

Qualifying Foreign Corks for Domestic Sales

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Purpose

This study was conducted to qualify potential synthetic cork vendors for sale within the United States. Saxco International, a leading supplier of packaging to the Wine, Spirits, and Brewing industry, has noticed a recent increase in demand for an alternative to natural cork. As with other packaging products, introducing a new synthetic cork requires due diligence on the part of the supplier to ensure the product meets the safety and functional requirements of the industry.

Thesis Statement

Company A and Company B's synthetic cork stopper's are viable options for domestic sale as an alternative to cork stoppers and existing synthetic stoppers.

Background

Cork has been used as a closure since the Greek and Roman eras. It is a natural material that comes from the cork tree, *Quercus Suber*. It is unique in its ability to provide a barrier against oxygen, while allow just enough oxygen to pass over time and aid in the aging of red wine. This is a property that alternative closures have found difficulty reproducing.

Cork has a few inherent downfalls. First, the trees that produce this material are only common in areas around Portugal, Spain, and Northeast Africa, making cork a limited resource. Cork is a natural substance, and as with wood, there are defects that lower the yield of usable cork. Even then, the cork is often classified to determine its quality grade. Low quality grades are not as effective at producing a proper seal, and along with various manufacturing techniques, can play a role in whether or not the cork crumbles into the product.

Cork also can influence the beverage it is sealing. "Cork taint" refers to the product's color, flavor, or aroma altering after coming in contact with the cork. This is less prevalent with strong, dark, liquors such as bourbon and red wine, and more of a concern with mild white wines or vodkas.

To combat the problems of supply/demand, quality inconsistency, and cork taint, the industry looked to alternative solutions. Some solution required changing the finish on the glass bottle to fit plastic screw caps and metal roll-on closures. Another product that is gaining popularity is the synthetic cork.

Synthetic cork manufacturers either extrude or inject polymer to create a synthetic shank. The shank can either be applied to a bottle and withdrawn with a bottle opener, or it can be bonded to a "stopper" using an adhesive. The stopper or "Bartop" is used as a grip to remove the cork and also to stop it from pushing through the bore of the bottle and into the body with the liquid it contains. The stopper is often decorated for marketing and can be made with a variety of materials including wood, metal, and plastic.

The synthetic material solves all of the problems inherent to natural cork. The manufacturing process has been fine-tuned to ensure consistent quality. The required material is readily available, and can be produced so that it does not affect the sensory properties of the product it seals. The synthetic cork, however, has not been able to fully replicate the unique barrier properties of natural cork, in that it produces a stronger oxygen barrier which will not allow red wines to age properly.

Methodology

Saxco International identified a three-step process to qualify two potential cork vendors:

- 1.) FDA compliance
- 2.) Mechanical
- 3.) Organoleptic

To aid in accomplishing our objective, we turned to several third-party facilities to provide their testing expertise. We also consulted one of our largest customers on their cork closure standards.

The FDA compliance testing was performed by Intertek. With their aid, we determined that the corks should be tested against the FDA requirement 21 found in the CFR 176.170. We provided samples, and following the stated standard, the corks were tested for total extractives in both 10% aqueous ethanol and 50% aqueous ethanol. The mean results of both potential vendors were below the limit of 0.5 mg/inch².

The Mechanical testing was performed by the APC lab, at the Rochester Institute of Technology, under the guidance of Dr. Changfeng Ge and his team. We supplied RIT with testing standards (modified) provided to us by our customer. The tests included:

- 1.) Foreign Material Weight Determination
 - multiple samples from Company B were tested because Saxco questioned whether or not the same shank material was used for various model stoppers.
- 2.) Cork Bartop Bond Test
 - multiple samples from Company A were tested because more than one bartop option was interesting to Saxco.
- 3.) Leakage Test for Corked Packages

*The standards can be found in the Appendix A.

The Organoleptic testing had not been attempted as of the point in time Saxco and this researcher had parted ways. The results of the Mechanical testing, detailed in the next section, did not impress Saxco enough to move forward and invest in the Organoleptic tests. However, Saxco engaged several Food Science programs, including the University of North Carolina to discuss testing options.

Results

*This information can be found in Appendix B, pg 16 - 20. The summary is as follows:

FDA Compliance - both Company A and B passed the test. Company A had a few borderline results, so Interek performed further testing which Company A passed.

Foreign Material Weight Determination – Both companies passed these tests. I question the validity of this test because in most cases, the weight of the filter paper decreased after the test. No residue or material was noticed on the filter paper.

Cork Bartop Bond Test – This test offered mixed results. The conclusive data is that the wooden bartop from Company A did not pass. All of the plastic bartop from Company B and the one of the plastic bartops from Company A (A1) passed. The majority (6/10) of Company A's standard plastic top (A2) passed the test, while 3 of the failures were very close to 8.5 lbs mark required to pass.

Leakage Test for Corked Packages – All of the bartops failed this test. The results were recorded on two attempts. A third attempt which included synthetic corks from two well established manufacturers, also failed and the results were not recorded.

Conclusion

The results from the tests show that more work and research needs to be performed before attempting to sell these products to customers in the U.S. market. However, the testing thusfar, does offer some insight on the product and future testing strategies.

Giving consideration to our sample size, the data from the FDA compliance test shows that the product is safe for food contact. Ideally, a larger study could be called for, but the results coincide with the information and assurances both companies willingly offered Saxco International during initial negotiations. Further, though neither company has sold product to the United States, both are established in Europe and Asia.

The Foreign Material Weight Determination data proved that the test, not the product, was an unexpected failure. More interesting than the weight calculation, which proves inconclusive because the weight of the filter paper actually decreased in most cases, is the fact that the technician found no visual evidence of foreign material on the filter paper.

The Cork Bartop Bond Test offered arguably the most useful data. Clearly, all of plastic stoppers A1 and B1 passed the criteria of the test standard, while one of the plastic stoppers (A2) had a majority pass. The wooden stopper failed completely. Saxco can be confident they have a robust solution for the plastic stopper, but a new bonding agent for the wooden stoppers that is safe and effective must be found.

The data from the Leakage Test for Corked Packaging testing was the biggest surprise. Saxco went through great pains to be sure that both synthetic cork manufacturers were familiar with the bottle that their product would be used on. Sample bottles and the bottle specification were sent with the request that they send the ideal stopper for our tests.

Saxco expected no failure for this test, and when all the corks failed, the test was modified to simulate a more “real life” testing atmosphere. When the corks failed again, sample corks from established synthetic cork companies were sourced to act as controls. Upon the third failure, including both the controls, Saxco determined that the testing specification must be faulty.

Concerning this researcher’s earlier Thesis Statement, the collective results prove inconclusive. Saxco had decided to judge the synthetic corks in question based on the testing protocol of a customer that is notoriously over-zealous in their requirements. Further, Saxco had assumed that synthetic corks had been designed to be benchmarked against natural corks in terms of performance.

However, the results and determination from the Foreign Material Weight Determination combined with the Leakage Test prompted this researcher to question whether or not Saxco’s customer’s specifications for natural corks were a valid test for synthetic corks.

In any case, more testing should be performed in order to familiarize Saxco with the limits and potential of the product they intend to sell.

Recommendations

As mentioned previously, further testing should be considered. In hindsight, and concerning future studies, several changes should be made to more accurately test the synthetic corks.

If possible, a testing protocol specifically formulated for synthetic corks should be used. For comparison sake and to add to Saxco’s own expertise, a suitable natural cork could be used as a control, but not as a benchmark for success/failure.

Also, all testing should be performed with a suitable synthetic cork solution from a manufacturer that is established in the US. This/these controls should be used as the more realistic benchmark the potential suppliers will be held against.

Lastly, a larger sample size could really help to solidify Saxco’s confidence in the potential suppliers. Admittedly, it would require more of an investment. However, the value in the first set of tests is that they can be looked at as a training session; teaching Saxco and the technicians how to prepare for a more thorough review of the synthetic corks.