Fundamentals of Measuring Maintenance Effectiveness

By Matt Adams

The basic returns of planned preventive maintenance have benefited from technology within the facilities management industry. Our peer leaders are proving the value of best practices associated with failure-based and run-time-based maintenance programs. The opportunity to reap the rewards of a robust maintenance program with less resources is more than appealing to our budget-constrained business. This opportunity further reinforces the need to document the return on investment for the resources we devote to these new, best-of-class maintenance approaches. The "numbers" have always been in our favor when communicated effectively. And now we have an even better story to tell, and more and more are telling it. It's always been a lean environment, but now more than ever, we can demonstrate what has been expected of us for many, many years: Do more with less.

SUPPORTING AND DOCUMENTING

Before we delve into financial returns, however, there is an important task to accomplish. Each institution should facilitate the discussion about supporting its educational mission and document and communicate the resulting goals. This discussion will revolve around the mechanical elements of our facilities. The basic template is the same for all service provided by our facility services operating units, and although the values or targets for many will be similar, it's important to communicate them to the greater campus stakeholders in order to promote a better understanding of the facilities department.

With respect to the mechanical aspects of our facilities, we should assemble a working group and agree upon those performance characteristics that we are going to leverage to support the educational mission. The "performance" of our mechanical systems refers to the ability of those systems to operate as designed in a manner that provides the maximum benefit for our campus stakeholders and customers. Each performance measurement should be selected, defined, and prioritized by the facilities management team. Some examples include:

Energy consumption. The energy consumption of various mechanical systems is predicted in optimal conditions by the original designer and equipment manufacturer. Each system and its associated subsystems can be monitored in a variety of ways, individually or in groups, to determine deviation from designed energy consumption. Effective maintenance will improve this performance measurement in a significant way.

System reliability. A variety of mechanical systems must perform reliably to support the institution's educational mission. Outages directly impact education and research in a variety of negative ways. The measurement of outages and the duration of each is a direct performance measurement impacting our ability to support the educational mission. Once again, effective maintenance will improve this system performance measurement.

Total maintenance. Cost, not to be confused with total cost of ownership (TCO), is a subset referring to the annual maintenance cost of delivered services to the various mechanical systems. Typically this is tracked by the computerized maintenance management system (CMMS). The important consideration is the collection of maintenance information, as opposed to replacement. As better run-time and failure-based maintenance systems are engaged, costly, unplanned failures will gradually be replaced by highly efficient, planned maintenance activities. In turn, the cost of all maintenance activities will be reduced.

Life cycle. All mechanical systems have a designed and/or manufacturer-specified life or life cycle, which typically ranges from 5 to 50 years—but the performance of a system for the full duration of its life cycle is the goal. Any premature failure of a system that requires its replacement or overhaul is effectively lost capital or asset consumption. This measurement is sometimes collected in the facility condition assessment process. Capture of the measurements documenting the "lengthening" of our system life cycles is translatable to actual capital saved or preserved, and is a good story to tell.

Output per design specifications. The mechanical systems that directly influence the selected system performance measurements are assembled based both on maintenance planning considerations and on cost accounting. In other words, the one or more HVAC systems within a facility are tracked as an assembly of subsystems that are related by design, performance, and output. The value (cost) of maintenance resources delivered to these assembled

systems is aggregated and tracked in support of the performance measurements. For example, a system group called HVAC 1A might refer to a complete system delivering defined outputs that are measurable in terms of our performance measures. This is largely an accounting and CMMS organization setup at the start of any program.

In addition, added to all other considerations is that of simplicity. Each facility may have many systems and subsystems, but a clever planner can assemble those systems and components into a group. This grouping aligns with maintenance efforts, designed outputs, and associated costs. Most importantly, this grouping allows for sensible measurement of performance metrics that support the educational mission.

GOING FURTHER AND DEMONSTRATING VALUE

A maintenance professional might be inclined to introduce a great many more metrics beyond the basic system performance metrics that are prescribed here. This is totally acceptable, but it is likely to be preferable for internal facilities use only; the system performance metrics are selected precisely because they are easily correlated to the support of the educational mission by laypersons (everyone outside of the physical plant). In addition, when presented effectively, these metrics demonstrate the good use of resources by the facilities department in order to support campus stakeholders. The "moving of the dial" is even better when facilities professionals make judgments, adjustments, and maintenance planning changes that increase system performance in a measurable way.

By utilizing the new best practices of maintenance planning, the facilities department's demonstration of effectiveness is accelerated. Basic maintenance standards from APPA's Operational Guidelines and others should be met or surpassed using these new information-based, planned maintenance techniques.

In the past, many felt helpless to implement new planned maintenance practices amid the chaos of constant unplanned failures and constrained resources. However, these new practices allow for just that situation to be overcome. Better yet, if we organize and select performance measurements that are relevant to our stakeholders, facilities professionals can demonstrate significant value to the campus.

Matt Adams is president of Adams FM², Atlanta, GA. He can be reached at *matt@adamsfm2.com*.