Conveyor lubricants: benefits, application and optimization in the packaging hall

M-12

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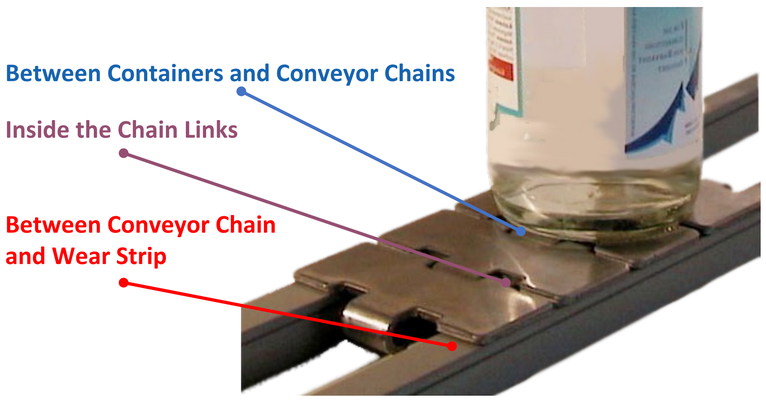
Why Use Conveyor Lubricants?



- Facilitates package movement at high speeds without falling
- Increase the usable life of conveyors and wear strips by reducing friction

Wet vs. Dry Conveyor Lubricants

Wet Conveyor Lubricants

- Liquid formulation
- Common active ingredients:
  - Fatty acids
  - Amines
  - Silicones
  - Oils
- Typical dilution range: 0.2% - 1.0%, depending on product and application
- Application frequency:
  - Continuous
  - Intermittent (30 seconds on/off)
- Visually a foam profile, wet conveyors/floors

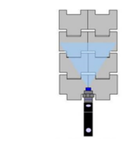
Dry Conveyor Lubricants

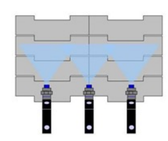
- Liquid formulation
- Common active ingredients:
  - Silicones
  - Oils
  - PTFE
- Typical dilution range: product not diluted, applied as is.
- Application frequency:
  - Sparce (6 seconds/hr)
  - Immersion
- Visually a flat, shiny or dry conveyor surface

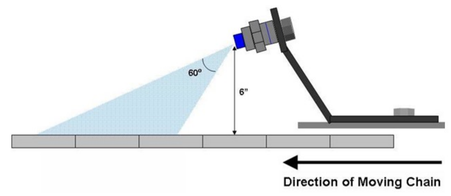
Installation Guidance

Application Locations

- Place nozzles/brushes at the beginning of a conveyor
  - Allows lubricant to absorb into chain before conveyor is inverted
  - Place to cover multiple chains when possible





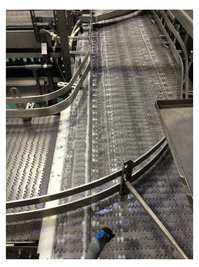


- Direction & distance from conveyor
  - Nozzle: 6” – 8” from conveyor allows full cone-spray
  - Brush: direct contact with conveyor chain
  - Ensure application is on conveyor as improper direction causes:
    - build-up on areas that don’t require lube
    - Lube dripping onto floor

Troubleshooting

Best Practices

- Minimize application points near back end of a line; case-packers
  - Packers often rely on back-pressure to work properly
  - Too much lube will prevent back-pressure, causing packer jams
- Cleaning still needed with dry applications to prevent dirt build-up on conveyors
  - Material on conveyors
  - Dry Lube buildup
  - Corrugate dust



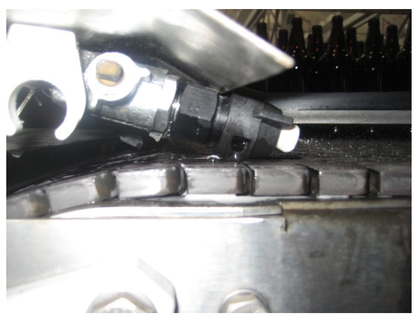
Too much or not enough lubrication?

- Signs of UNDER lubrication
  - Bottles falling when shifting across conveyors on slow-down modules
  - “Jerky” motion as bottles transition
  - COF above 0.17
  - Cans “twisting” when on the transfer more than 90 degrees
- Signs of OVER lubrication
  - Lateral bottle movement as they exit the filler
  - Packages contact guardrails and twist or fall from out underneath them
  - Packages “bridging” across the conveyor and creating a jam
  - COF below 0.08 (This number is higher as you get closer to case packers)

Line Concerns Not Related to Lubricant

- Incorrect chain speeds
- Uneven or gapped chains
- Mis-aligned guide rails
- Bottles traversing dead plates
- Mis-aligned combiner
- Excess product spillage
- Bottle malformities
- Bottle pressure on the line

Lubricants are not made to cover up these problems!
Look for these mechanical problems before assuming a lubricant issue –
especially if COF is good.



Coefficient of Friction

Measuring Process

- Coefficient of Friction (COF) is used to validate the application and lubricity of the lubricant on the line
- A simple fish-scale and rope is all you need to measure COF
- COF is calculated the following way:

$$\frac{\text{Drag of package}}{\text{Weight of package}} = \text{Coefficient of Friction}$$

- Good locations to check COF – Slow down module, near accumulation table, before packers, etc.

Performance Guidance

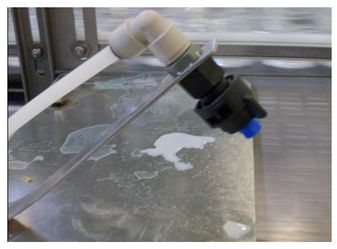
- Proper COF range on a beverage line is 0.08 – 0.17, depending on situation
- Higher speed lines, tall and slim bottles will require lower COF
- Areas that require lowest COF (0.08 – 0.12)
  - Combiner/single-filers
  - Slow-down modules
  - 90°turns with dead plates
- Areas that need higher COF (0.12 – 0.17)
  - Packer in-feeds
  - Inclines and declines

NOTE: These are guidelines. Individual plants/lines may require different COFs for optimal performance; this is a good general starting point

PET Stress-Cracking

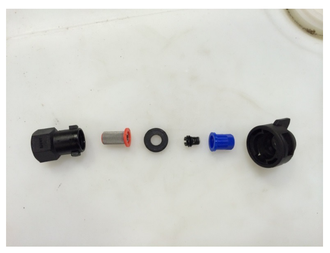
- SOFT WATER catalyzes polymer chain breaking of PET
- All water that contacts outside of bottles should be HARD
  - Hardness ppm > Alkalinity ppm + 20 ppm
  - Water contact areas include warmers, rinsers, and overhead sprayers
- NO WATER SOFTENERS for PET bottle warmers and rinser water
- Soap wet lubricants can provide protection for PET bottles
- ALWAYS CHECK WATER when switching lubes

Hardness > Alkalinity NO SOFTENED WATER



Nozzle Set-Up

- Orange check valve in nozzle should not be removed
  - Keeps zone pressurized
  - If removed, will impact other nozzles’ ability to apply lube
- Black spray tip should not be removed
  - Creates “cone-spray” of lube which covers wide surface area across conveyor
  - If removed, will spray in a stream, which will not provide adequate coverage
  - If nozzle tip is clogged, troubleshoot your lubricant and water for potential causes



Summary

- Lubrication is important not just for the package/conveyor interaction, but also for conveyor/conveyor and conveyor/wear strip interactions
- Wet lubricants and dry lubricants are very different, each have their own attributes
- Measuring COF is easy, and is the BEST way to assess the current state of lubricity on a line
- Proper installation and application set-up will ensure success of the product and help minimize use
- Over-lubrication and under-lubrication will cause problems - symptoms are similar
- Lubricants should NOT be used to cover up mechanical problems
- With PET bottles, ensure hardness ppm > alkalinity ppm to prevent stress-cracking