



# Lift ropes and lubrication

Following several lectures for the Lift Academy, Dennis Major provides answers to frequently asked questions around lift rope lubrication and maintenance

**W**hen it comes to steel wire ropes for lifts and elevators, getting lubrication and maintenance right couldn't be much more critical. At the most basic level, all such ropes must be periodically checked for equal tensions, as well as for lubrication, while lift ropes (whether on traction or hydraulic applications) must also be re-lubricated in a controlled manner. The problem, however, is how much and when.

Back-tracking for a moment, useful life on a rope can be reduced by up to 50%, if it is allowed to dry out – so a relatively small investment in time and materials to ensure good lubrication can save significantly on rope changes.

So, returning to the problem, much depends on the rope core – whether it's made from natural or synthetic materials, or steel wire. Lift ropes mainly use fibre cores (generally sisal), partly because the fibre acts as a lubricant store. However, if too much grease is injected, that can cause problems, mostly due to rope diameter shrinkage over time, as lubricant migrates during use. Since the life of a lift rope is closely linked to its diameter, it is essential that the core maintains its volume.

Suffice it to say, special controls must be imposed, including during manufacture – and not only on the evenness of the core, but the quantity of lubrication applied. It's slightly different with the alternative steel core ropes, quite simply because there is no lubrication store, so no shrinkage as they dry. However, on these ropes, once the lubricant applied during manufacture starts

to dry out, external lubrication is essential, since there is no other replacement source.

So what do you need to know about rope re-lubrication following fitting? Although elevator ropes are lubricated during manufacture to prevent corrosion and abrasion, the quantity should only be enough to ensure that lifts operate with sufficient traction and without slippage. So, given that lubricants tend to bind dust and particles, this initial preparation is hardly ever sufficient to cover a rope's service life – meaning that re-lubrication is essential.

As a rule of thumb, if wiping a clean white cloth over the rope shows a faint smudge, there is no need for lubrication. However, there are no other generic criteria, because frequency and quantity depend on such factors as: lift usage, the environment (particularly temperature and dust in glass-clad scenic lifts and motor rooms), sheave material and wear (hardened traction sheaves require more re-lubrication, as no graphite is released), and slip between the rope and sheave.

Some rope manufacturers suggest usage or time periods for maintenance management – for example, six-monthly intervals or after 250,000 starts – but service engineers must use their own judgement. Remember, the aim is primarily to avoid internal rope abrasion and corrosion – commonly known as rouging. And when rouging occurs, it cannot be stopped with lubricants: minor cases can be treated to slow the corroding process, but the rope can never be restored. The only option then is to schedule a rope replacement and look to improve

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to that used in manufacture of your rope. Lubricants used in the crane rope industry are not recommended, as they are designed for outdoor use and there is less concern around compromising traction. Hydraulic oils or worm gear oils are also not suitable, while lubricants with particle content (such as molybdenum sulphide or teflon) are not advised for traction elevators, as they can reduce the friction between rope and groove.

In fact, rope lubricants diluted with solvent are best – although take care with ventilation and do not use excessively (they can also compromise traction). Remember, also, that in some countries, including the UK, re-lubrication agents containing solvents are prohibited for occupational safety reasons. Further, if a fixed lubrication device is used with an electrostatic pad, then a non-solvent based lubricant becomes essential.

Finally, I often get asked about lubrication in unusual lift installations and, in summary, the following is best practice. If humidity is high in the shaft, no special precautions are required, other than more frequent rope checks – although it may be advisable to insist on galvanized ropes.

For outdoor installations, apart from those in very dry climates, galvanized elevator ropes must be used, but with water-resistant lubricants. Also, re-lubrication must be performed using lubricants containing solvents, ideally during cooler weather and after extended dry periods. As for installations outside the normal 0° to 35°C range, the only real issue concerns elevators operating between 35° and 50°C. At these temperatures, you need to check lubricant condition more frequently, because it tends to evaporate more quickly. **PE**

preventative lubrication next time.

So what are the preferred methods of re-lubrication? Fluid lubricants can be applied using a can and paintbrush or decorator's roller, but be cautious with spray cans: they should only be used for small lengths. Either way, only use minimal quantities and ensure that the elevator executes several round trips, watching for slip behaviour and applying further lubricant, if necessary. If you're in any doubt as to whether the rope still has adequate traction, carry out a round trip before and after re-lubricating: car completely up, make a joint chalk mark across the rope and elevator; car completely down and then back up again – there should be no major offset.

### High-speed lifts

Permanent lubrication devices are a good alternative, particularly on high-demand, high-speed and -rise applications, and especially where steel core ropes are fitted. However, it is important that all falls of the rope are lubricated and that may require more than one lubricator. It is also very important to install the lubricator correctly and best to use a type that applies oil electrostatically. Additionally, to avoid over-lubrication, fixed rope lubricators must not be constantly topped up: check the ropes first before replenishing. That said, roped hydraulic elevators and compensating ropes may, and indeed should, be more heavily lubricated, because the precise quantity of lubricant is not as critical as it is with traction sheave ropes.

As for the lube itself, don't go for very low viscosity oil, but do be sure it has sufficient penetrative capability. The base must also be similar



## Pointers

- Useful life of lift ropes can be reduced by 50%, if they are not re-lubricated
- Special controls need to be imposed on lift rope lubrication, including during manufacture itself
- If wiping a clean white cloth over a lift rope shows a faint smudge, there is no need for more lubricant
- Fluid lubricants can be applied using a paintbrush or decorator's roller, but be cautious with spray cans
- Lift ropes mainly use fibre cores, which act as a lubricant store