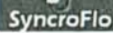



Sizing a Domestic Water Booster System


John Kahren
Richard Hanson
David Romaine
Adonis Layyous

 SyncroFlo





How I saved energy without VFD's and why I recommend them anyway



VFD's: Do They Save Money?

Yes when ...

- Varying suction pressure
- Pump is oversized
- Reduced inrush current


No because ...

- Static head requirement
- Cost more up-front
- More expensive to service




Tank Efficiency

- Bigger the better for
 - Energy savings
 - Pump seal life
- Smaller the better for
 - cost
 - installation
 - maintenance




Where to put a tank?

- Higher the better for
 - energy efficiency
 - reducing hydraulic shock
- Lower the better for
 - cost
 - installation
 - maintenance




Formulas to consider

- 10 HP pump at shutoff consumes \$ ____ /hr
- Each 10 HP pump start costs \$ ____




Do Not Forget

- Tank bladders wear out!
- When they wear out they fill with water!
- When they fill with water they are heavy!
- When they fill with water it gets nasty!
 - Space
 - Access
 - Drain




New Tank Tricks

- Remote tank - overpressurized
- Low flow tests
 - Flow switch (1 FPS)
 - Flow sensor (1/4 FPS)
 - Flow probe (??? FPS)
 - VFD sequence




VFD/Tank Sequence

- Timer expires, or flow sensor says "0"
- Slow down VFD
- Measure pressure
- If it drops, stay on
- If it maintains, turn off




Pump Efficiency

- Credit Hydraulic Institute
- Annual energy cost for 10 HP pump running at shutoff
- Cost of 10 HP pump
- Left or right of BEP (I say right, if ...)




Pump Sequencing to Save \$\$

- Minimize inrush current by minimizing starts
- What does a pump start = in power consumption vs. running at shutoff



Demand is above Shutoff flow less than 20% of time in most buildings


So what about that 20%?



During moderate - heavy usage


Run 1 pump as long as possible, but beware

- Cavitation
 - Excess flow (can be measured)
- Motor Load
 - Excess current (can be measured)




Recommendation

- If you have a choice, use a smaller pump
- Measure flow
- Size motor for NOL at max flow




More New Tricks

- Estimate Flow with VFD speed, ΔP , and the pump curve
- Measure current from the VFD



Other VFD Benefits


- No hydraulic shock when starting, stopping
- Easy to change system pressure
- Doesn't waste energy under normal suction pressures
- Less expensive to MAINTAIN
- Eroding water quality vs. PRV's
- Less physically demanding to SERVICE



VFD Caveats

Fewer service technicians

- So make sure that your supplier has one
- Needs to understand the pump system more than the drive
- OK to send VFD out for service, in many cases



Conclusion

Test "us" (your rep) and then trust us to write a spec and provide a drawing that meets your needs

OR

Confirm that some company will meet your WHOLE specification and drawing (don't cobble together something & hope)
