



# Story of Spillage and Foaming of Toilet Cleaner bottles

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## The Problems:

- Dripping and spillage (foaming from bottles) & product from nozzles
- Frequent leakage from syringes
- Plug damage in capping machine
- Weight variation (slight)

# Main Issues

- Forming and Dripping spoils the look of the bottle and such bottle are not accepted by the customer.
- Loss of sales
- Complaints
- Free Replacement
- Loss of Profits





# The Way we Think

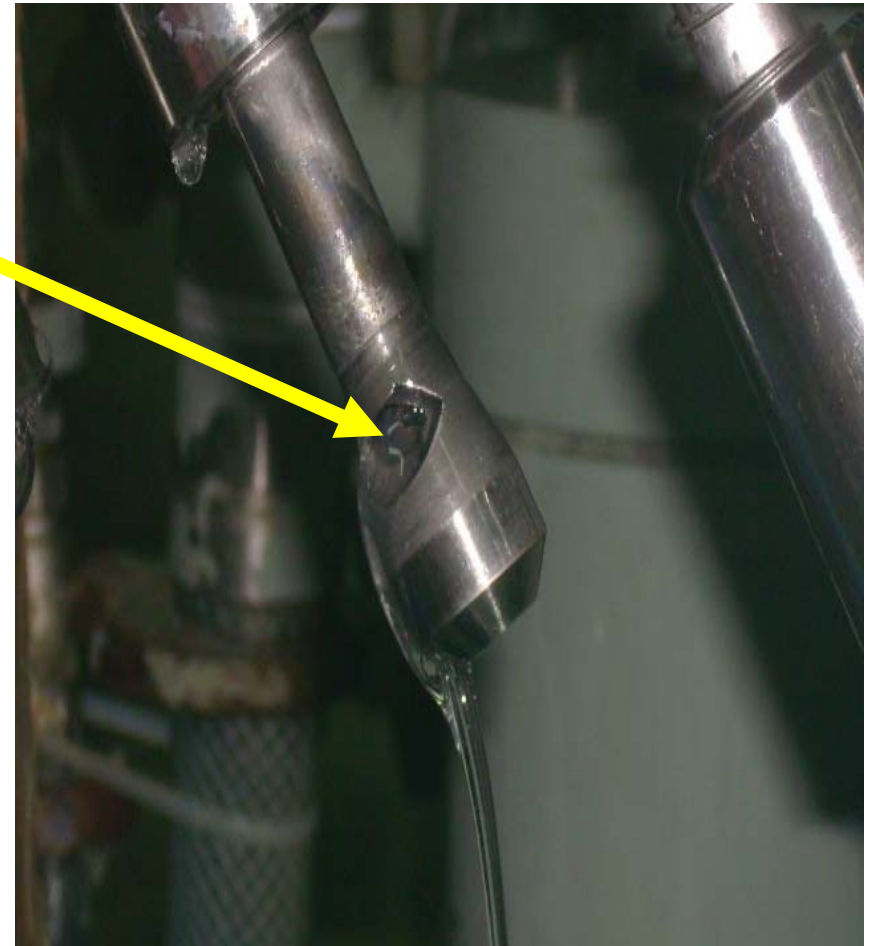
- Observe
- Respond & Design Solutions
- Do it (Implement)
- Get on-going benefits for life





# Interesting Observations

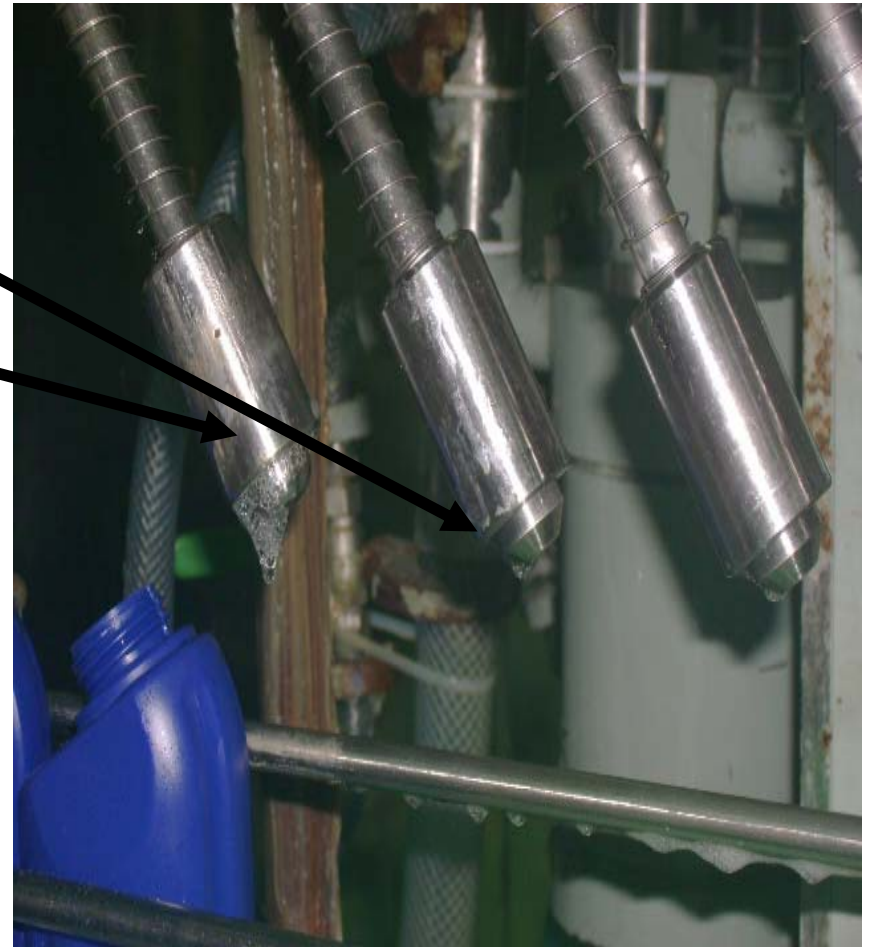
- Dripping takes place from the sides of the opening.





# Interesting Observations

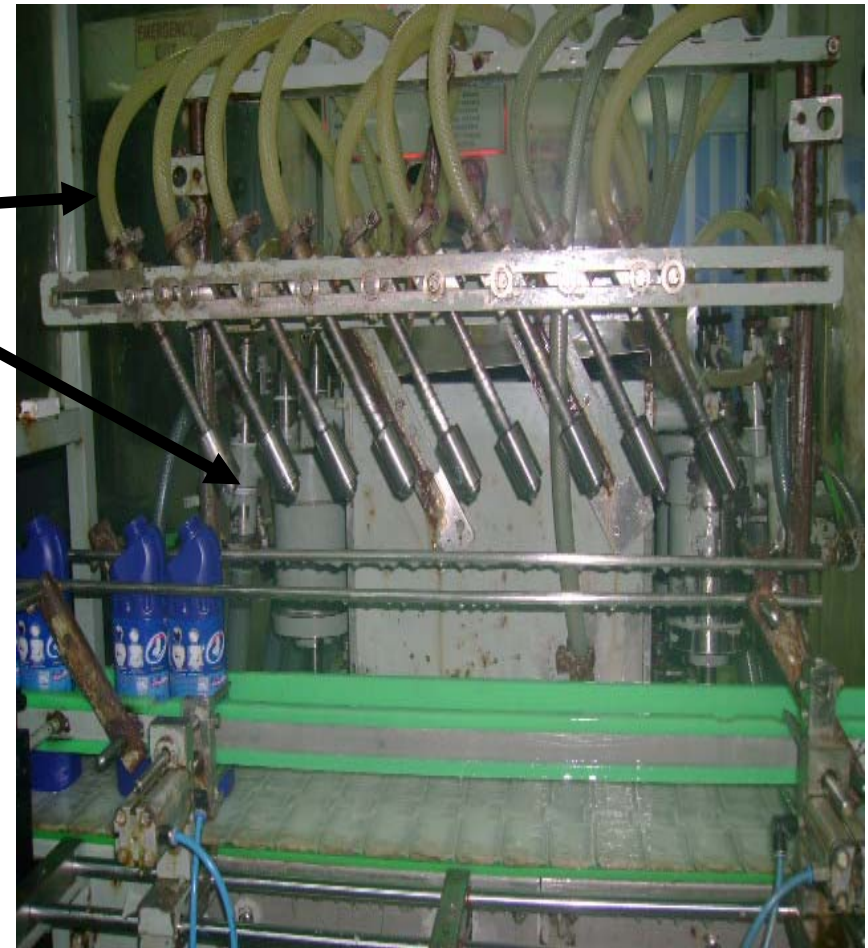
- Interesting to note that dripping is taking place in a few nozzles only – not on all nozzles!





# Interesting Observations

- Here dripping is taking place from one nozzle only and the pipe is also leaking – indicates air entrapment in the pipe.





# Interesting Observations

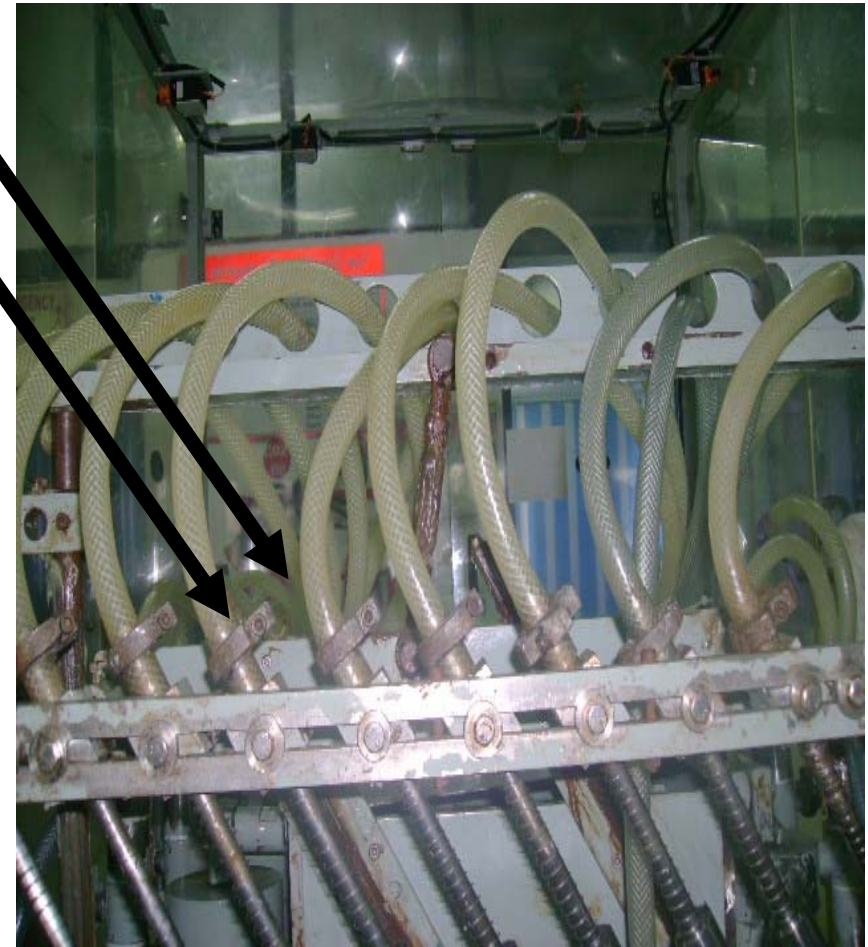
- Note that foaming is taking place in one bottle (in the set) → Air + Flow turbulence





# Interesting Observations

- The connections leak at the ends – points of air ingestion into the system – the primary cause of foaming



# Interesting Observation

- The appropriate sealing of the system entirely depends on the critical range of surface roughness (CLA – Center Line Average)



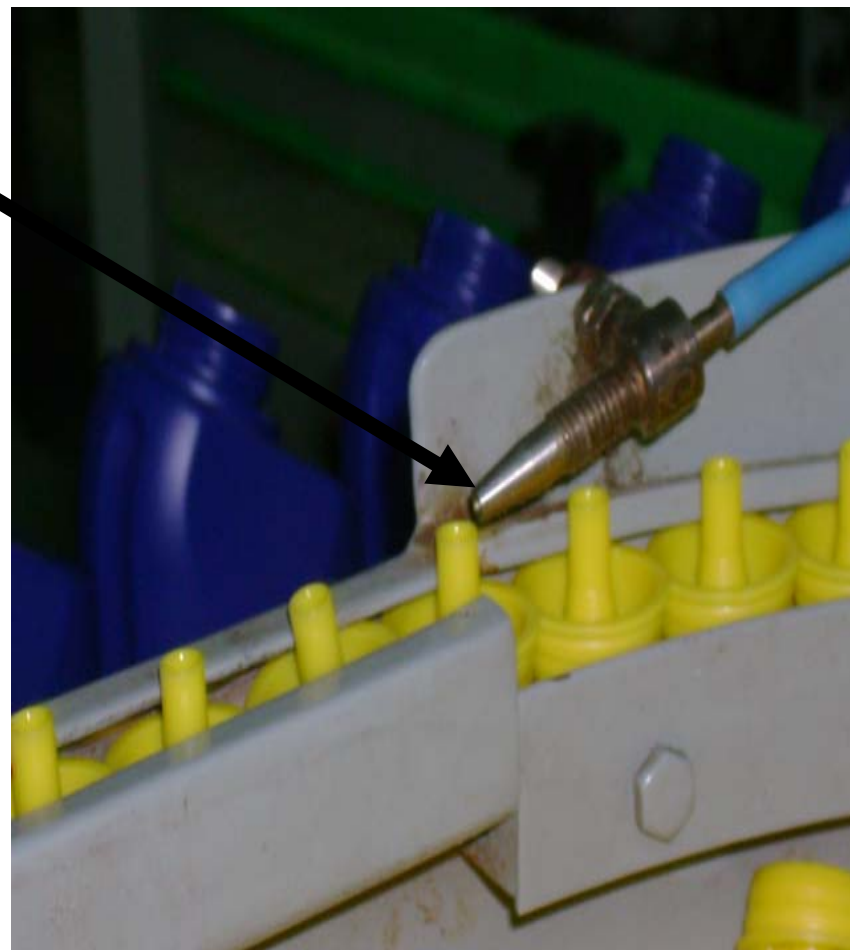
## Interesting Observation

- The screw-in mechanism does not hold the cap at the center.
- And the cap placing mechanism pushes the cap just too hard onto the bottles – squeezing the bottle and stressing the caps



## Interesting Observation

- Wastage of compressed air. Could be redesigned by using natural forces of gravity and eliminating or reducing the use of compressed air.





# Intelligent Response

- If the elliptical slit is along the stem, i.e. 'vertical' instead of being horizontal less dripping would take place.





- Eliminate false air entry
- Shorten the length of the nozzle
- Reduce the land area at the end of the nozzle.
- Either increase the spring tension or cut the present length of the spring by half to increase acceleration.



- Turn the elliptical delivery hole at the end of the nozzle by 90 degrees so that the major axis is in line with the bottle.
- Make a groove 2 mm wide and 2.5 mm deep at the end of the nozzle after the delivery hole.
- Make the filling pipelines (plastic) shorter and straighter as possible to reduce the friction losses during delivery.
- Clamp the plastic pipes in an asymmetrical manner so that the vibrations generated due to flow are cut off.



- Reduce the pressure of the cap placing mechanism by half.
- Reduce the travel stroke length of the cap placing mechanism
- Adjust the position of the cap tightening mechanism so that it is able to hold the cap at the centre.
- When the syringes are due for re-grinding specify the surface roughness to be within 3 microns to 6 microns (CLA – Centre Line Average). This would automatically provide better sealing and prevent side leakage.

Effects:

R A P I D

INNOVATION



- No further dripping.
- No further foaming.
- No bottle spoiled
- No loss of brand image
- No rejection
- No loss of profitability
- On-going benefits for life