

# **Return on Investment Analysis Based on the Use of LABsys**

Prepared by Contek, Inc

## **Background**

The client has elected to use the LABsys computer program, produced by Contek, inc., to manage their concrete, aggregate quality control information. To develop a cost-justification for using LABsys, the client has requested that Contek prepare a "Return on Investment Analysis" (ROI) based on the use of LABsys.

Contek is a consulting and software design firm specializing in Quality Control and Mix analysis solutions for the construction industry's Aggregate, Concrete and Hot Mix Asphalt producers. Based out of Montreal, Quebec Canada with a second office in Dallas Texas, Contek has provided tailor made solutions to medium and large size material producers for over 11 years. With over 2200 users in 45 different countries, Contek is one of the fastest growing Quality Control software companies in the market today. Our in-house Concrete experts, Jim and Jay Shilstone, together bring over eighty years of industry experience to the table. Their tireless efforts in Concrete mix optimization and improving Aggregate grading, has profoundly changed the way in which we see and think about Concrete. Our state of the art technology for Portland cement concrete mixture optimization has long been recognized as providing industry-wide leadership for advanced concrete technology.

LABsys is designed to facilitate the operation of the quality control function for concrete, aggregate and asphalt producers. One of its strengths is its ability to manage concrete mixtures as materials and conditions change. For example, if the density of a concrete coarse aggregate decreases by 0.02, which is about a 1% change in density, it will result in about a 1/10 cubic foot over-yield in the concrete. This may not seem like much, but on a 500 cubic yard concrete placement, this translates to about 2 cubic yards of concrete. In today's prices, that can translate to over \$200 in lost revenue for a single placement. For one batch plant over one year, that figure may climb to over \$30,000, just because a single material changed. Combine the over-yield situation with excessive strength over-design, the cost of developing concrete submittals, the cost of documenting concrete performance and the time and effort required to update batch plant mix formulas, and LABsys can conceivably save your company \$100,000 or more per year.

With changing materials, the high cost of imported cement and the need for concrete to meet the needs of a variety of projects, contractors and designers place a high demand on quality assurance personnel. LABsys can help make QC operations more efficient and provide a rapid means of making adjustments to accommodate the changing market situation.

## **Payback based on LABsys use**

While Contek cannot guarantee that the client will accrue the financial benefits listed below, past experience with previous customers indicates that substantial financial benefits will occur. In the quality control industry the “rule of thumb” is that every dollar invested in quality results in a \$3 cost benefit. These benefits include “hard dollar” benefits and “soft dollar” benefits.

*Hard dollar benefits* – These are benefits that can be readily quantified. Some possible areas for hard dollar benefits are:

- Modifying concrete mix yields to eliminate over-yielding
- Reducing cement usage by reducing overdesign factors or improving cement efficiency
- Reducing asphalt content in asphaltic concrete mixtures
- Reducing manpower requirements to produce required documentation
- Reducing manpower requirements to manage plant mixture databases
- Incorporating less expensive non-standard materials while maintaining concrete quality
- Reducing handling of materials
- Improving plant management, including monitoring production tolerances

*Soft dollar benefits* – These are benefits that cannot be so readily quantified. Some soft dollar benefits include:

- Reducing problems, callback and concrete failures
- Obtaining more contracts due to more efficient mixes and bids
- Resolving problems before they can result in litigation
- Improving customer awareness and appreciation for the clients products
- Providing quality control personnel tools to allow them to do more with the same number of personnel

## **Examples of payback**

The following examples are based on actual data for some of the clients most common mixes.

**Yield:** Since concrete is sold by the cubic yard, it is typical to proportion a concrete mix to produce 1 cubic yard (27 cubic feet). This is done by calculating weights of materials based on their specific gravity so that the weights of materials will yield the desired volume. If the materials result in too little volume, the contractor will need to order more material than he expects and will complain. If the material results in too much volume, the contractor will not have to order as much material (resulting in a loss of sales) and the concrete producer will ship more material than is required (resulting in increased material cost).

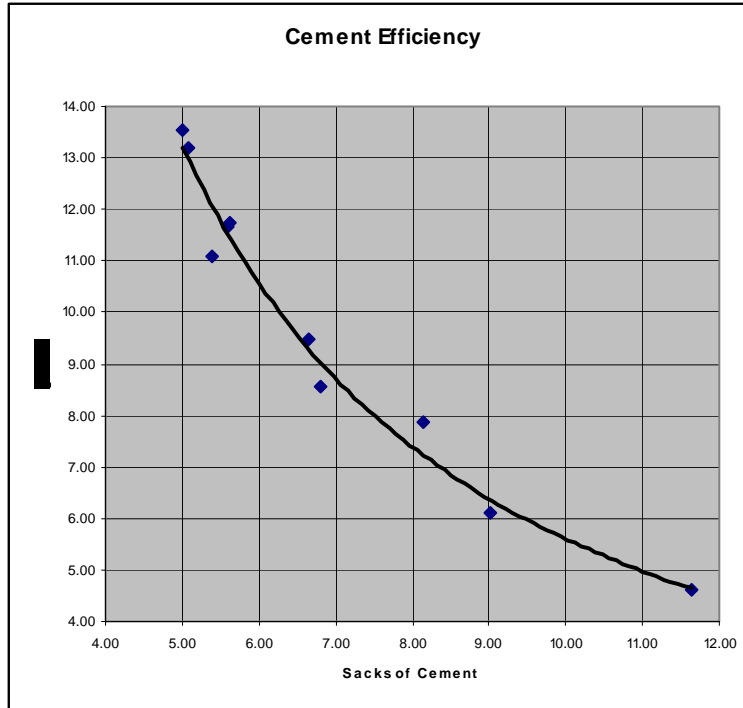
For example, if a concrete mix yields 27.3 cubic feet, that is .3 cubic feet (or 1.1%) more than is required. If a contractor can reduce his order by 1.1%, at a price of \$100 per cubic yard of concrete, the concrete producer will lose \$1.10 per cubic yard in sales. Additionally, if the materials for the concrete mix cost \$75 per yard, the concrete producer will have to ship \$0.82 more material than is necessary. This results in a total loss to the producer of \$1.92 per cubic yard.

Typically concrete mixes are proportioned to yield between 27.00 cubic feet and 27.2 cubic feet. A slight overyield reduces potential contractor complaints.

One potential outcome of this analysis is that the concrete mixes in the batch plants should be evaluated to make certain that the correct material densities are being recorded. In most cases the measured unit weight is actually less than the calculated unit weight. However, these values can change over time and it may be difficult to keep all the mixes updated without a computerized mix management system like LABsys. If the client can save \$0.05 per yard by monitoring yield, that can result in a savings of \$17,500 per year.

**Reducing cement:** Reducing cement is usually accomplished by reducing the strength overdesign for a mix or by increasing the cement efficiency (psi produced per pound of cementitious material). However, if project specifications require a minimum cement factor, it may be impossible to reduce the cement content for a given project. Each project needs to be evaluated on a case-by-case basis.

Another way to decrease the amount of cement used in a mixture is to improve the cementitious efficiency, or the psi produced per pound of cementitious material. This can be accomplished in a variety of ways, including improving combined aggregate grading or the appropriate use of mineral additives or chemical admixture. Accordingly, a concrete mix with 7 sacks of cement will have about an 8.7 psi/lb (about 5724 psi). A mix with 6 sacks of cement will produce about 10.5 psi/lb (about 5922 psi). In this example decreasing cement content can actually increase strength. This is based on actual test data. Of course it doesn't distinguish the variations in admixture. In this example, decreasing cement from 7 sacks to 6 sacks will slightly increase strength and can save approximately \$9.40 per yard if cement costs \$200 per ton. If the client can save only 10 cents per yard on its cement costs, that can produce \$35,000 per year in savings.



**Reducing manpower requirements:** During the year 2007 to date, the client has captured test results for 120 different projects. It can be fairly safely assumed that any project requiring concrete testing also required a concrete mix submittal. LABsys can substantially reduce the time required to produce a concrete submittal. If LABsys can reduce submittal production time by just 15 minutes per submittal, that will translate to 40 hours over a 9 month period or a savings of \$1200 (for a man with a \$40,000 per year salary at 50% burden).

**Improved batch tolerance management:** LABsys can monitor concrete batch weights and provide notification to QC personnel when batch weights are out of tolerance. The client has already saved over \$250 000 by reducing over batching of cement. Future savings can be lost by not maintaining oversight on batching tolerances. If LABsys can save only 10% of this amount per year, the savings will be \$25 000.

### Summary

If the client can make the changes and savings as previously shown, it can save the following amount per year:

Overyield correction	\$17,500
Cement reduction	\$35,000
Reduced manpower	\$ 1,200
Tolerances	<u>\$25,000</u>
TOTAL	\$78,700