

# Methods of Applying Caps to Bottles

## Introduction

The idea of screwing a cap onto a bottle might appear to be simple. After all, we all do it every day with our own hands. However, to do it reliably with good repeatability in the production environment is a technical challenge.

There are various methods for applying the torque to screw a cap onto a bottle and these notes are intended to explain the basics of some of these methods.

## The Friction Cup

The friction cup is best described as a pneumatic screwdriver with a rubber friction cup that simply pushes down on the cap and uses friction to rotate it onto the bottle. Generally restricted to manual operation, it is occasionally incorporated into an automatic machine.

### Advantages

- Simple in design
- Inexpensive

### Disadvantages

- Repeatability is entirely dependent on the consistency of the applied downward force
- Requires constant measurement of operational variables and regular adjustment
- Susceptible to high wear rates
- Not suitable for anything other than circular caps

## Collet

Normally used in speed-dedicated machines, collets need to be designed to close tolerances to ensure that they grip the cap accurately and reliably.

The collet application is restricted totally to round caps.

## Friction Belts

Friction belts are used to cap bottles where the caps have been pre-placed and, in some instances, pre-started.

The caps are tightened by contra rotating belts that contact opposing sides of the cap.

### Advantages

- Continuous
- Speed of operation
- Cheap solution where quality of finished product is not an issue

### Disadvantages

- Can not be automated. Requires a high level of operator interface
- High wear rates on belts
- Uniformity of tightness can not be guaranteed
- Caps prone to damage
- Excessive overhead in maintaining accuracy of operation

### Tightening Wheels

Tightening caps with wheels is a variation on belt tightening. The containers to be capped are driven by belts. The caps, already located on the containers, are then re-tightened by passing between an initial set of opposed driven wheels above before being finally tightened by a second set of opposed driven wheels.

### Advantages

- An improvement on the basic belt system
- Less chance of over-tightening

### Disadvantages

- Tangential contact between wheels and cap results in instantaneous contact. Torque control is difficult to set and maintain.
- Torque is applied by opposing forces from the wheels combined with the movement of the cap through the wheels. Unless set precisely and monitored regularly, the forces could distort the cap and container. Cap ovality is the likely result.

### Gripping Jaws

Gripping jaws (the basis of the Cap Coder Tri-Torque solution) use 3 rubber-lined jaws. These are designed as change parts to ensure that caps of various sizes and types can be screwed to bottles automatically. Of all the existing capping methods, the jaw operation mimics the natural use of the human hand.

### Advantages

- All round equilibrium grip minimises cap distortion
- Rubber linings prevent cap damage even on highly reflective metalised caps
- The linings provide good grip thereby requiring less gripping force
- The large variable gripping envelope enables the capping of a wide variety of cap designs; Spray Nozzles, Tamper Proof, Flip Tops, etc.
- Full circumferential contact allows oval and eccentric shapes to be handled with confidence
- Facilitates picking and placing of caps onto bottles lending itself to fully automatic production operations

### Disadvantage

- Marginally longer dwell time to engage caps