

## Bottle Cap Torque Testing: Why is it Important?

### The History of Cap Torque Testing

Over time, the subjective feeling of cap tightness triggered the development of more reliable and consistent measurement devices, such as the spring based manual torque tester (analog).

By the late 1980's, ergonomic concerns and repeatability issues (such as varying cap gripping pressure and employee joint/muscle issues) lead to the development of manual (digital) and automated torque testers.

Ever since, changes in materials, marketing themes, transportation methods and packaging aesthetics and processes (induction sealing, hot filling) have created new challenges and drives continuous product improvement on this field.

### Why is Cap Torque Important?

Consumers judge bottled product quality based on many observations:

1. The appearance of the package.
2. The appearance, efficacy/taste of the product.
3. The ease of opening and re-sealing the closure.

Brand owners, bottle cap/bottle suppliers are under tremendous pressure. They must:

- 1. Reduce the cost of the packaging (lightweight, 1 vs 2 piece enclosures).**
  - Lightweight bottles are pressurized to maintain product quality and package integrity. Insufficient torque and a resulting bad seal can reduce shelf life, cause product leaks, and the bottles can collapse when stacked in multiple rows.
  - Lightweight caps are more sensitive to over-torqueing. Over-torqued caps can develop cracks causing product spills and shelf life issues.
- 2. Improve the shelf-life of the products (hot-filling, induction sealing).**
  - The different thermal expansion contraction rates of the cap, liner and bottle materials, the varying dwell times between cap tightening and release torque measurements can all result in different release torque values.
  - Too much torque can cause wrinkles on the foil resulting in a bad seal, spills and reduced shelf life. If the threads strip, or the applied torque is too low, the foil will not be seated properly resulting in shorter shelf life.
- 3. Maintain the quality of the product while innovating package design, improving aesthetics, ergonomics and security (tamper evident band, child-resistant design).**
  - Example: User configurable cap that can function both as Child-Resistant (CR) and non-CR closure. Such design increases QC requirements:  
The torque must be monitored to maintain good induction seals.  
The CR functionality (shelling/reverse ratchet/topload) needs to be controlled.

For more information, [contact](#) a Mesa expert today.