Power Factor Costs: How Are They Affecting The Bottom Line?

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This article discusses the concept of power factor and introduces a number of considerations for improving the control and consumption of power in thermal processing facilities.

Power factor may represent a large portion of a thermal processor's operating expense. In an environment with increasing deregulated electric energy suppliers, understanding the impact of power factor on electric energy costs will help the end user to navigate the supplier selection process. Understanding the penalties and how they are applied will allow the end user to make decisions about future direction for the thermal processes in their facility.

ELECTRIC UTILITY COSTS

How Do Suppliers Calculate the Commercial Bill?

While the exact method of determining the final cost of electricity varies region to region, in most regions, the cost is calculated based on two parameters: the kilowatt-hour usage, and the peak demand. Most of us are familiar with the kilowatt-hour usage as this is how we pay for electricity in our homes.

The kilowatt-hour cost represents the consumable energy delivered to your door. It includes the cost to generate the electricity, the cost to transport the electricity to the final destination, and some additional miscellaneous charges. Usually this results in a figure that is several cents per kilowatt-hour (¢/Kw-hr).

Demand

The demand cost can be thought of as the lease of the electric suppliers equipment. In most regions, the demand figure is based upon the peak power drawn by the user over some defined period of time. Usually, the demand is determined during the hours in which the most electricity in the region is consumed. This demand can be measured or can be estimated depending on the methods applied by the energy supplier. Demand is expressed in kilowatts.

The demand charge is an effort by the energy supplier/distributor to offset the cost of their equipment which must be capable of meeting the user's peak demand even though the user's average kilowatt requirement is significantly different from the peak requirement. Demand is not a figure which is based on the hours of use. It is based solely on the peak power drawn from the supplier. The demand charge is usually expressed in dollars per kilowatt ($/Kw).

Power Factor

In many regions, the demand figure is modified by a penalty known as the "power factor." Power factor can best be described as the ratio of the usable power in a facility (measurable in watts) to the actual voltamps (the apparent power) delivered from the supply lines. Not all of the energy delivered to a facility is converted into watts. Some of the energy is stored within the electrical equipment in the plant. This stored energy is not available to do useful work. It has to be thought of as a by-product of the electrical system. The problem for the supplier is that he still has to size his equipment to deliver the apparent power mentioned above.

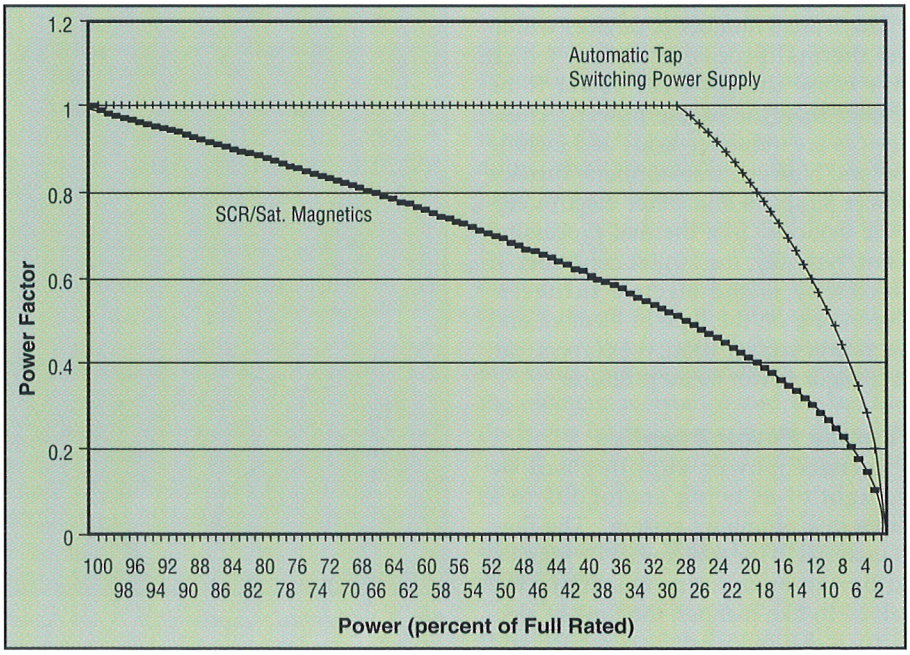

Fig. 1 *Power factor versus operating power percentage.*

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