A Strategic Goals Update

Data Shows Link Between Environmental & Economic Performance in Finishing

The launch of the Strategic Goals Program (SGP) at AESF Week 1998 was met with both enthusiasm and skepticism with respect to what the finishing industry could accomplish with the federal EPA and state/local regulators. This so-called "common sense" project received a top award from none other than then-Vice-President Al Gore for its boldness in seeking to reinvent government and reflected, among other things, a convergence of several industry objectives:

- Regulatory "Quid Pro Quo" to test an alternative policy framework that would provide greater regulatory flexibility for firms in exchange for voluntary "beyond compliance" environmental improvements;
- (2) Industry-Regulator Communication to position the industry to communicate more effectively with – and be better understood by – regulators;
- (3) "Bottom Line" Results to encourage the deployment of a management approach that would deliver "bottom line" results to firms pursuing excellence in their resource uses and waste outputs;
- (4) Recognition to focus attention on the solid environmental performance of individual finishers and recast the industry as an environmental steward and leader in the small manufacturing community.

While not without its predictable challenges on the regulatory front, Strategic Goals has served the industry and participating companies well. Since 1998, a total of 400 metal finishing companies have joined the SGP, voluntarily submitted valuable data, and pursued aggressive facility targets for waste outputs and resource inputs.

A Value-Added Endeavor: Tracking Environmental Progress Yields Cost Savings

Progress of participating companies is tracked by the collection and submittal of data annually covering:

- water use
- energy use
- waste generation / emission rates
- process information, and
- selected costs.

The National Metal Finishing Resource Center (NMFRC) maintains the SGP database and assures the confidentially of data submissions. Each year the NMFRC distributes to SGP participants an environmental progress report and a cost analysis. Companies can also download



Fig. 1–Average normalized rate of wastewater discharge.

these reports from the SGP web site and view aggregate data reports (see).

The economy has changed drastically since the SGP's inception, yet the program has tremendous utility during these turbulent times. The primary reason: the data shows that achieving environmental goals has also led to *real cost savings*. Considering the current economy, this aspect of the SGP is more important than ever.

This article, the first in a series of two, presents a summary of the 2001 SGP data. The second article will focus on environmental benchmarking, a tool that finishers can use to compare their data with other companies, and to recognize which of their operations offer the best opportunities for cutting environmentally-related costs and improving their environmental performance.

Wastewater Reductions

Data for the universe of SGP firms shows dramatic reductions in both the volume of wastewater and the quantity of metal they discharge to publicly owned treatment works (POTWs). Discharge reductions were accomplished primarily through *improved rinsing methods* and to a smaller degree through *implementation of advanced recovery/ water recycle systems*.

Preliminary analysis of the data point to the fact that the average normalized rate of wastewater discharge declined steadily from a baseline value of 3.1 gal/\$ sales to 1.9 gal/\$ sales in 2001, a 38.7% decline (see Fig. 1). The quantity of regulated metals discharged dropped from a baseline value of 94.5 lbs/\$ million sales (in 1992 for most companies) to 34.4 lbs/\$ million sales in 2001 (see Fig. 2), a 63.6% decline. Compared to the baseline year, the annual cost savings from reduced water use realized for the average company in 2001 were \$23,490 per year (based on an average water/sewer charge of \$4.35/1,000 gal and average sales of \$4.5 million/yr).



Fig. 2-Quantity of regulated metals discharged.

Wastewater Treatment, Sludge Generation & Disposal/Recycle

The total amount of sludge generated by SGP companies has also decreased significantly over the course of the program, although less dramatically than water use. The average normalized sludge generation rate has dropped from a baseline value of 13.6 lbs/\$1,000 sales to 11.5 lbs/\$1,000 sales in 2001, a 15.7% drop (see Fig. 3)¹. It appears that three primary factors have caused the changes in sludge generation rates:

- Local standards have become more stringent, causing finishers to employ more aggressive wastewater treatment, including higher dosages of treatment chemicals. While water quality has improved, the change has resulted in higher sludge generation rates.
- Metal cleaning methods have changed dramatically. Many SGP companies converted from solvent cleaning to aqueous cleaning between their baseline year and 1997. Solvent cleaning did not involve water use and no wastewater treatment sludge was generated. But with aqueous cleaning, materials such as oil and cleaning compounds enter the wastewater, and are subsequently converted into sludge.
- Improved rinsing methods and chemical recovery reduce drag-out losses, which counterbalance the factors that
- The SGP measures sludge quantity on a dry weight basis, which eliminates any influence caused by changes to the water content of the sludge. Over the course of the program, SGP companies have produced dryer sludges. This change is primarily due to greater use of sludge dryers.



Fig. 4-Wastewater sludge disposed in landfills.

Sludge Generation (Ibs./SK sales)

Fig. 3-Average normalized sludge generation rate.

have led to increased sludge generation. Less metal entering the wastewater translates to less sludge.

Most metal finishing companies send hazardous wastewater treatment sludge off-site, either to a permitted landfill or to a recovery facility. Figure 4 shows that the landfill option declined in use dramatically from the baseline year to 1997, increased from 1998 to 2000 and then leveled off at 6 lbs/\$1,000 sales. These changes are due primarily to two factors:

- **Recycling Availability** Changes with regard to the number of recycling facilities that accepted metal finishing wastewater sludge. In the mid-1990's recycling facilities were readily accepting metal finishing wastewater treatment sludges. However, as metal finishers reduced metal losses to their wastewater, the concentration of recoverable metals in the sludge declined. As a result, fewer recycling companies accepted these wastes and many finishing shops that were previously able to send their waste off-site for recycling had to resort to landfill disposal. This trend has continued over the past several years.
- Sludge Generation Drop An overall decline in the generation rate of wastewater treatment sludge, as shown in Figure 3, and discussed above.

Organic Chemical Emissions

Organic chemicals, such as TCA and TCE, were used extensively for degreasing by metal finishing shops prior to 1990. The production and use of certain solvents were phased out during the early 1990's and finishers migrated to aqueous cleaning methods. These events are reflected in the SGP data shown in Fig. 5.



Fig. 5-Organic chemical use.



Fig. 6-Normalized energy use for SGP companies in 2001.

The average baseline year organic chemical emissions were 1.10 lbs/\$1,000 sales. Organic emissions dropped to 0.47 lbs/\$1,000 sales in 1997 and remained at approximately that level through 2001. Further declines in solvent use will be difficult to achieve since the remaining applications are mostly situations where aqueous cleaning is inadequate.

Energy Use

The primary sources of energy used by metal finishers are electricity and natural gas. Some shops use fuel oil in place of or in addition to natural gas. Normalized energy use (expressed in BTUs) for SGP companies from the baseline year to 2001 is shown in Fig. 6. This graph shows a decrease in normalized energy use from the baseline year to 2002 and a sharp increase in 2001. A comparison of normalized energy use and average sales data for the same time period are shown in Fig. 7. This graph suggests that normalized energy use and sales are inversely related. This relationship is primarily due to the fact that metal finishng shops have both fixed energy uses (space heating, lighting, solution heating) that are relatively independent of sales, and variable energy uses (powering rectifiers) that are closely related to sales. Normalized energy use is equal to the total energy consumed divided by the total sales. A significant increase in sales will cause an increase in variable energy use, but will have little effect on fixed energy use. The entire denominator will increase, but only a portion of the numerator will increase, so the net result is a decreasee in the size of the fraction. Similarly, a decrease in sales will result in an increase in energy use divided by sales. Thus, normalized energy use will go up as sales go down, and vice versa.

Also, possibly clouding the picture is the fact that in some cases, energy increases have occurred at some facilities where new energy-intensive treatment or recovery equipment was installed.

For these reasons, it is difficult to determine if SGP companies have achieved real energy reductions. A more detailed energy-use analysis would be needed to provide the answer.

SGP Transition & the Future Of Environmental Performance Data

The expansive program infrastructure associated with the SGP a few years ago has been scaled back substantially. Tougher financial times, new Administration priorities in Washington and the finishing industry's leadership preference to streamline the program have eliminated some of the labor-intensive elements of the initiative.

However, the industry has exerted considerable effort in ensuring that the SGP transition focus on true "bottom line" and marketing needs for participating companies looking to compete successfully in lean times. This approach – which emphasizes an intensive



Fig. 7-Relation of energy use and sales.

training program for companies in Environmental Management Systems – was showcased at this year's recent AESF Week in Daytona Beach.

To complement the industry's attention on Environmental Management Systems and ISO 14000, the new vision for SGP's future emphasizes:

- Environmental Data Repository continued data collection and data-pooling from SGP companies to demonstrate environmental excellence; and
- Benchmarking Best Practices advancing the state of knowledge and progress for environmental benchmarking and "best practices" for finishers.

Send in Data & Get a Progress Report

The NMFRC is now accepting Year 2002 SGP datasheets.² As the SGP database becomes more extensive, the value of the SGP increases for both individual companies and the metal finishing industry as a whole. Each year that a company submits data, it receives an environmental progress report in return.

The progress report is valuable proof that a company is environmentally aware, proactive and systematic in its stewardship efforts. This resonates well with both environmental agency personnel and customers. In some states, there may also be a local SGP program that provides regulatory incentives when goals are achieved. In addition, SGP companies receive an annual cost analysis. This report provides a breakdown of environmental spending and compares costs for the current and baseline years.

The SGP database is a unique resource for the metal finishing industry – no other industry sector has a similar asset. Having a data-driven program sends a credible message to policy makers in Washington and across the nation that metal finishers are serious about reducing their environmental footprint to the greatest extent possible.

The next article in this series will cover benchmarking for the metal finishing industry, building on the SGP database. Using benchmarking results, any metal finishing company can compare its environmental performance (*e.g.*, water use, sludge generation, energy use) and associated costs with industry averages. Separate benchmarks have been calculated for each major metal finishing process. By using benchmarks, a company can pinpoint those areas where potential cost savings are greatest, which can come in handy in times like these.

You can submit your SGP data online at: www.nmfrc.org/bmform.cfm. If you have any questions, contact George Cushnie at 703-255-2240 (george@caiweb.com).