Operator Quiz Corner

Understanding Pump Curves

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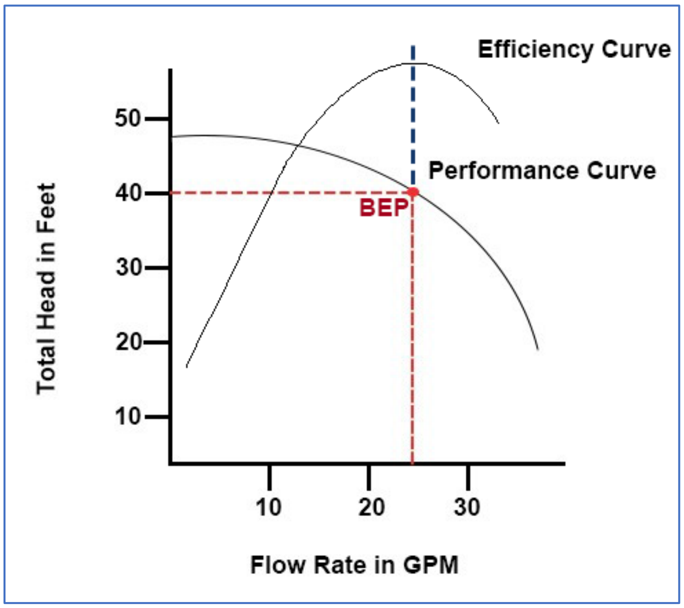
Centrifugal pumps are the most common type of pump in the water industry. While there are many different designs and configurations of centrifugal pumps they all operate on the same principal of a blade (impeller) spinning which forces water to move along a path inside an enclosure (volute). It is similar to how a fan moves air.

Every centrifugal pump has design features that make it unique with regards to how much water it can move (capacity) and how much pressure (head) it can generate under different operating conditions. A pump curve, or pump performance curve, is a type of graph that provides all of the important information specific to a particular pump. An example pump curve is shown below.



The 'performance curve' shows how high 'total head' the pump can push water at various flow rates. In the example pump curve approximately 24 gpm can be pushed to a height of 40 feet. Pushing water to a higher elevation causes a drop in the capacity, and conversely pushing water to a lower elevation results in delivering a higher capacity. The 'efficiency' curve indicates what is the best operating condition (e.g., highest efficiency) for a particular pump indicated by "BEP" (Best Efficiency Point).

Most pump curves will display additional information such as variable impeller sizes and horsepower. Watch this short video to learn more about how to read pump curves: https://www.youtube.com/watch?v=uP1ZiZ4khDM

1. Which of the following is a true statement with regards to the information on a pump performance curve?
    a. As the flow rate increases the total head decreases
    b. As the total head increases the flow rate decreases
    c. Peak efficiency occurs at a specific head and flow rate

d. All of the above

2. True or False? In the example pump curve it is possible to fill a water storage tank located on a hill 100 feet above the location of the pump.
    a. True
    b. False

3. Pumps arranged in ‘parallel’ will provide ______ flow rate as pumps arranged in ‘series’.
    a. a higher
    b. a lower
    c. the same

4. What is likely to happen if a pump is not being operated at peak efficiency?
    a. Electrical cost will be higher.
    b. Cavitation will occur
    c. The packing gland will fail
    d. All of the above

5. Using the example pump curve above, what pressure (psi) is the pump capable of providing when operating a peak efficiency?
    a. 2.31
    b. 17
    c. 25
    d. 92.4

Solution:
Conversion to use: 2.31 ft = 1 psi
At peak efficiency, the pump is capable of delivering 24 gpm to a height of 40 ft
40 feet X (1psi/2.31 ft) = 17.32 psi