
Water Use Reduction at an Auto Assembly Plant

Misunderstanding the true cost of utilizing raw materials such as water can frequently result in poor management choices regarding how the raw materials are used. Metal finishing operations are notorious for using large quantities of water in their processes. The common perception is that “water is cheap” so, it can be used liberally to ensure that work-pieces are adequately cleaned, rinsed and coated. While it may be true that the actual purchase of the water itself is relatively inexpensive, the cost to using the water within the processes may be considerably more expensive.

A 2004 assessment performed by the Illinois Waste Management and Research Center on a major automotive assembly plant’s phosphating processes revealed that they perceived their water costs to be only \$2.20 per 1,000 gallons (the cost to purchase water from the city). At this low cost, water was used liberally throughout the plant to ensure adequate quality of cleaning and coating processes.

Consequently, conservation measures were difficult to justify from an economic standpoint. However, when the process was broken down on a step-by-step basis and all costs associated with using the water were considered, it was concluded that the true cost of using the water was much higher. Including the value of process chemicals, energy, water purification measures, and wastewater treatment in the total cost of using water, increased the average cost to \$80 per 1,000 gallons (a 36 fold increase).

Figure 1 shows the breakdown of water use costs on a stage-by-stage basis. As shown, some stages were considerably more costly than others. In general, rinsing stages that used municipal water (Stages 3, 4, and 7) were the cheapest while the most expensive step was the degreasing stage (Stage 2) costing \$200 per 1,000 gallons. An analysis of the total costs associated with Stage 2 is provided in Figure 2. As shown, process chemicals comprise the vast majority of process inputs (82%) in this Stage followed by wastewater treatment (9%), de-ionized water (5%) and heat energy (5%).

Prior to performing this analysis, the plant had been using about 90 million gallons of water annually because they perceived that water was cheap and conservation measures were not warranted. They estimated that the water cost them about \$200,000 per year. The results of the assessment showed them that using this quantity of water was actually costing them over \$7 million dollars per year.

Within 1 year of the assessment, numerous conservation measures had been implemented such that water usage was reduced by nearly one third resulting in cost savings of over 2 million dollars per year. Understanding the full cost of using raw materials such as water - not just the cost of purchasing the raw materials - can provide the necessary incentives and justification for making changes that improve both economic and environmental performance.

For more information, contact Dr. Tim Lindsey, WMRC, 217-333-8940.

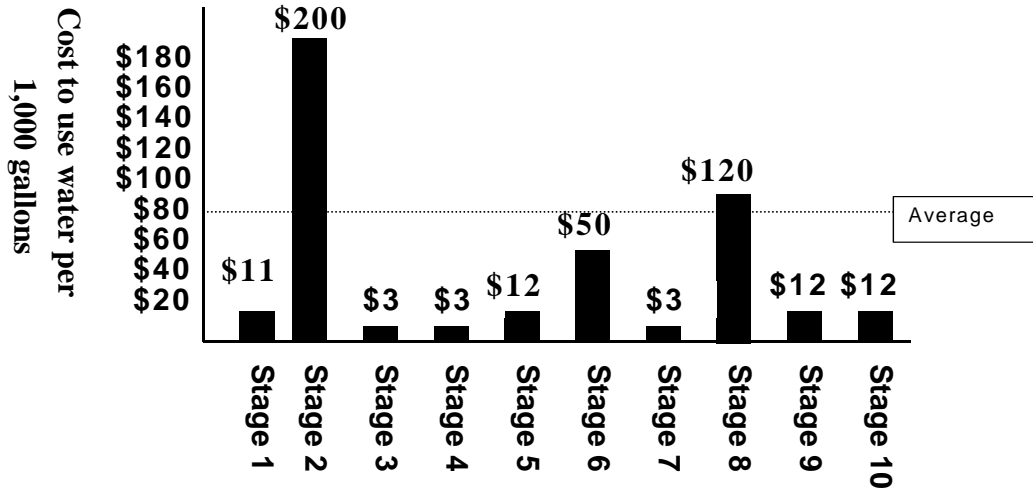


Figure 1. Cost to Use Water in an Automotive Plant Phosphate Line

Total Stage 2 Costs = \$200/1,000 gallons

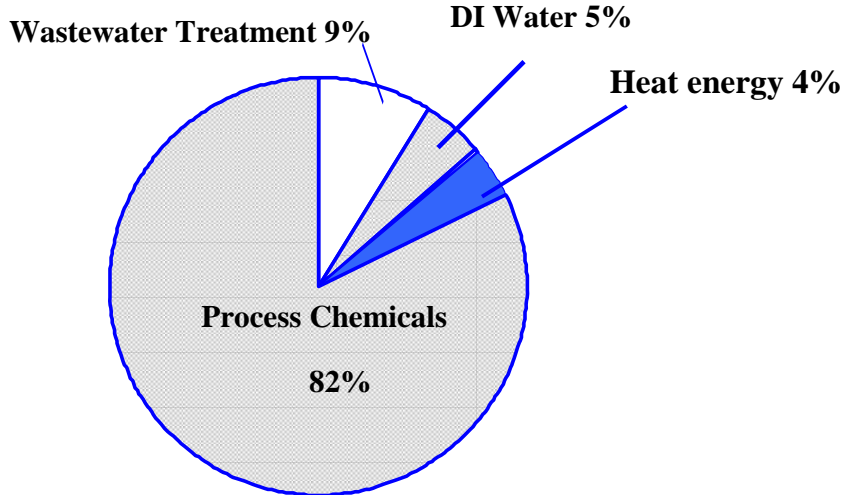


Figure 2. Cost Breakdown of Stage 2 Degreasing Process in an Automotive Plant's Phosphate Line