

Receiving sporadic results in the same production run from your SureTorque Analyzer?

If your [SureTorque Analyzer](#) is producing a varied range of torque values in the same production run, there are a few common causes:

- Resin changes (specifically color, slip, nucleating agents) can influence the topload/gripping pressure sensitivity of the cap or the coefficient of friction between the closure and bottle threads.
- The capper drive speed or the chuck pressure may be fluctuating, resulting in varying application torque.
- When multiple operators use a torque tester and change-overs are common, the setup of the torque tester may be inconsistent. Variation in the software and hardware setup can lead to varying release torque results.

Case study:

A line operator sets the capper's application torque setpoint to 60 lbf.in. During the capping process validation, a chuck calibrator is used to measure the torque applied by capping heads. After hundreds of application cycles, it is found that the chuck application torque is consistently 59.5 +/- 0.5 lbf.in.

However, when the operator is testing the caps for removal torque values, they find that the values vary between 32 and 48lbf.in. Why?

Further closure/bottle system analysis reveals that depending on individual cap/bottle and capping profile (application angle), it can take up to 20 lbf.in. of the application torque to overcome the topload introduced friction.

Now, let's assume that the topload independent torque retention of the bottle/closure design is 80%, (note: the dwell time must be controlled in order to avoid torque variation due to relaxation). So, for the 60 lbf.in. application torque, the operator should read $0.8 \times 60 \text{ lbf.in.} = 48 \text{ lbf.in.}$ removal torque. However, due to the varying topload introduced friction (varying application angle), it is found that the removal torque varies between 32 lbf.in. and 48 lbf.in.

Similarly, when measuring removal torque, topload introduced friction can influence the torque readout, producing skewed data.

How to eliminate topload variation?

Based on our experience, one way to eliminate topload variation on CT closures is to slightly pull the cap and bottle apart during the application/removal cycle. On the ST-120S and ST-S3 models, this may be accomplished by adjusting the topload variable in the test recipe and manually adjusting the pressure platform/head pressure cylinder settings.

Another good option is to purchase the "floating" chuck option. The floating chuck is designed to follow the vertical travel of the cap as it is rotated CW or CCW.

It is also good idea to work with the cap supplier and confirm that the color, slip, nucleating, etc. agents are controlled and stay within reasonable levels from one batch to the other.



Careful consideration of the color, nucleating and slip agents can greatly reduce the frequency of torque/seal integrity issues and simplify the production and quality assurance of the product.

To learn more about variations in cap torque testing, download our [whitepaper](#), or [contact us](#).

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