians fabricating

and assembling them. You can see photos of some of the projects and products on page 6, ranging from the above grade self priming 180 series stations to our Fiberglass 421 series underground submersible stations as well as metering pump skids, Cornell Food processing pump skids and a complete packaged pump house.

This New Year brings about new regulations on motor efficiencies to reduce the USA's energy demand (see the front page). Fortunately for us in the Northwest most of the engineers and owners have taken a proactive approach to this and have already been specifying and we have been providing premium efficient motors over the last 10 years. What we will see with the new Federal regulation is a greater inventory of the more efficient motors which should reduce the lead times in the months ahead.

This newsletter contains technical education from our learned staff. Joe Evans discusses suction specific speed and its relevance to a pumps performance and application while Ed Smith focuses on mechanical seal fundamentals. Additionally there is a product focus on the Grundfos DME digital dosing pumps by Scott Bush.

Our spring newsletter will highlight PumpTech's service, repair and installation capabilities ranging from our preventative maintenance services which include laser alignment and vibration analysis to deep well turbine pump repairs and installation, as well as our pump station retrofits and upgrades. Even though our winter here in the NW has been mild compared to the rest of the country, one cannot help but look forward to spring.



Doug Davidson ddavidson@pumptechnw.com

HYDRONIX Model PPP (AKA - P³)

Our newest addition to the HYDRONIX family of engineered products is the P³ or PumpTech Portable Pumper. This unit was built specifically for the North Bend, Fire Training Center wastewater treatment plant which is operated by the Washington State Patrol. It will be used as an emergency standby pump to transfer liquids among any of the tanks and wet wells in the plant. It will also serve as a backup effluent pump.

The pump is a solids handling, self primer mounted on a stainless steel carriage. Quick disconnect fittings allow easy attachment of the suction and discharge hoses. The single phase motor power cord plugs directly into a generator or other available power source. It is a simple machine that was built to meet the needs of the customer. For more information on this pump contact Jim Joyce at jjoyce@pumptechnw.com



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PumpTech Pipeline

A Publication of



Upcoming PumpTech Participating Events

- 2/8-10 Evergreen Rural Water of WA, Yakima
- 3/14-16 AWWA Short School, Eugene
- 3/22-24 WES School, Clackamas CC
- 3/28-30 PNCWA, Pendleton
- 4/4-5 Evergreen Rural Water of WA, Bremerton
- 4/6-7 Evergreen Rural Water of WA, Longview
- 4/28-29 WASWD Spring Conference, Kennewick
- 5/4-6 PNWS AWWA, Boise
- 5/10-12 MSAWWA, Seeley Lake, MT
- 5/15-18 NIOS, Post Falls, ID

