Using pump performance curves

to improve efficiency

Pumping efficiency and capacity typically decline as suction head or flow rate demands increase. Pump manufacturers publish performance curves for each pump make and model to demonstrate this relationship for each pump model.

The performance curve provides information on the pump's ability to produce pressure (head) and flow rate (capacity) along with information on pump efficiency and kilowatt (kW) / brake horsepower (HP) requirements.

Pump curves can show the following information:

- Mechanical specifications of the pump (impeller speed, inlet diameter, outlet/ discharge diameter)
- Curves for different impeller sizes
- Flow rates and head in imperial, US or metric values.
- Efficiency curves and power curves
- Net positive suction head required

The simplest curve illustrates this relationship and shows the capacity of a pump to meet the demands of the system. Clearly, a pump that is capable of meeting the needs of system should be selected.

SIMPLE PUMP CURVE

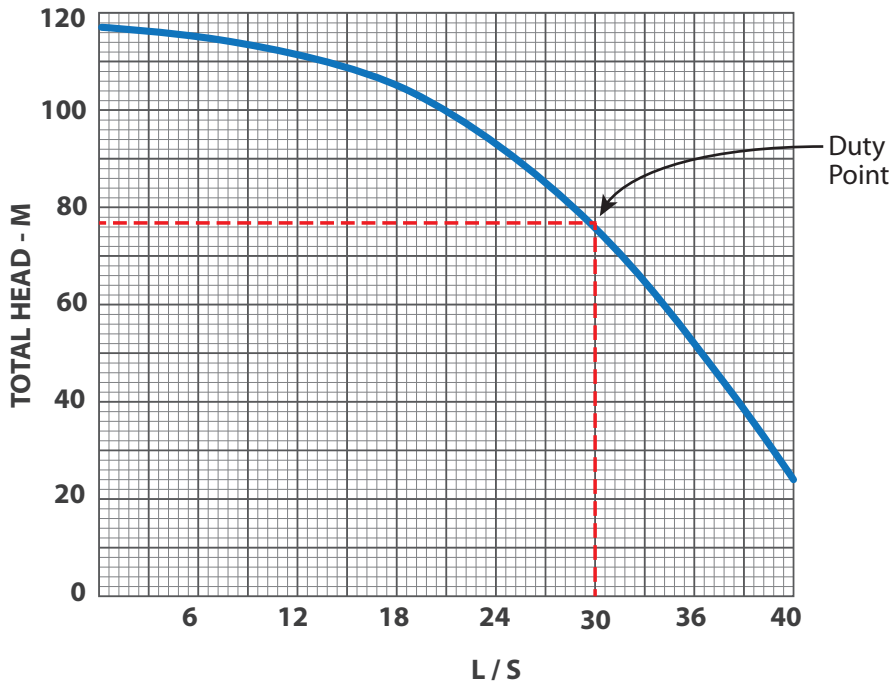

Figure 1 Simple Pump Curve[1]

1 *Source: Pump Basics, page 26*

Pump efficiency curves

Irrigators can use the engine performance curve to ensure proper loading of the engine and maximise fuel economy of their pump. An audit of the pump efficiency performance can be compared to the performance curve to determine where improvements to the system can be made.

The efficiency curves intersect with the head-capacity curve and are labelled with percentages. Consequently, each pump will have its own maximum efficiency point.

CENTRIFUGAL PUMP CHARACTERISTIC CURVE - EFFICIENCY

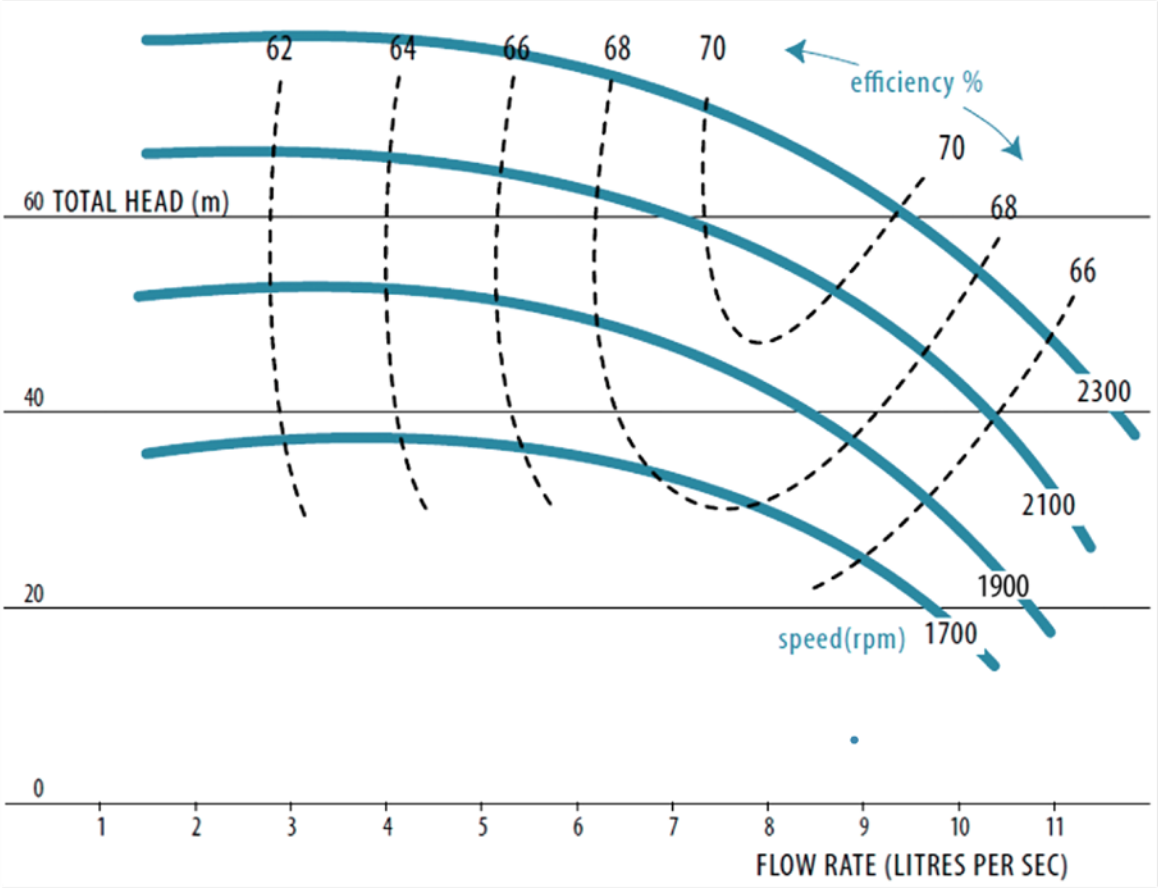

Figure 2 Efficiency curves overlaid on Flow versus Head curves[1]

Next Steps

If the audit of the pump performance indicates that efficiency is outside the optimal range, it may be possible to make adjustments to the existing system through:

- **Adding pump stages** increases horsepower by an equal amount.
- **Trimming impellers.**
- **Adjusting operating speed.**

1 *Source: WATERPak a guide for irrigation management in cotton and grain farming systems, page 119*