FACT SHEET

NO: 20
Date: February 2015

Turf Queensland
Grow Green

PUMP EFFICIENCY

There are many reasons for poor pump plant efficiency. Some of the more common causes of unsatisfactory performance and their remedies are as follows:

Troubleshooting for Efficiency

- [ ] **1. Check suction pipe strainer for blockages**.
- [ ] **2. Measure the suction lift pressure.** Height from water to centre line of pump and friction in the suction pipe combined.
- [ ] **3. Measure the pressure upstream of pump discharge valves or filters**. For Pump Efficiency
- [ ] **4. Measure the pressure downstream of pump discharge valves or filters**. For System Efficiency
- [ ] **5. Measure the height difference between the centre line of pump and the pressure gauges.**
- [ ] **6. Measure the flow rate over time.**
- [ ] **7. Measure the energy used kWh or Lph for fuel.**
- [ ] **8. Know what the target pressure is at the irrigation emitter**
- [ ] **9. Measure the pressure at the emitter**

Note: a reduction in operating pressure results when center pivot sprinklers are converted from high pressure to low pressure in an attempt to save energy. Usually the pump will operate less efficiently under the new lower pressure conditions.

Determining Efficiency

Total Dynamic Head (pressure) is the total of:

- Static height from water to centre line of the pump volute
- Friction loss in the suction pipe and fittings
- Height difference between the centre line of pump volute and discharge pressure gauge

Calculation: Pump Efficiency

$$\frac{0.98 \times \text{flow rate} \times \text{total dynamic head}}{\text{kWh} \times \text{motor eff} \times \text{drive factor}}$$

Common Problems

- Suction pipes are too small causing cavitation to the pump
- Pumps not matched to the duty at their BEP (Best Efficiency Point)
- Pump discharge is restricted with a valve or filter which is consuming more energy per volume pumped

Question to ask during pump repair:

What parts are worn?

95% of turf producers use centrifugal pumps to operate irrigation systems. The following parts need to be checked: volute, volute neck ring impeller, shaft, back plate, back plate neck ring and mechanical seal or glad packing. Often, when the impeller has damage, the neck rings will require repair, as well as the water cutter that is cast into the volute. Generally, the mechanical seal and bearing will need replacing as well.

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Industry Fact Sheet is published by Turf Queensland as part of the Industry Development Services for the Queensland Turf Industry project. This project has been funded by Horticulture Innovation Australia Limited using the turf industry levy, co-investment from Turf Queensland and funds from the Australian Government

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