Written by Al Poling, CMRP and Richard B. Jones, Ph.D HSB Solomon Associates LLC
Sunday, 17 October 2010 18:55

Industries everywhere are finding themselves operating in a new reality. Here's a new standard for dealing with it.

As some markets fl ourish and others recover from economic recession, it's clear that the onetime buzzword "globalization" is now a reality. Today, industries compete on a global scale where, given acceptable product reliability and quality, price is the ultimate currency of success. With instant global communication capabilities available at virtually all levels, it is getting harder to sustain business performance at those companies that choose to isolate themselves and operate in a self-imposed cocoon or vacuum. Successful manufacturing performance is no longer tied to a technology, process or location. Instead, it's basically a function of who can make a quality product at the lowest cost.

The value of performance benchmarking

All for-profit businesses operate under the same simple equation: Profit = Revenue – Cost. From this equation, it is easier to earn a dollar more profit by reducing expenses (which is *your* choice) than to earn an additional dollar of revenue (which is
someone else's
choice.) In practice, there are interactions between expense reductions and revenue growth that also need to be understood to effectively optimize this deceptively simple equation. While there is no single business model to do this, one general strategy that can provide valuable insights is performance benchmarking—
or, using Solomon's terminology,
Comparative Performance Analysis™ (CPA).

Benchmarking enables a company to measure and compare its performance against peer companies in a constructive and confi dential manner. The quantitative differences computed between a plant and other similar plants using a detailed data taxonomy can provide invaluable information regarding improvement opportunities. This is a way of effectively extending a "lessons learned" exercise across multiple companies.

A critical attribute of effective reliability and maintenance benchmarking is the ability to compare disparate assets. But even small differences for similar plants can alter the value of the comparison. Each asset-performance value (e.g., maintenance cost) is divided by a computed standard to normalize the results. Our company computes these standards using patented methodologies [Ref. 1 and 2] that are accepted around the world as integral parts of CPA studies in refining, petrochemicals, power generation, pipelines and terminals (see Sidebar below).

Historically, maintenance cost performance has been measured by dividing expense data by the plant replacement value (PRV). The generally accepted assumption is that the amount of money required to maintain a plant's physical assets varies directly with the amount of money required to replace it. Intuitively, there is a logical connection in the sense that the more equipment a specific type of plant has, the higher the replacement and maintenance cost.

Individual companies use various methods to calculate or estimate PRV for insurance and other internal purposes—*and in most cases, these values are accepted, internal standards.* Aside from The Society for Maintenance and Reliability Professionals (SMRP) Work Management Guideline 1.0,
Determining Asset Replacement Value,
published in 2009, there's no generally accepted common method for computing and auditing PRV calculations [Ref. 3]. Consequently, using PRV divisors for intercompany comparisons can add uncertainty to performance metric comparisons. Moreover, PRV inherently contains additional uncertainty because these calculations are seldom, if ever, verified in practice. There is little actual data on the true cost of plantreplacement at a given site in a given year since companies do not actually undergo such an ordeal.

For CPA studies of reliability and maintenance (RAM), our company has developed a new maintenance normalizer called Equivalent Maintenance Complexity (EMC™). The intent is not to displace the use of PRV, but rather to provide a more accurate means of benchmarking that does not possess the fi nancial, market and computational uncertainties inherent in PRV.

Since the objective of a standard is to bisect the actual performance data, roughly 50% of the actual performance is above and below the standard values. It's not intended to be a predictor of future or past performance. Prediction techniques are intended as precise estimates that aren't relevant to performance assessment. For example, if a prediction model were completely accurate, all asset ratios (Actual/Divisor) would be one—*there would be no assets with above or below-par performance.*
The prediction model would include this modeling as part of its calculation, resulting in little comparative analysis value.

How EMC works

The EMC standard is computed as the nominal number of routine maintenance labor hours required to maintain a plant with its specific characteristics. For RAM benchmarking analyses, Solomon has chosen routine maintenance labor hours as the standard variable (instead of labor or other costs) because of uncertainties in exchange rates and regional labor cost differences. Labor *costs* required to maintain similar assets can vary widely across regions or countries, but labor *hours* should be the same.

Our method first determines, from data and expert opinion, the primary, direct drivers of routine maintenance labor hours. These variables are called "first principle characteristics." In general, these characteristics fall into the following categories: location, process unit size, process type, process severity and the equipment counts for specific types like centrifugal pumps, electric motors, etc. After these variables are identified, a database of unit information is compiled and a non-linear optimization model is used to calculate the EMC coefficients as a function of first-principle characteristics.

Value limitations or constraints are applied to these coefficients to ensure that the results reflect realistic relationships. For example, all coefficients may be required to be positive, because increasing values can imply more (not fewer) labor hours.

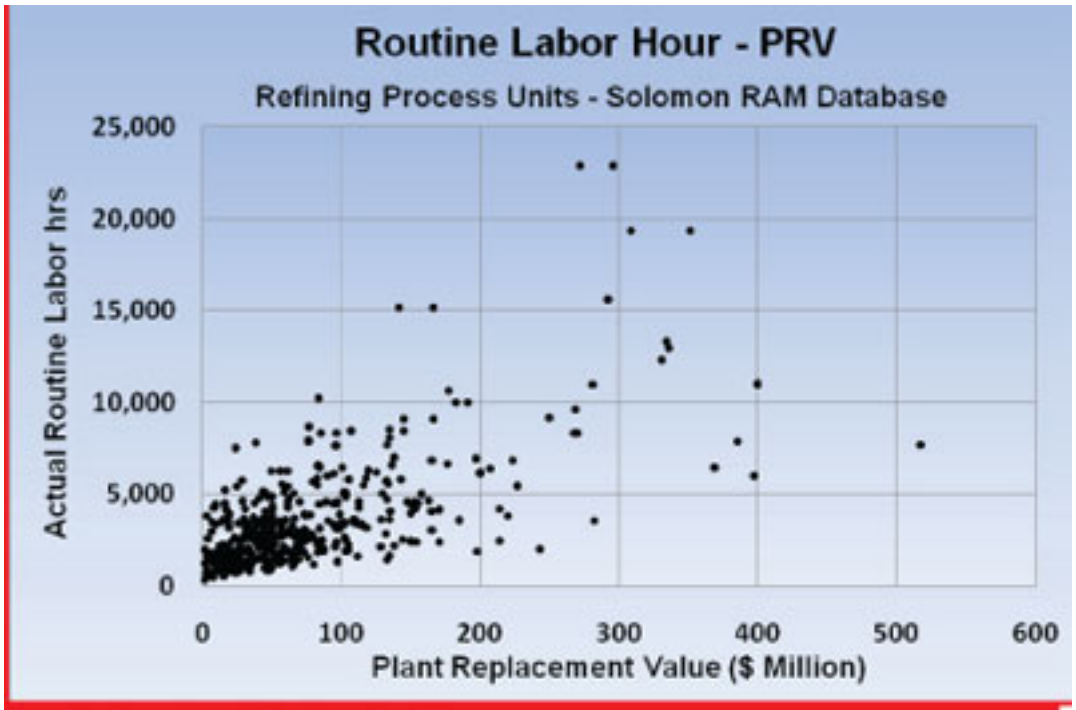

Fig. 1. Rotating-equipment labor hours using PRV

[redacted] *units*

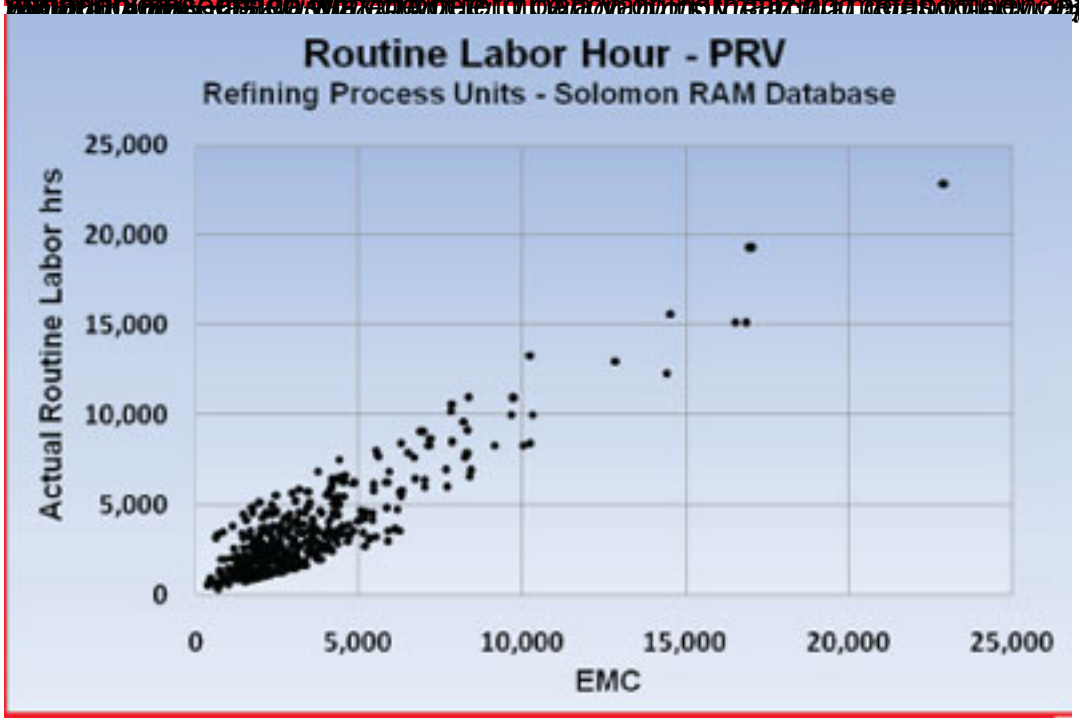

Fig. 2. Rotating-equipment labor hours using EMC

[redacted]

Rick.Jones@SolomonOnline.com

About HSB Solomon Associates, LLC

Driving world-class performance improvement for energy-intensive assets…

A subsidiary of the Hartford Steam Boiler organization, HSB Solomon is a provider of benchmarking services and performance improvement consulting for the global energy industry. Headquartered in Dallas, TX, the company focuses specifically on the petroleum refining, petrochemical, pipeline, terminal and power generation markets.

Regarding the Comparative Performance Analysis (CPA) product referenced in this article, while Solomon maintains this intellectual property and uniquely applies it in energy-related industries, the method is available for license to companies in industries or work areas that the company does not service.

For more info, enter 01 at www.MT-Freeinfo.com