



Vibrac Case Study: Non-Destructive Testing Cuts Costs

Industry: Carbonated Soft Drink (CSD)

Overview: Manual torque testers have been used in the beverage industry for decades. As a manual operation, a quality technician installs a bottle into a torque testing device and twists the cap by hand in the opening direction while obtaining an analog or digital torque readout; ***all performed with the interaction of a human hand as the sample locator and the driving force of rotation of the cap.***

What is Non-Destructive Testing? - Testing a sealed bottle by a manual test process will destroy seal integrity between the cap and bottle, resulting in product contamination and disposal of the bottle, cap, label, CO², and the product itself, when the test is completed. The cost of this kind of testing can lead to a large operating expense that bottlers incur over multiple lines and locations. New motorized cap torque test systems are computer controlled and stepper motor driven, and can provide precise torque measurement with up to 36,000 lines of resolution per revolution. This measuring method is so precise in fact, that when the cap is rotating in the opening direction, the computer torque sensor “feels” the very first release point of the cap and immediately stops, reverses direction, and reapplies the cap to a pre-set torque, without compromising the seal integrity of the bottle. The maximum torque measurement of the cap will be at the release point, so once the cap experiences its release point (maximum torque reading taken), torque only decreases as the cap rotates in the opening direction – so reversing direction immediately after the release point allows for the measurement to be taken and the cap to be reapplied so the seal remains intact and is not compromised.

Is the Savings Worth High Cost of Motorized Cap Torques Testers? Depends. The savings is related to how many samples are tested per the Quality SOP's (Standard Operating Procedure) set by the bottler. If the bottler tests twenty bottles of water per hour from one average filling line it may not justify the expense. Why? The water industry typically uses very lightweight bottles and caps (low material cost) and the product “water” is a low cost product. HOWEVER, on the other hand, large national water bottlers which produce high volumes of bottles, may test hundreds of bottles per day, and would see a very significant benefit by using a motorized cap torque tester by non-destructively saving caps, bottles, water and time on destroyed samples. Further, if you move upmarket to a herbal tea, for example, which is brewed and filled in a unique glass or plastic bottle, non-destructive testing can save bottler considerable waste in product (water and additives), bottles, caps, process time, labeling, etc. This is not to mention the benefits of easier and more accurate motorized testing, which ultimately reduces the problems of leaking or over tightening. The fact is, non-destructive cap torque testing can save the beverage producer a lot of money by putting tested samples back on the line.

Is There a Way to Estimate These Savings? Yes. Following is a financial analysis and some formulas that you can use to determine your potential savings using a motorized cap torque test system with non-destructive testing in comparison to manual testing. Product cost savings is between water and herbal tea shown in the example.

Savings Analysis – The amount you save will depend on a number of factors: your production volume, number of tests required per hour, number of production lines, cost of the product, cost of the bottles, caps and labels and the availability of time for testing. There may be additional costs associated with your beverage. You will need to determine the true cost of each bottle of beverage (your facility may already have this information available).

Let's gather some production data for your analysis:

1. Production Volume per Line: Number per hour (or per day or per week)
2. Number of production lines at facility
3. Cost of the product in the bottle - use your most popular size
4. Cost of the bottle, cap and label - each
5. Cost of filling, including labor, equipment costs, etc.
6. Number of production hours per day

An Example of Savings per Plant per Day:

1. Sample Rate = 10 per hour per line
2. Number of bottling lines at plant = 2 lines
3. Cost of the product in the bottle = \$0.05 each
4. Cost of bottle, cap, label, CO² = \$0.20 each
5. Cost of filling/labor/equipment = \$0.08 each
6. Production hours per day = 20 hours

Formula:

Samples per Hr x No Lines x (Cost Bottled Product) + Operating Hrs per Day = Per Day Cost

$10 \times 2 \times (0.05 + 0.20 + 0.08) \times 20 = \132 per day (in lost profits)

$\$132$ per day x 365 days = \$48,180 per year (in lost profits)

If your product and packaging costs are higher, your savings will be greater. The cost of a motorized cap torque test system is +/- \$16,000 and it has a life expectancy of about 8 years, with proper maintenance, and would provide a payback in approximately 120 days, or 3 months, according to the above calculation.

There's More....In Addition to Non Destructive Savings, since motorized cap torque test systems are computer driven they can be connected to a beverage producer's local or network quality system (InfinityQS or other LIMS system) and all torque data can automatically be downloaded and available for future audits. And, there will be no carpal tunnel injury claims from wrist twisting all day. Questions? Call us. We would be more than happy to speak with you.