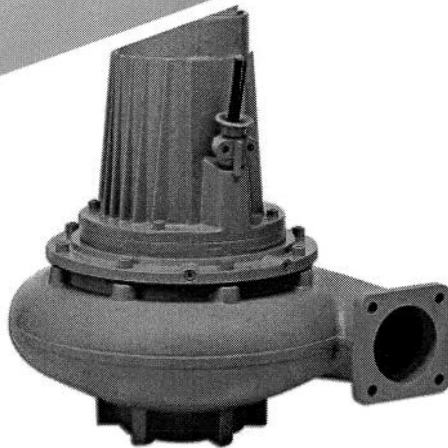


Pumps

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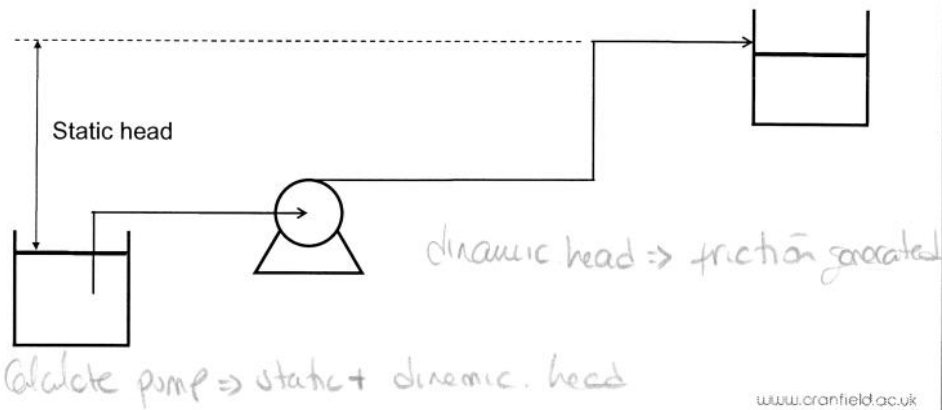


<http://www.cranfield.ac.uk>

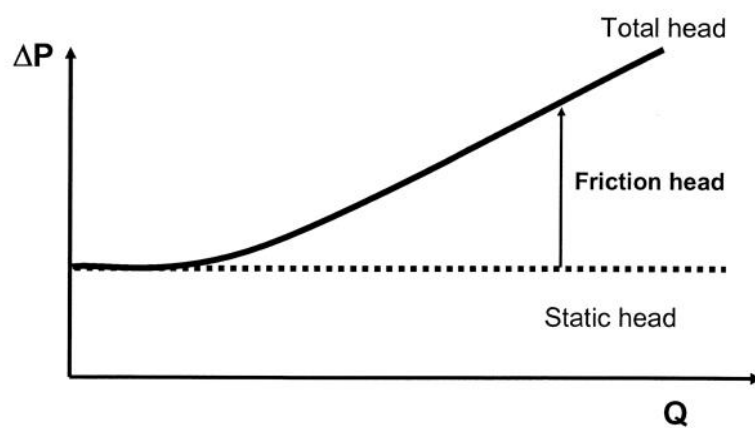
Moving fluid

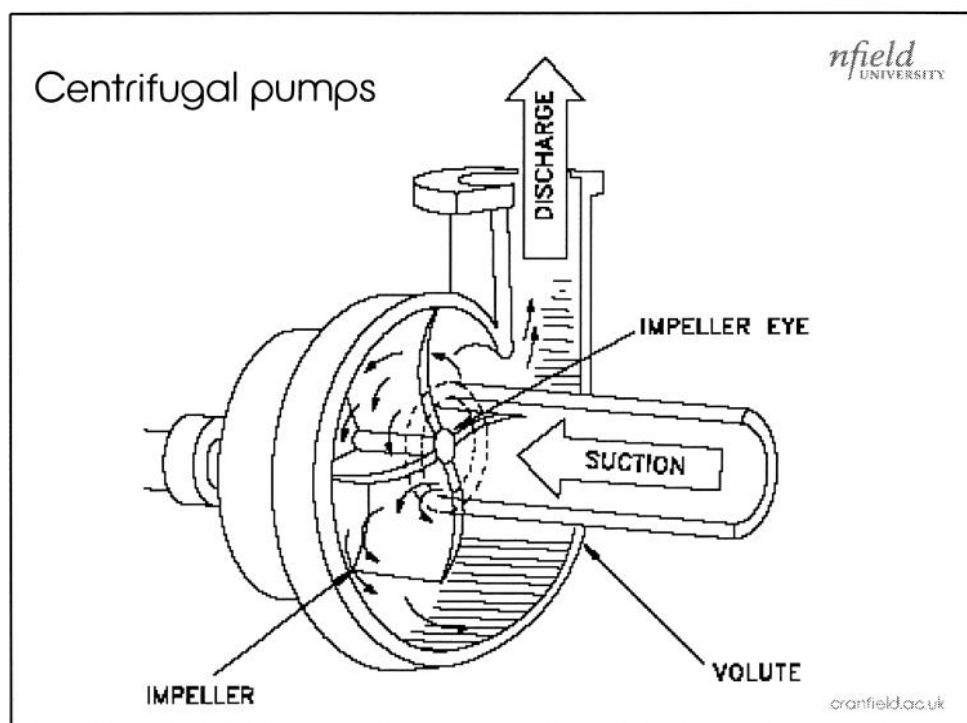
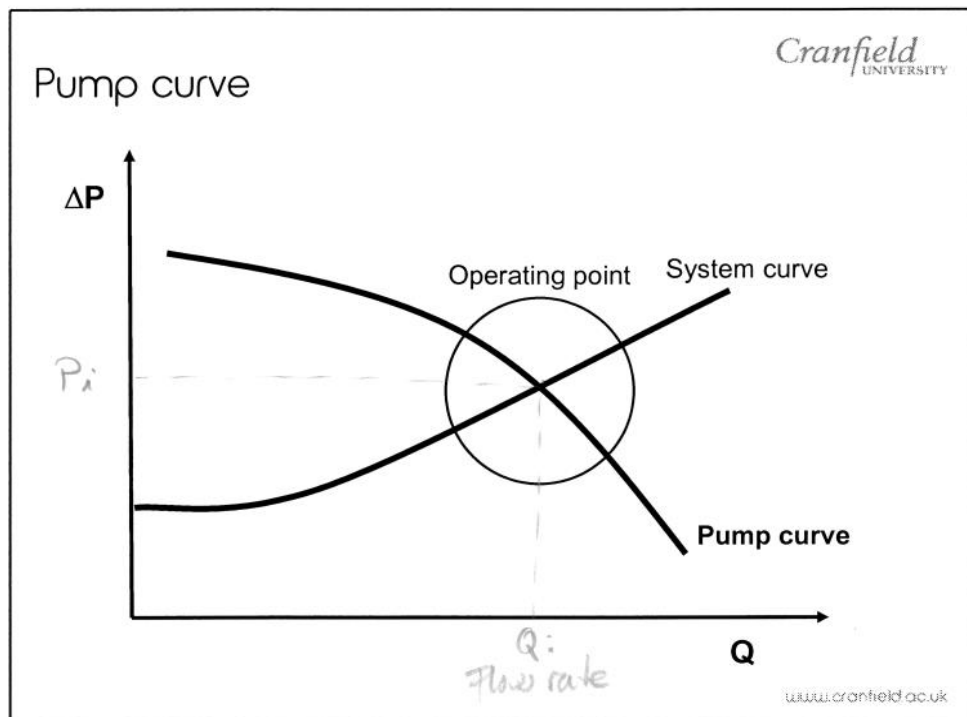


Pump Basics

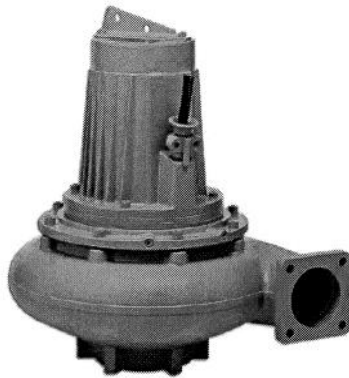


System curve

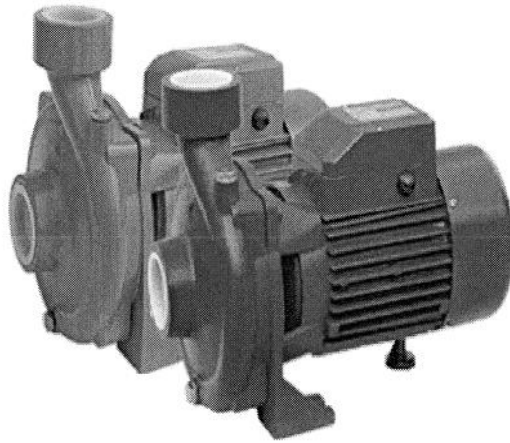




Centrifugal pumps



Submersible

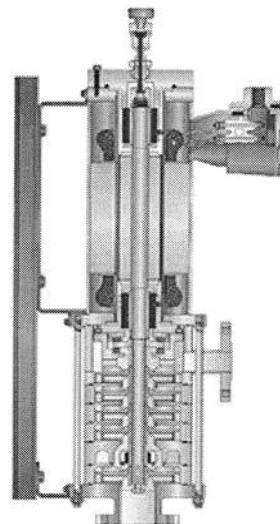
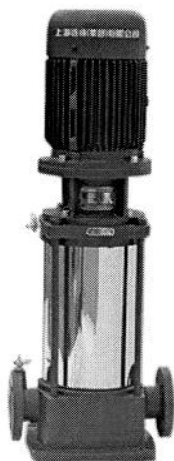


Surface mounted

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Multistage pumps

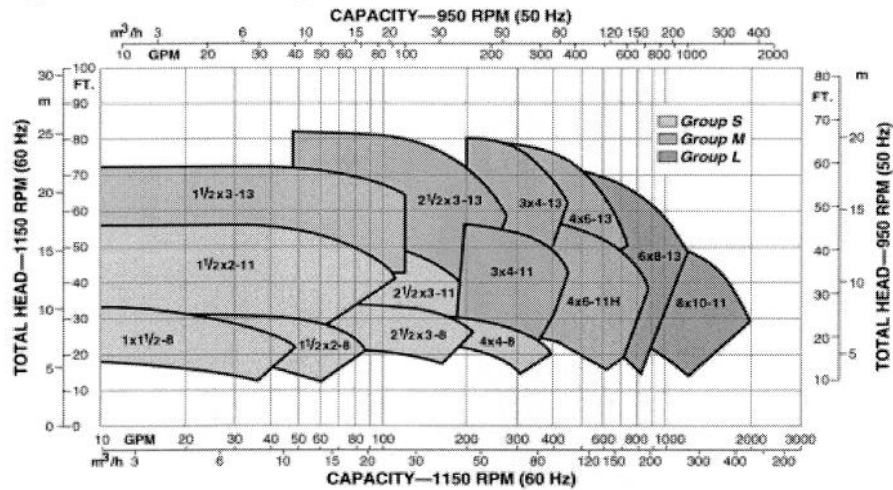
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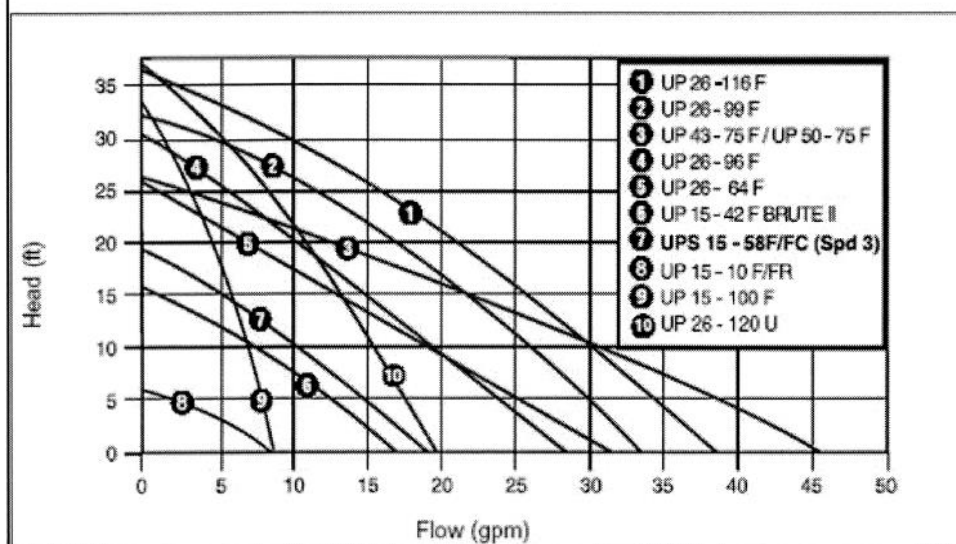
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Selection curves

Hydraulic Coverage 1150/950 RPM



Selection curves

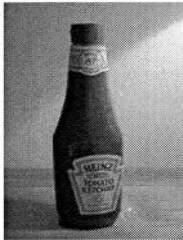


Centrifugal pumps: key facts

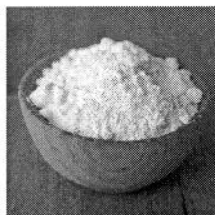
- Most common pumps
- Surface or submersible
- Very little pulsation
- Wide flow range
- Easy, simple, cheap pump



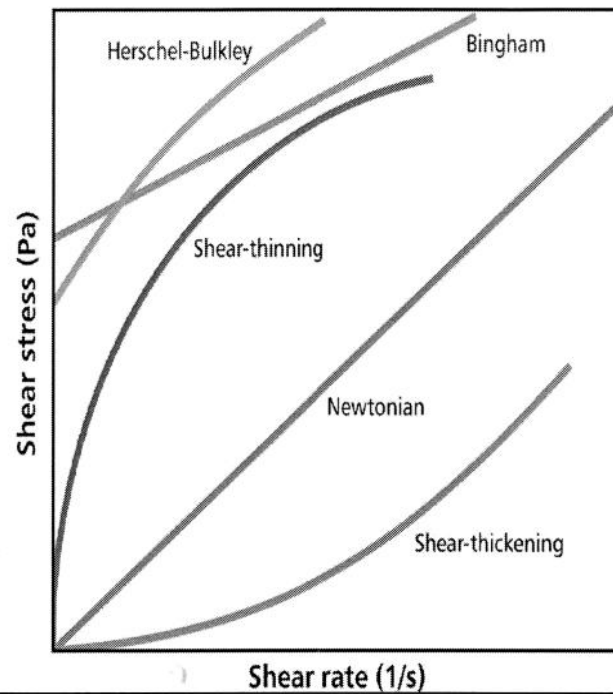
Viscosity



pseudoplastic



dilatant

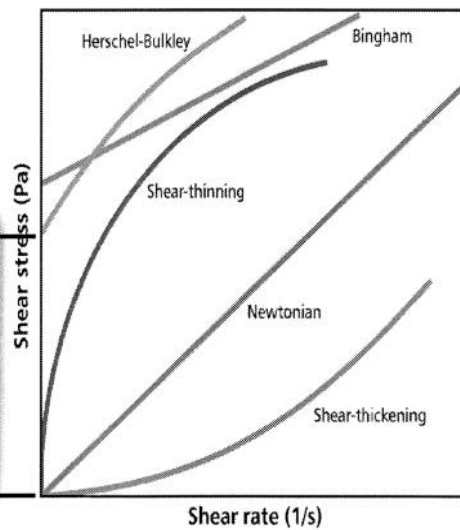
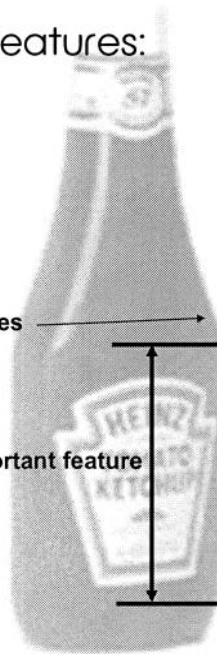


Important features:

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Sewage sludges

Important feature

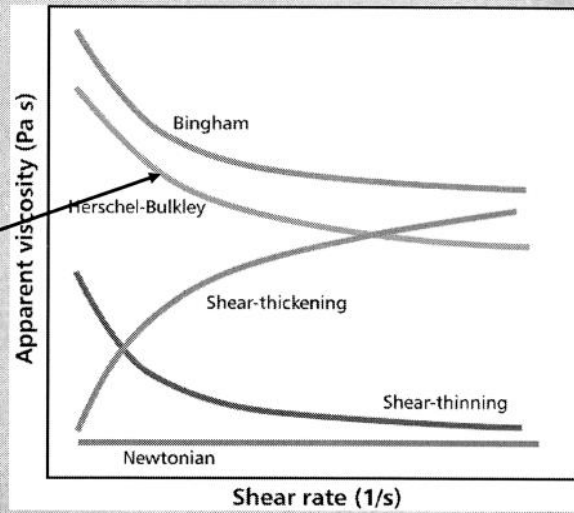


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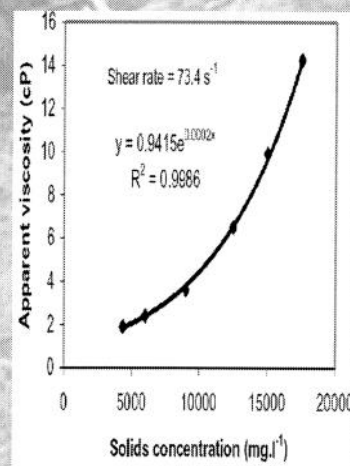
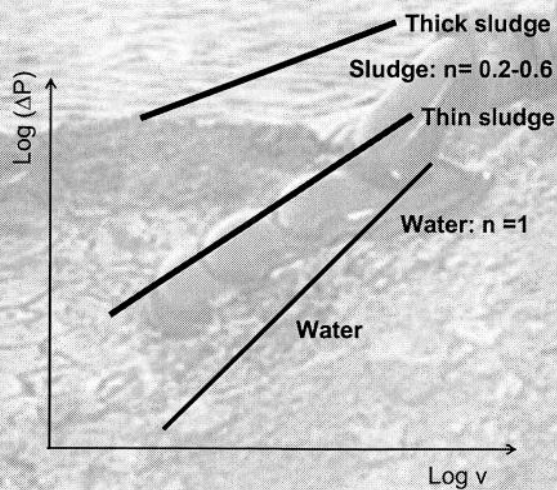
Viscosity

Sewage sludge exhibits shear thinning properties:

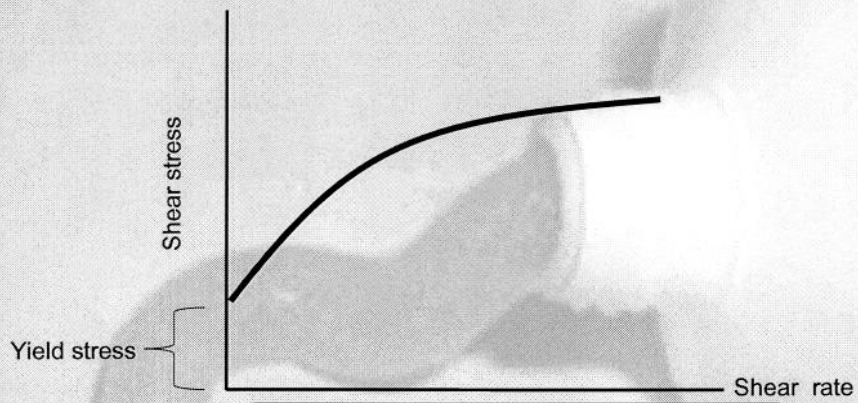
Viscosity decreases as shear applied



So what does that mean to me



Viscoplastic: Yield stress

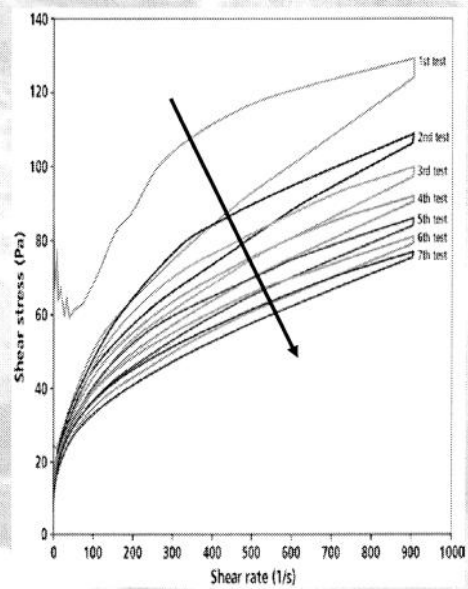


Sludge will not flow when small shear stresses are applied

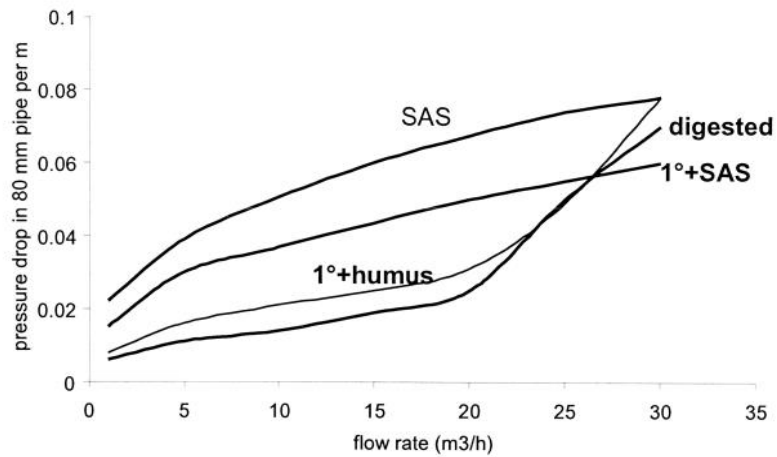
Thixotropy

**Decrease in viscosity
over time (constant
shear)**

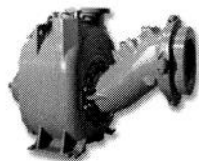
**Pre condition sludge to
make it easier to flow**



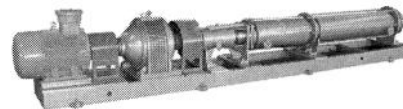
Sludge type makes a difference



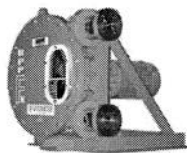
Common sludge pumps



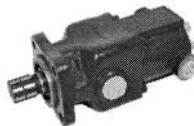
Chopper
(Vaughan)



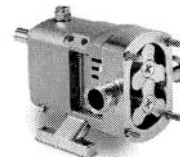
Progressive cavity
(seepex)



peristaltic
(Watson Marlow)



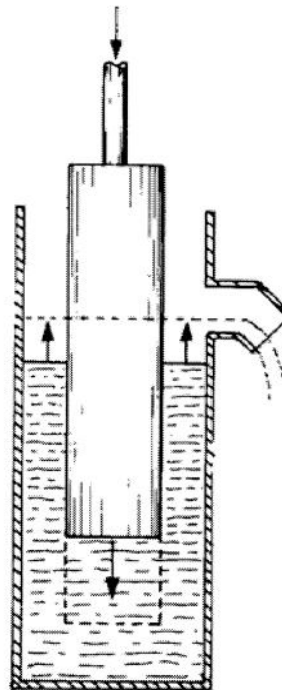
Piston pump
(Willet)



Rotary lobe
(Bredel)

Positive displacement

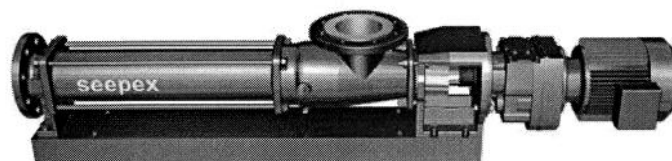
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Progressivity pumps are the most common type of sludge pump

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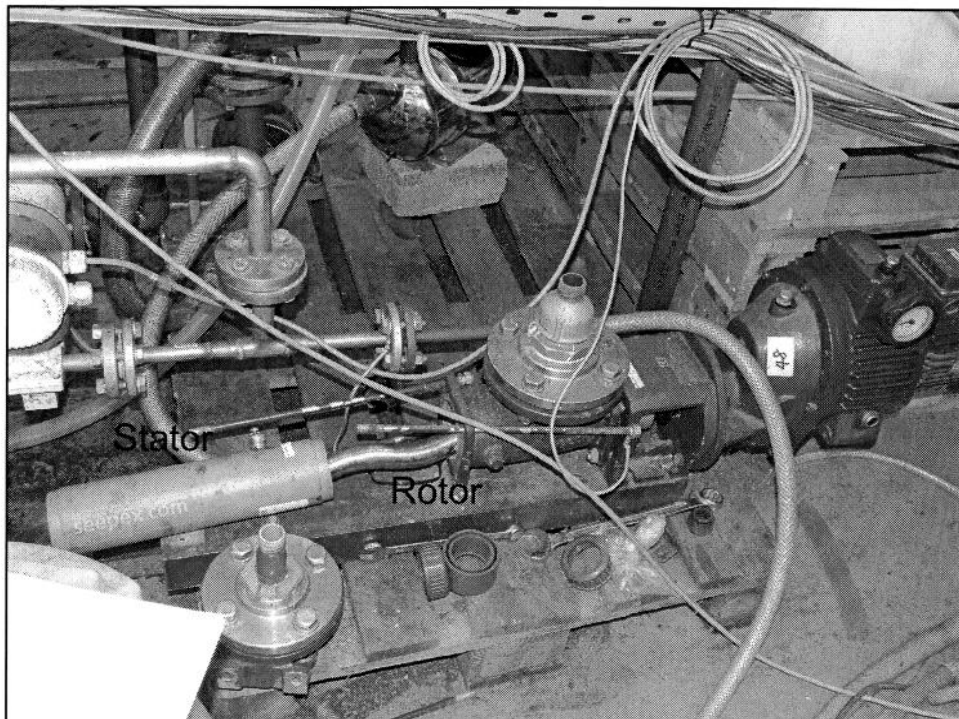


Main type of pump used for sludge pumping

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A progressing cavity pushes the fluid

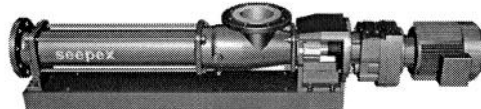
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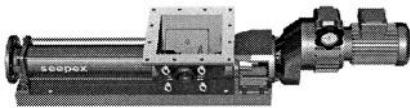
Application

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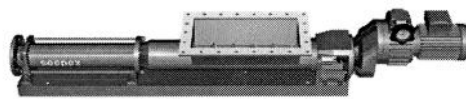
Model: BN
30 l/h- 500 m³/h



Primary, secondary, digested, heat exchange loops



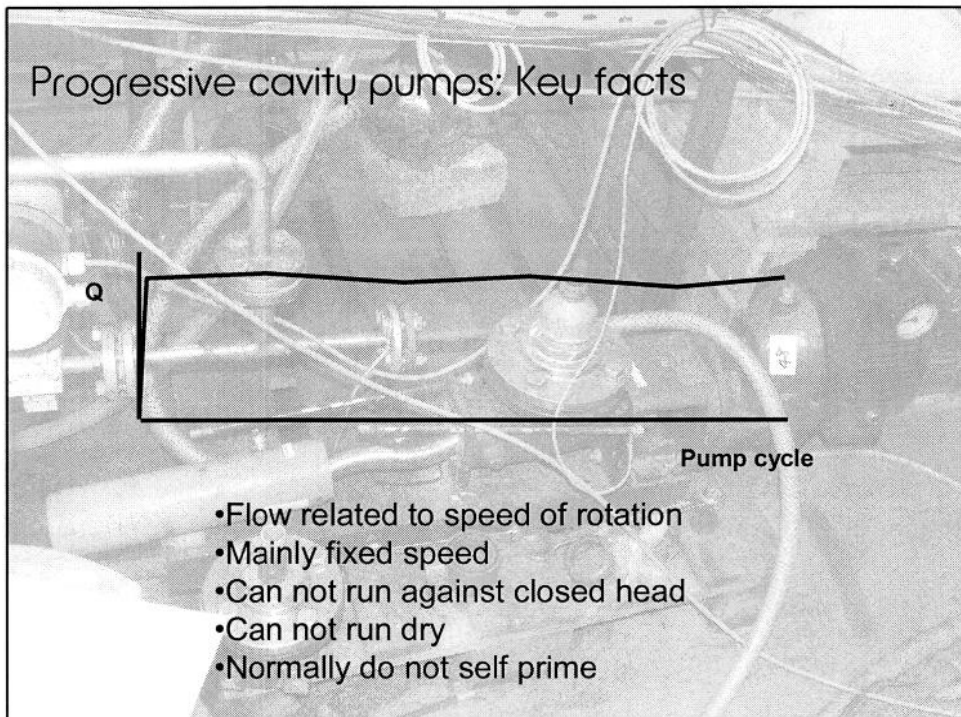
Model: BTQ (thickened)
Screw feed (-100 m³/h)



Model: BT (imported dewatered)
**Compression zone and
auger screw**

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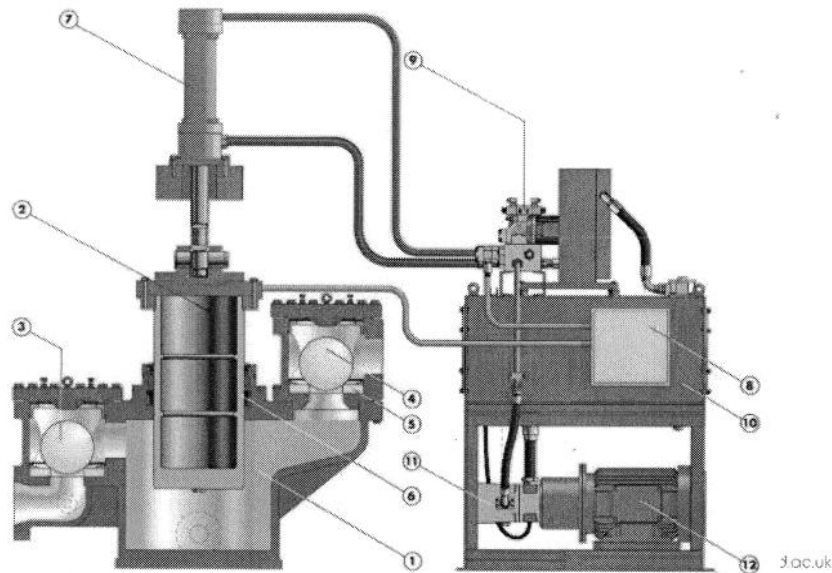
Progressive cavity pumps: Key facts



- Flow related to speed of rotation
- Mainly fixed speed
- Can not run against closed head
- Can not run dry
- Normally do not self prime

Ram pump

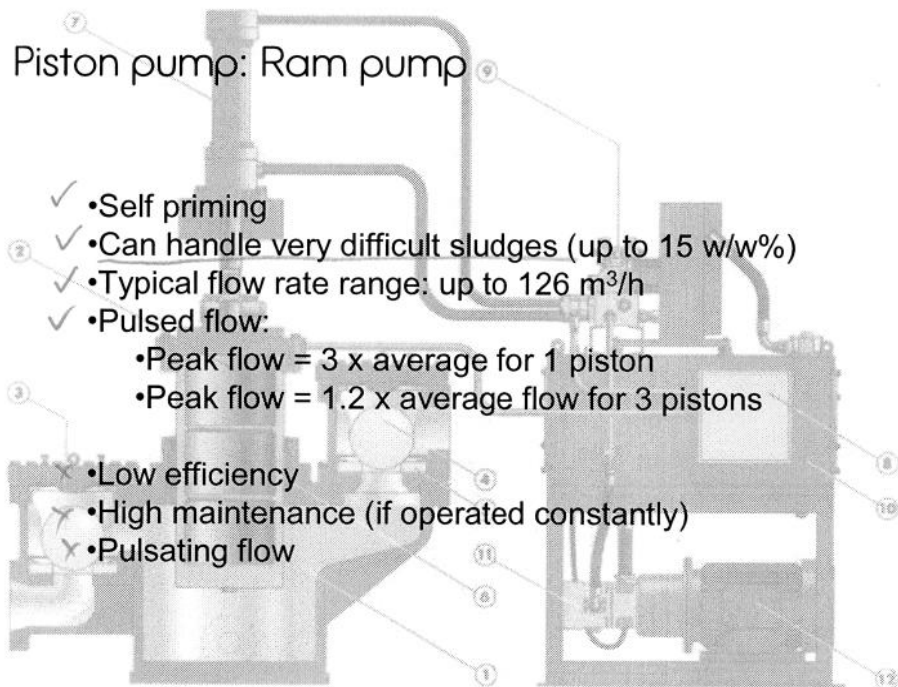
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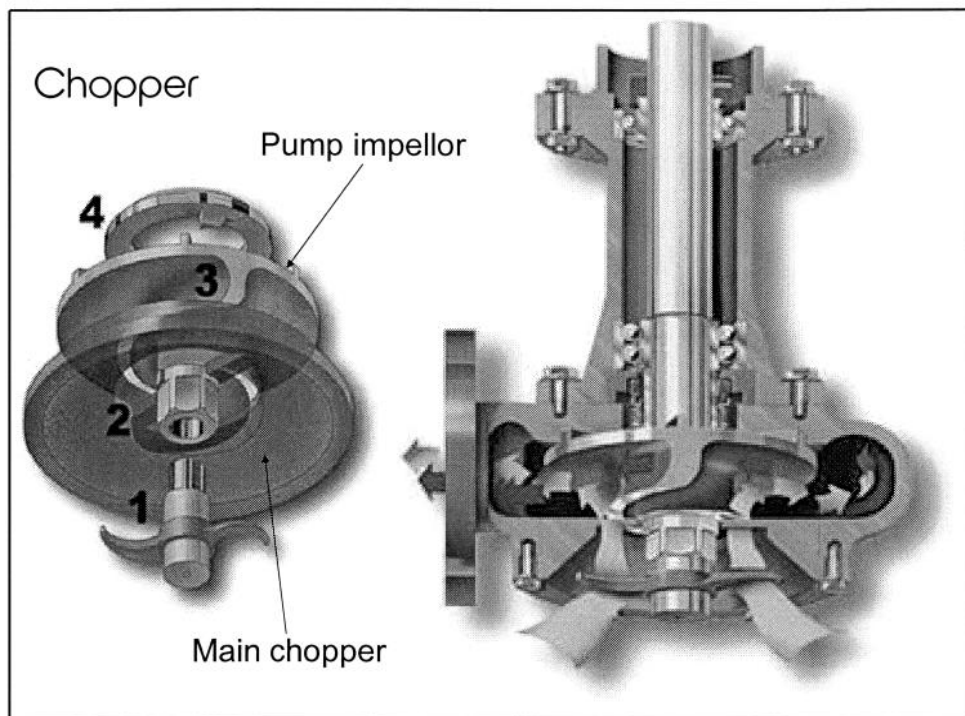


Piston pump: Ram pump

- ✓ • Self priming
- ✓ • Can handle very difficult sludges (up to 15 w/w%)
- ✓ • Typical flow rate range: up to 126 m³/h
- ✓ • Pulsed flow:
 - Peak flow = 3 x average for 1 piston
 - Peak flow = 1.2 x average flow for 3 pistons

- ✗ • Low efficiency
- ✗ • High maintenance (if operated constantly)
- ✗ • Pulsating flow





Chopper

'Chopper' pumps help Southern Water to cut costs

"Vaughan Chopper Pumps from P+M Pumps achieved a significant improvement in the throughput of sludge, minimised reactive maintenance and reduced spares requirements for a key Southern Water site"

"Commenting on the performance of the Vaughan Chopper pumps, Mark Catlin, Southern Water Senior Process Engineer says, 'Installing the Vaughan equipment has made a significant improvement to asset availability and a large reduction in this sites operational costs'."

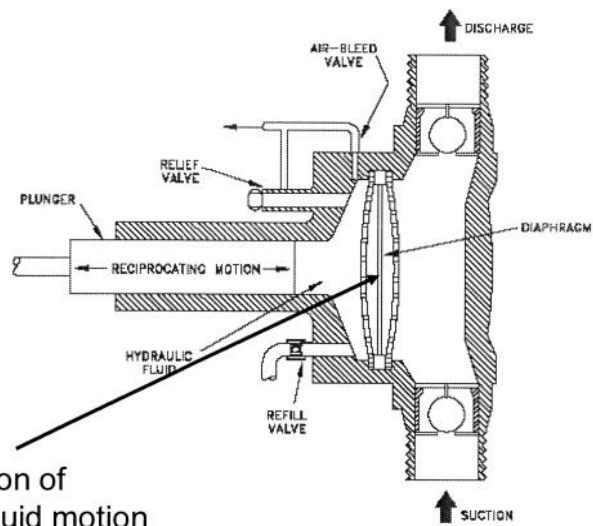
News Release from: **P+M Pumps** | Subject: **Vaughan Chopper Pumps**
Edited by the Processingtalk Editorial Team on **06 November 2007**

Dosing pumps

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Multiple chambers
smooth out flow

Acts like a piston
Reciprocating motion of
diaphragm drives fluid motion



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Liquid Metering Instruments (LMI)

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