

TOTAL SUSPENDED SOLIDS RETURN ON INVESTMENT

POTENTIAL MONETARY SAVINGS WITH ROYCE TSS

Like you, we at Royce have to go through procedures to determine whether any capital item can be purchased. And like you, we have two primary criteria – are funds available and what is the Return on Investment (ROI).

In the wastewater industry, many plant operators and managers think there are no funds available. While that may be true in the general sense, funds are available; it is just not common knowledge. For example, most organizations have emergency funds for things like emergency repairs, accidents and breaches of EPA license conditions. Also, every well-managed organization these days is prepared to review a capital expenditure request, even if no funds have been allocated for the project.

ROI is fundamental to Capital Expense approval. As a general rule, the ROI has to be less than 5 years. If the ROI is near 5 years, the project will have a low priority. The closer the ROI gets to one year, the higher in priority it becomes. Any project with an ROI of less than 2 years is almost certain to go ahead, and go ahead very quickly. In fact, most financial managers would find the funds from somewhere if this were the case. They would even be prepared to source the funds externally (borrow) or leasing through partners of Royce Technologies.

To determine what the ROI is, we need to compare an automatic method of determining TSS values against a manual method. To manually measure TSS:

1. A plant operator or laboratory technician must go into the field once or twice a day and collect samples of both Mixed Liquor (ML) from all aeration basins as well as Return Activated Solids (RAS). If a solids balancing study is in progress, then sample collection may be as often as 4 times a day. Depending on the number and locations of necessary sample points, this can take from ½ hr to 2 hrs.
2. Samples are sent to the laboratory to perform a gravimetric analysis of the TSS in each sample bottle. This takes about 1 hour to perform if doing a batch at a time.
3. Results are tabulated and provided to operations in order to determine if plant operational changes are necessary.
4. If plant operational changes are necessary, the operator must adjust the Waste Activated Solids (WAS) flow rate either automatically or manually.

So what are the major benefits when using the Royce TSS system verses manual collection methods?

1. **Reduction of laboratory time:** It takes an operator and/or laboratory technician about 2 to 3 hours to collect and analyze TSS information from grab samples per sample collection which can occur from 1 to 4 times a day.
2. **Increase in accuracy:** Depending on how well the samples are collected and then processed, the TSS concentration in a grab sample can be up to 50% different than the daily average. There is a potential for human errors.
3. **Real time information:** Sampling frequency and waste flow calculations are restricted to once or twice a day. TSS meters from Royce provide this information continuously and real time.
4. **Better closed loop control:** Gravimetric test results delays waste adjustments for several hours. Instant TSS information assures that results are accurate, and not 2-3 hours old.
5. **Automatic color compensation & self-cleaning:** All Royce TSS instrumentation has automatic ambient light compensation and the ability for automatic self-cleaning of the optical surfaces to ensure the highest accuracy. Furthermore Royce Series 73 TSS sensors also have “phased array” automatic color compensation to prevent changes in color from affecting the measured TSS value.

6. **Primary element in automatic waste valve control:** The Royce TSS equipment is a vital part of our SRT Controller system, which automatically adjusts the Waste Activated Solids (WAS) flow rate for optimum control over your sludge age.

The most readily appreciated monetary benefit of the Royce TSS instrumentation is universal to every wastewater treatment facility and it is the Operator time and laboratory analysis costs which are required to collect and then determine MLSS & RASS and then control of the plant sludge aging process.

It has been shown through plant testing that reliable, automatic TSS instrumentation can reduce laboratory analyses costs by at least 75%. The following formula can be used to determine laboratory cost savings when using the Royce TSS instrumentation. Just plug in your plant's numbers to calculate the savings and payback period.

(Samples/year) x .75 x 1.0 (hours/sample) x \$20 / hour = Total Reduction in Sampling Dollars

System Cost / Total Sampling Dollars = Payback Years

Check the following example for more details:

The following example of cost reduction is for a plant collecting a minimum of 2 samples per day for both MLSS and RAS suspended solids. This example assumes only 5 days a week of laboratory analysis.

4 samples x 261 days = 1044 samples/year x .75 (reduction factor) x 1.0 (hour/sample) x \$20/hour labor cost = **\$15,660 per year.**

$\$8,000 / \$15,660 = .51$ years payback

\$8,000 is the cost of two typical Royce TSS systems (one for RAS and other for MLSS).

1.0 hours was used as the time for analysis – time/sample – when completing several analysis

\$20/hour was used as a typical average cost of laboratory staff

The above example shows exactly how cost effective the Royce TSS instrumentation can be; allowing for a very short payback period. If any of the other process cost variables are added to the laboratory savings, plant management should ask themselves how they can afford not to have this monitoring system.

Royce has focused this paper on the most readily appreciated monetary benefit of the TSS instrumentation, as laboratory analyses costs are universal to every wastewater facility. As it was mentioned earlier, the main goal of good TSS measurement is to calculate waste flow rate to promote a better plant biomass health. It is sometimes difficult to put a dollar value on better health, but it is easy to see the savings from reduced labor costs for sampling and laboratory analysis.

For more information about Royce and the Model 7011A TSS instrumentation, please contact your local representative, Royce Regional Manager, our factory at 1-800-347-3505 or see our web site www.roycetechnologies.com.



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