

PUMP SYSTEM ASSESSMENT FOR ENERGY AND MAINTENANCE SAVINGS

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Introduction

I will discuss pump system assessment but I will try to discuss what relates to the user and what you, the user, can do to assess your system to improve performance and energy savings. Some studies have shown that 20 to 40 percent of the energy consumed by pump systems can be saved through equipment or system changes. We will discuss the opportunities for savings in existing systems mainly because not many of us have the luxury of being able to install a new system every time we have a change in equipment or an increase in demand on our condensate return and boiler feed systems. Most of you have a system that you inherited at the time you were given the opportunity to become the kiln and/or boiler supervisor so you have to make do with what you have and still provide quality and production. We will discuss Life Cycle Cost of the pump system and give some ideas how we can reduce the life cycle cost in the areas of maintenance and energy consumption. After all, these are costs that are ongoing and continuously increasing with rising power, labor and material cost.

How Do You Make an Accurate Assessment of Your System?

- Pressure gages
- Power use monitoring
- Pipe maintenance and layout
- Know system requirements

We as the user can make an assessment of our existing system by:

1. Having gages installed on the suction and discharge side of the pump. We can usually troubleshoot the system by knowing the pressure readings on the suction and discharge of a pump.
2. Monitoring power consumption and/or monitoring motor amp draw.
3. Checking and maintaining our piping i.e.; layout pipe to reduce sediment and use chemical treatment to combat scale build up.
4. We can avoid maintenance and operational problems by being aware of what our system requirements are and by realizing that these requirements will change with time due to wear, additions of equipment and increased demand.

The typical life cycle cost of equipment ownership is shown in Figure 1. Usually when costs are being considered, the initial costs are given the most attention cost of maintenance and power consumption throughout the life of a pump are not considered.

Improving system performance by improving layout, proper sizing of the pump and driver are often overlooked opportunities to reduce life cycle cost of a pump. There are more



opportunities to reduce cost in an existing system than there are in a new system mainly because there are more existing systems and these systems have experienced wear and at the same time, more than likely, have been added on to without the consideration of the increased demand on the system. Another cause of increased demand other than adding a new kiln is new techniques in drying i.e., high temperature drying.

FIGURE 1. Cost of ownership on a life cycle basis.

Know System Requirements

It is a good practice to keep up to date on system requirements as these can change due to equipment add-ons, wear, etc.

If you are not aware of your pump capabilities, that is a good place to start. Most manufacturers have pump selection software free to download and this is a good tool to use to determine the capabilities of your pump.

NPSHR is often overlooked when sizing a pump especially when pumping hot liquids. If the NPSH is not adequate we will experience flashing in which serious damage can occur. Ensuring that our NPSH is adequate is imperative to ensure pump performance and uninterrupted service or unscheduled maintenance.

NPSH should be figured for full load requirements.

Figure 2 is a pump curve in which we see our NPSH requirements at different flow and heads. Don't just assume that if the pump will do the flow and head that the pump is the correct choice. You must give consideration to NPSHR. I would like to add that sometimes the need for a new pump can be avoided if you are using a pump that has a trimmed impeller you may be able provide the increased production by increasing the impeller diameter and horsepower for your pump.

Pipe System and Components

Probably one the most common mistakes I see in pump piping installation is pipe strain. This will greatly reduce pump life cycle and effect performance. Pumps, valves and other components in the system are not meant to be part of the support system. This is easily detected and can be corrected without interruption of production. If this goes uncorrected it can cause early bearing and seal failure and may result in an interruption of service.

Pipe condition. Scale build up and sediment can be avoided by proper chemical treatment.

