Pumps & Systems had the opportunity to sit in on an excellent session at the Chem Show in New York City last November. “Life Cycle Costs—Buying Right,” was presented by Paul Barringer, P.E., President, Barringer & Associates, Inc., of Humble, TX.

Barringer is no stranger to Pumps & Systems. His work has been cited both in our magazine articles and at PumpUser Expos. Sponsored by the Fluid Sealing Association (FSA), his Chem Show presentation was a real eye opener for anyone interested in the topic of equipment life cycle costs. Pumps & Systems commends FSA for its support of such an enlightening event.

Capital & Sustaining Costs

Barringer opened his presentation with definitions of capital and sustaining costs. What is referred to as “life cycle costs” is really made up of capital costs and sustaining costs.

Capital costs include:
- purchase price of equipment,
- engineering and procurement costs to buy the equipment, and
- installation cost.

On the other hand, sustaining costs are those required to operate and maintain equipment. Sustaining costs include:
- cost of energy,
- cost of spare parts, and
- cost of maintenance.

Barringer noted that depending on the equipment, sustaining costs may be equal to, twice as much as or up to 20 times more than the capital costs. (Editor’s Note: The data typically presented for pumps would indicate that sustaining costs are in the range of three to four times the capital costs.) He then introduced the concept of a “window of opportunity” to control the sustaining costs of the equipment.

To Barringer, the window of opportunity is that period when decisions can be made or actions taken that would control the sustaining costs of equipment. The conclusion shown as a graph in Figure 1 is that 65 percent of the window of opportunity has already closed by the time the pump and installation bill of material has been established. Further to the right on Figure 1 is the point at which the equipment is commissioned and started up. At this point, according to Barringer, more than 80 percent of the window of opportunity to control sustaining costs has closed.

Figure 1. Opportunities for controlling sustaining costs (Courtesy of Barringer & Associates, Inc.)
A Closing Window

Why is 65 percent of the window to control life cycle costs closed once the bill of material is set? I can think of several reasons. The key variables that affect life cycle costs are:

1. selection of the right type of pump, materials and accessory components such as mechanical seals, labyrinth seals, etc., for the application;
2. selection of the right size pump relative to operating at BEP and pump-operating speed;
3. selection of the method of pump control, such as variable speed drive vs. throttling valve;
4. the standards specified for alignment and balancing; and
5. whether energy efficient motors are used.

All these key items are decided at the time the bill of material is set. To the extent these items are not defined when the bill of material is set, generally means that the criteria will likely default to the lowest common denominator (cheapest) available.

Why has 80 percent of the window of opportunity to control sustaining costs closed by the time the pump is started up? It's simple. Since 65 percent of the window is already closed at the point the bill of material is written, whatever remains between 80 percent and 65 percent of opportunity is contingent on the quality of installation.

Whether a pump is grouted in properly, is installed free of pipe strain and has a precise coupling alignment is determined during the installation phase. Barringer uses the analogy of a guided missile. "When the start button is pushed, the trajectory of the sustaining costs of the equipment is set, and the sustaining cost outcome is largely pre-determined."

Real World vs. Theory

In a side interview, Barringer recounted a plant situation where pumps had been mounted on makeshift improvised bases. The plant manager was quite impressed with the creativity and thriftiness of his staff. What troubled him, though, was the fact that these pumps were failing monthly, repair bills were mounting and pump outages were disrupting operations. After the pumps were reinstalled on proper bases, the mean time between failure went to three years—and it's still counting.

This is a situation where people acted with the best of intentions to save money. The improvised bases did, in fact, save a small amount of money on the initial pump installations (on the capital cost side, that is). Unfortunately, this was a cost-saving action that inflicted heavy damage on the reliability of the pumps, resulting in substantial increases in the sustaining costs of the pumps.

The increase in sustaining costs was a multiplication of many times the savings in capital costs. What was missing at this plant had been an understanding of the consequences of the initial cost-saving action. This may seem to be a more obvious case, but there are similar false economy decisions being made in many plants on a fairly routine basis.

Making a Case with Numbers

In his presentation Barringer went on to show some case-study comparisons using Net Present Value financial analysis. The conclusions were that the lowest first-cost options were always among the highest total-cost options. Total costs reflected the sum of capital costs and sustaining costs discounted on a Net Present Value basis. What also was interesting in these comparisons was that the most expensive options were not always the lowest total costs. On paper, some options really looked like good investments in technology. But, when the financial analysis was done, their higher initial capital costs were not justified.

Barringer makes a strong case that the window of opportunity to manage sustaining costs is more than 80 percent closed by the time the commissioning start button is pushed. It is my personal observation that something close to 80 percent of the effective effort to control pump sustaining costs is applied after the start button is pushed.

The sustaining cost management time consists of trying to squeeze costs out by pushing the turnaround on pump repairs, finding cheaper pump repair parts, trial and error experiments on mechanical seals, etc. While people struggle to keep up, there's not much time to consider that most of the pump repair activity being done would be totally unnecessary if the right equipment had been purchased and if the right installation procedures had been used. The situation described may keep people busy and look good to the boss, but there is
no way to catch up or get ahead when 80 percent of the effective effort is applied during only 20 percent of a window of opportunity to manage sustaining costs. The challenge users have, according to Barringer, is to understand the powerful cause and effect consequences between “buying right or buying cheap.”

**Kudos Are in Order**

We at *Pumps & Systems* wish to recognize and extend thanks to the Fluid Sealing Association for sponsoring Paul Barringer’s presentation at the Chem Show. Moreover, we applaud Barringer on his work to quantify the impacts of equipment selection, installation and operating practices on the life of the equipment and the financial impact on the organization. These types of presentations provide objective information for users to consider in getting the best overall value out of pumping equipment investments—all of which leads to pumping more profits & productivity. **P&S**