



The Economic Benefits of the Dry Lube System

An independent case study of a Dry Lube System compared with the traditional Water Based System in soft drinks bottling industry.

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1. Introduction

1.1 In the highly competitive soft drinks/beverage industry, production and packaging of the product is one of the key processes in the supply chain to the consumers. This operation involves manufacture of the product in batches followed by packaging the product in bottles/cans in high speed packaging lines. The packaging lines consist of series of conveyors which transfer the bottles/cans through inspection section for quality control, labelling of the bottles/cans and finally to the palletising and shrink wrapping machines for dispatch to the storage areas. The conveyors operate at high speed and require reliable and efficient lubrication to ensure smooth operation of the lines.

2. Water-based Lubrication System

2.2 The traditional lubrication system consists of water-based soap solution, which is applied to the surfaces of the conveyor belts on a continuous basis. Soap solution is pumped from a storage tank and mixed with water to a concentration of between 0.75 - 2%, this mixture is then pumped to injection points on the conveyor belts. The water-soap solution is collected in drip trays which discharge into drains systems and then to the effluent plant for disposal. Whilst this system provides some of the desired lubrication properties it has certain drawbacks as follows:

- The quantity of water required is high at circa 300-500ml of soap/water solution per 1-2litre of bottle of product for both the lubrication and cleaning of lines and floors
- Spillages on floors caused by frothing of soap solution resulting in hazardous working conditions around the packaging lines
- Requirement to treat the soap/water solution in the Effluent Treatment Plant before disposal
- Requirement to clean the lines to remove soap deposits from the conveying system
- High friction between the bottles and conveyor belts
- Occasional unpleasant odours are removed

3. Dry Lube Lubrication System

3.3 Recently an alternative to the traditional water based lubrication system has been developed. The new system involves application of minor quantity of H1 Food Grade Approved oil lubricant to the conveyors. The system consists of a small reservoir from which the lubricant is pumped to the distribution manifold on the conveyors. The dry lube system is a significant step change from the traditional water based lubrication system. In addition to overcoming the above drawbacks the dry lube system has provided operating cost benefits, reduction in minor accidents, operational benefits and reduction in effluent treatment requirements.

4. Benefits of a dry lube system compared with a traditional water-based system in a packaging line.

4.1 The significant benefit of a dry lube system is the elimination of water and its associated drawbacks. The benefits below are quantified based on a case study of a single line operating at circa 18,000 bottles/hr of capacity of between 1-2 litres. The quantified benefits are based on evaluation of a packaging line retro-fitted with a dry lube system for the past four years.

- Savings in water usage at circa 2500-4000m³/annum equivalent to £1250-2000/annum at water charge of £0.5 /m³.
- Based on consuming 3000m³/annum of water at a 0.75-2% soap concentration with detergent priced at £1/litre, there is a cost saving of £25,000-60,000/annum.
- Reduction in treatment of effluent water and water discharge levy. The levy varies but some authority charge circa £1/M³ of water discharged. At the above usage rate the savings is estimated at £2,500-4,000 /annum.
- Dry lube system results reduction in friction between conveyor belts and wear strips resulting in reduced frequency of changing the belts from once every two years to once every four years. The savings are estimated at around £10,000/annum per packaging line.
- Reduced maintenance costs estimated at around £2,000/annum per packaging line in addition to costs in 4.3.
- There is reduced friction between the conveyor and the bottles at a minimum this has resulted in increased utilisation time of around 1.5- 2.0% due to reduced incidents of falling bottles, in one case there has been an improvement of 20% utilisation since the system was installed two years ago.
- Estimated 50% reduction in minor accidents resulting from improved working environment surrounding the packaging line.
- For a new line there will be capital cost savings resulting from savings in water handling equipment and reduced loading on the effluent plant. There is no need to install drip trays, additional soap storage, incremental or new effluent treatment and associated pipe-work.

5. Conclusion

5.1 The following table is a summary of the cost savings based on a single line operating at 18,000 bottles/hr.

Item	Saving £/Annum
Water Usage	1,250 – 2,000
Soap Concentration	25,000 – 60,000
Effluent Treatment	2,500 – 4,000
Replacement of belts	10,000
Maintenance Costs	2,000

From the above, I conclude that a dry lube system not only provides a lower cost operation with a savings between £40,000-78,000 annum, but also a safer, more environmentally beneficial and productive system.

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