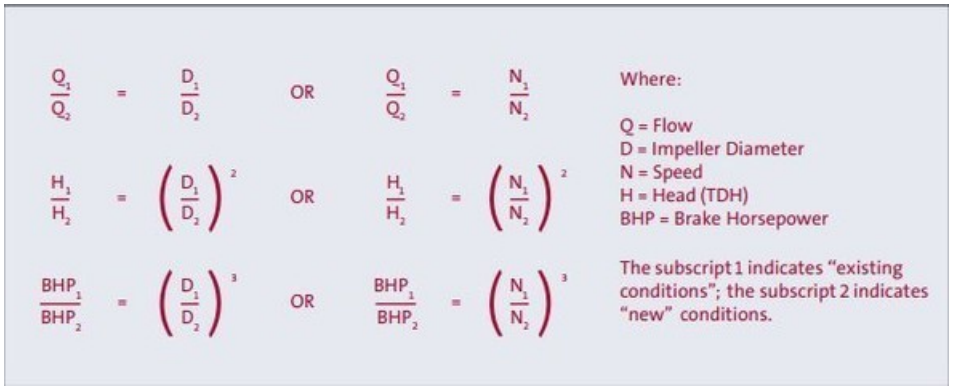
How to Use Affinity Laws in Mag Drive Pump Operations

Affinity laws in mag drive operation are used to " the relationship between variables involved in pump or fan performance such as head, flow rate," etc. These laws help mag drive pump operators to more closely predict the head discharge when delivered at different speeds or from different sized impellers.

1) Laws for a specific centrifugal pump, which approximates the head, capacity and power curves for different speeds and diameters, and;

2) Laws for a family of similar pumps, to approximate the same types of measurements

These laws are sets of formulae that users can add their specific device's measurements into and then arrive at a solution. Some examples are below:



Most pump manufacturers provide charts with the flow/head/power of the impeller at different diameters. They don't always have curves at different speeds because there are so many options. This is where Affinity Laws become most valuable. These laws allow users to calculate the affect of increased velocity on the operation. A pump calculator can be used to determine the new flow/head/power at speeds.

It is not recommended to go above the normal speed of the pump (in our case, 3450RPM) because the magnets (if a magnetic drive pump) are not strong enough and will cause the pump to decouple. Also, it will overload the motor. Slowing down the motor reduces power more than trimming the impeller or closing a valve restricting the flow. There is, however, a larger initial cost to buy the necessary equipment for variable speed.

It should also be noted that drastically changing the speed changes all three elements of performance differently. Please refer to the example below:

Note! If the speed of a pump is increased with *10%*

- the volume flow increases with *10%*
- the head increases with *21%*
- the power increases with *33 %*

If we want to increase the volume flow capacity of an existing system with *10%* we have to increase the power supply with *33%*.