DJAM PUMP SPECIALISTS

PUMP KNOWLEDGE SERIES

COOL THINGS ABOUT

CENTRIFUGAL PUMP CURVES

Centrifugal Pump Curves

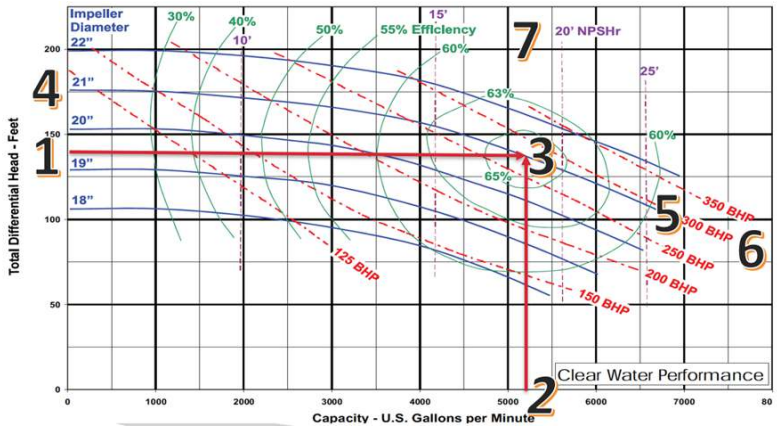
Sizing and reading a centrifugal pump curve is an interesting process that contains a ton of information, but if used incorrectly can provide you with the totally wrong pump for your application. Before we get into reading the

curve, I will go over some basics of centrifugal pumps.

1. Centrifugal pump curves start with data based on water with a specific gravity of 1.0.
2. Computer generated curves now can show the curves for different specific gravities.
3. Centrifugal pump flows are determined by the Head the pump will see across the pump. Head can be converted to pressure by using the specific gravity. H(meter) = 10.2 P/SG or H(feet)= 2.3P/SG.
4. Centrifugal pumps follow certain Laws of Affinity
    - Flow is inversely proportional to the speed.
    - Flow is inversely proportional to the impellor diameter.
    - Head is inversely proportional to the square of the speed.
    - Head is inversely proportional to the square of the impellor diameter.
    - Horsepower is inversely proportional to the cube of the speed.
    - Horsepower is inversely proportional to the cube of the impellor diameter.

BELOW IS A TYPICAL

CENTRIFUGAL PUMP CURVE



With centrifugal pumps, you find your impellor size by going to the intersection of your total differential head (1) and flow rate (2). This will get you your design point (3) and tell you you impellor size (3) and overall efficiency (3). Once we know the impellor size, we follow the impellor size to the far left of the curve, and that gets us our shut in Head (4). Following the impellor curve to the right, gives you your run out point (5), a point where you do not want to operate. When calculating the HP required, you follow the impellor curve to the run out point and go the higher HP point (6). Sometimes the run out point will be have a higher HP than the design point, always design your motors to the run out point. NPSH Required (7) is show above the curves in purple. The NPSHR goes down to the left and up to right of your design point.

1. Total Differential Head = 140 feet
2. Capacity = 5200 USGPM
3. Design Point = 21” Impellor and 65% Efficiency
4. Shut-In Head = 175 feet
5. Impellor run out point = 6800 USGPM and 110 feet
6. Horsepower = 290 HP at run out point
7. NPSH Required 18 feet

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Over the past 40 years, I have quoted and applied hundreds and hundreds of Centrifugal pumps, and I have lost my share of them as well. The most common questions I get when talking with buyers, is why do you have 20 HP and they have 15 HP, or why do you have an 1800 RPM motor versus a 3600 RPM motor.

Many things can affect the life and success of a Centrifugal pump. With the above HP issue, sometimes the run out point will be have a higher HP than the design point, always design your motors to the run out point.

NPSHR is another major factor when sizing a pump, if the customer does not give you a value for the NPSH Available, manufacturers will quote the lowest cost pump, which is generally a pump with a higher NPSHR. Not meeting the NPSHR can cause cavitation shown in this picture.

If you have any field application or premature wear/failures of any of your centrifugal pumps, I am available to do a virtual or on-site inspection and offer you solutions to your problems. Call Mike at 403-333-7405 or check out my website at www.djampumps.ca.

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