

 **O.I.T.A.F.**
Work-Committee No II
Characteristics and Inspection of Ropes

 **FATZER**


Lubrication and Re-lubrication




Bonjour
Buon giorno
Good morning
Guten Morgen


Full locked spiral ropes / track ropes

Name: Bruno Longatti Number of slide 1

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Lubrication and Re-lubrication




Have a look behind the curtain of the ropeways and their ropes


The guests are happy and enjoy the excursion

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Lubrication and Re-lubrication



It is unsafe and very expensive!

We do not feel happy and safe about this view!

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We do not feel happy and safe about this view!

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Lubrication and Re-lubrication

Topics

- ▲ Introduction, Differences to stranded ropes
- ▲ Lubrication (third body, manufacturing)
- ▲ Re-lubrication
- ▲ Specific rope areas
- ▲ Hazards

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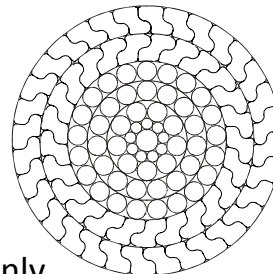
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Introduction

Differences to stranded ropes

- ▲ All wires are bright
- ▲ Locked ropes have z-shaped wires
- ▲ Ropes don't move, the cabins run only over a section of the hole rope length
- ▲ Different fatigue over the rope length
- ▲ Maintenance work only on the outer layer
- ▲ A repair peace isn't possible, only substitution of single wires



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Targets for lubrication

A steel wire rope needs to be lubricated:

- ▲ to prolong its useful service life
- ▲ reducing the coefficient of friction between the wires and the layers
- ▲ increasing the corrosion protection
- ▲ reducing the rate of development of the numbers of broken wires

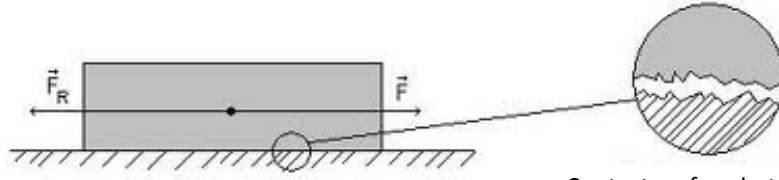
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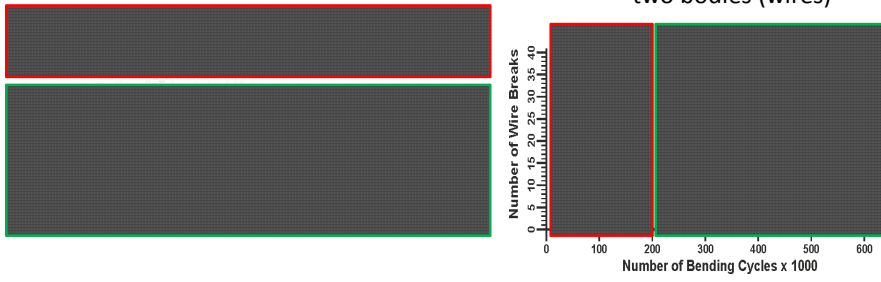
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Lubrication (Third body)



Contact surface between two bodies (wires)



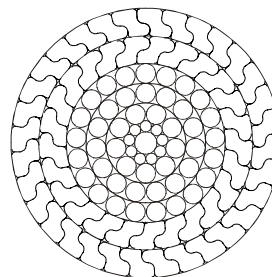
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Manufacturer's lubrication



full filling
of
each wire layer

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Hazards

Soiling of the installation and the guests



Track rope cleaning
Remove the lubricant on
the tight rope before the
installation goes in use!

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Why re-lubricate

- ▲ the bright wires in the outer layer must be protected against corrosion.
 - ➡ to build up a protective patina!
- ▲ lubricant is consumed in- and outside the rope and must be supplemented periodically once again!
- ▲ increased friction and corrosion is to prevent at contact points between rope and guiding element (saddle profile etc.)!

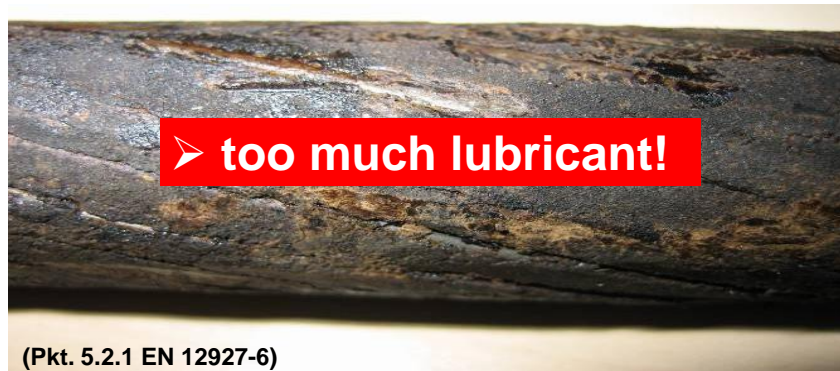
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Attention



(Pkt. 5.2.1 EN 12927-6)

«Ropes shall be discarded if their condition cannot, or can no longer, be assessed with the current methods of inspection.»

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Only clean ropes are to re-lubricate

With rotating brushes

Partial



Complete circumference



Attention

- ▲ No mechanical damages on the wire surface.
- ▲ No heat that influence a reduction of the strength

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How to re-lubricate

In the stations



Lubricant with solvent

- ▲ spraying
- ▲ brushing



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How to re-lubricate


On the free rope length




Lubricant with solvent
or
oil

- ▲ spraying
- ▲ dropping

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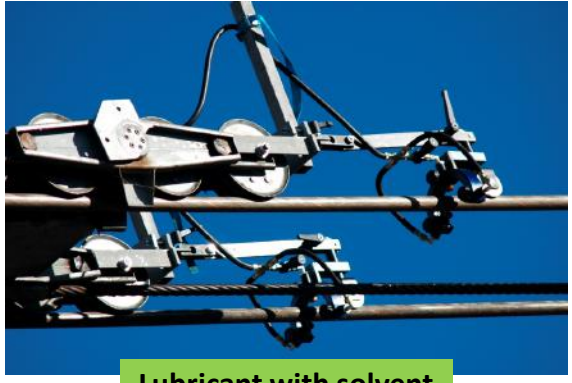
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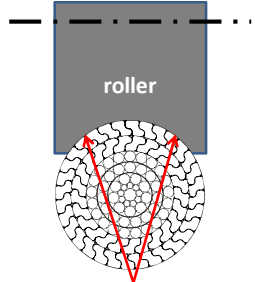
How to re-lubricate

Spraying tool

Lubricant is spraying with spray nozzles on the rope surface.




Lubricant with solvent




Attention
No or only a little lubricant on the contact surface with the roller

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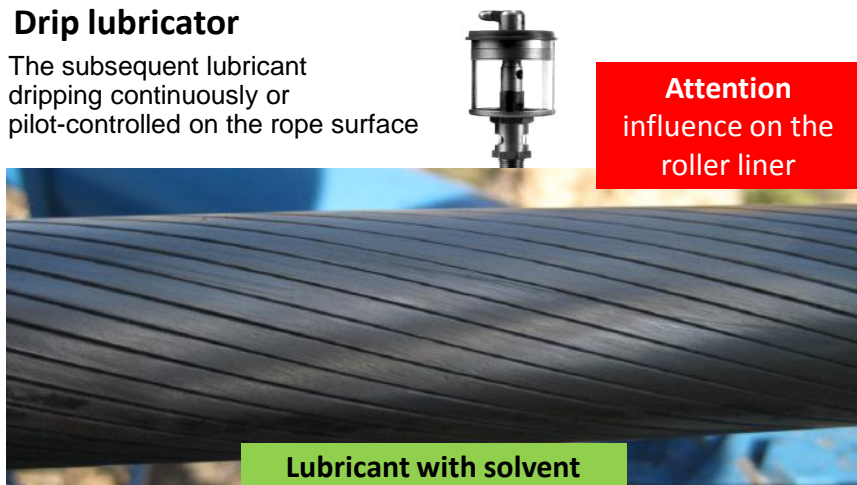
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How to re-lubricate

Drip lubricator

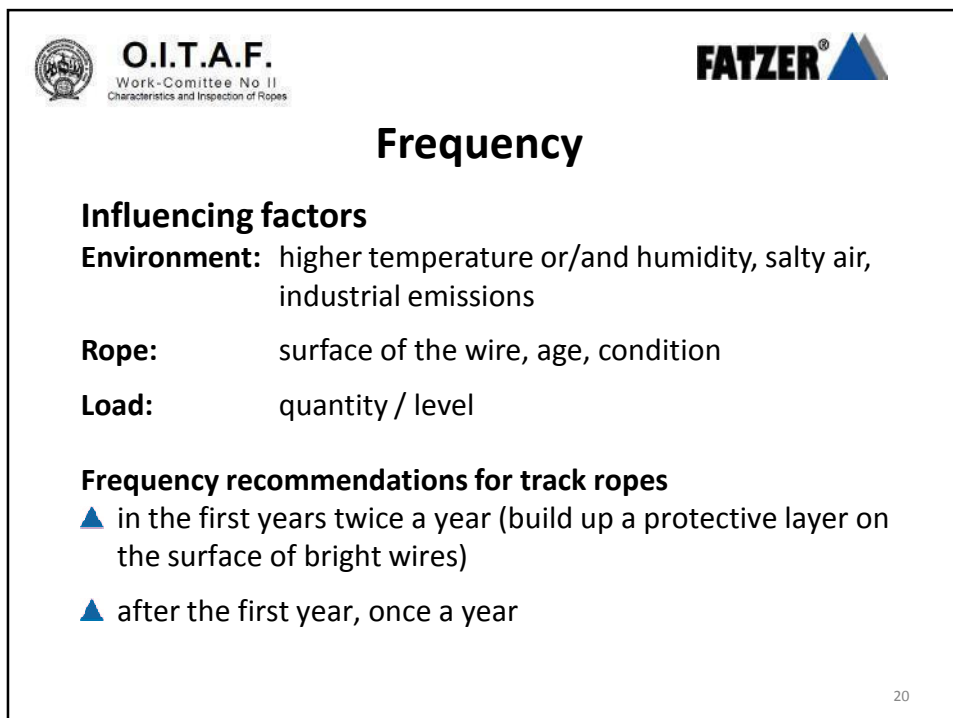
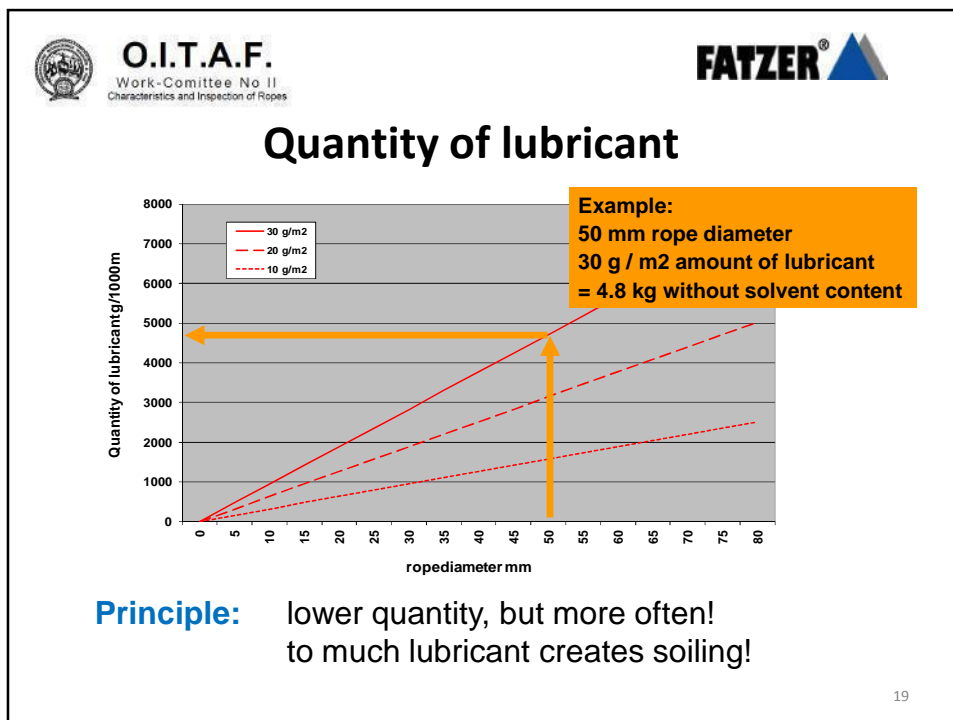
The subsequent lubricant dripping continuously or pilot-controlled on the rope surface





Lubricant with solvent or oil

Attention
influence on the roller liner

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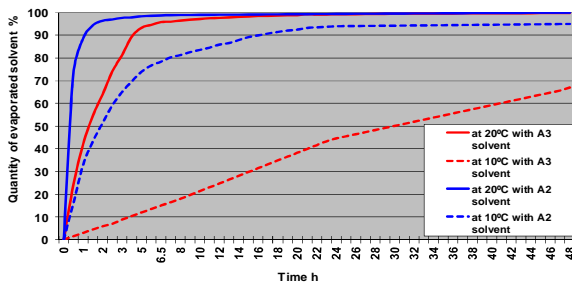
How to re-lubricate

Conditions

Re-Lubrication should be carried out only on dry ropes and by warm weather.

Attention:
If the subsequent lubricant with solvent is resolved, the operation may be not immediately resumed after a rope lubrication!

Time for evaporation of solvents



Time (h)	20°C with A3 (%)	10°C with A3 (%)	20°C with A2 (%)	10°C with A2 (%)
0	0	0	0	0
1	80	5	75	5
2	95	10	95	10
3	98	15	98	15
5	99	25	99	25
6.5	100	35	100	35
8	100	45	100	45
10	100	55	100	55
12	100	65	100	65
14	100	75	100	75
16	100	80	100	80
18	100	85	100	85
20	100	88	100	88
22	100	90	100	90
24	100	92	100	92
26	100	94	100	94
28	100	95	100	95
30	100	96	100	96
32	100	97	100	97
34	100	98	100	98
36	100	99	100	99
38	100	99.5	100	99.5
40	100	100	100	100
42	100	100	100	100
44	100	100	100	100
46	100	100	100	100
48	100	100	100	100

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Safety precautions

Employees, who are carrying out the re-lubrication needs:

- ▲ safety belts, warm wear, helmet, hard-toed shoes, glasses, gloves, etc.
- ▲ person who monitored the route and can stop the cabin at any time!
- ▲



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Lubrication of specific rope areas


Bollard




➤ Moisture = collapse the liners + corrosion

Necessary:


- ▲ rope maintenance (conservation)
- ▲ weather protection
- ▲ accessibility of appropriate inspections




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Lubrication of specific rope areas



no slip-stick!


Saddle 1


Reduction of the friction between the rope and the saddle profile



Fit support +
No constant moisture!

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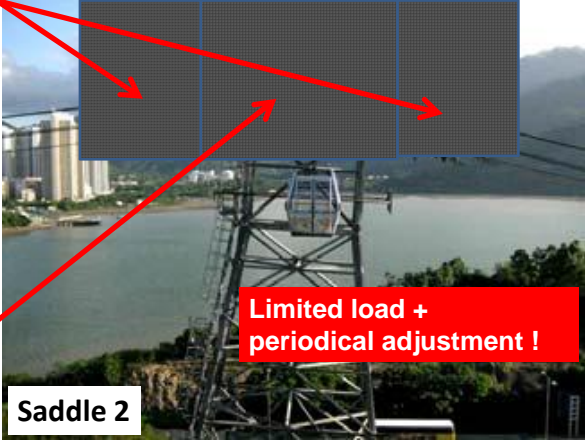
Lubrication of specific rope areas

Reverse bending's with restricted movement of the outer wires.


Ovalisation of the rope on the basis of increased shear force of the rollers.


Limited load + periodical adjustment !

Saddle 2



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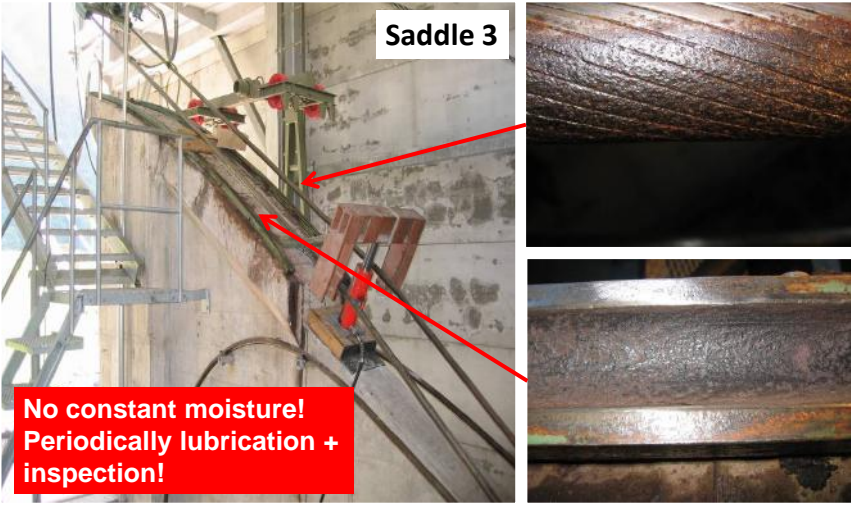
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Lubrication of specific rope areas


Saddle 3

**No constant moisture!
Periodically lubrication + inspection!**

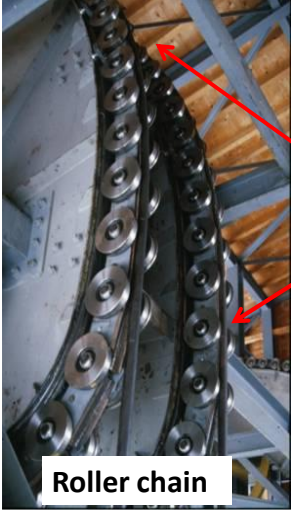


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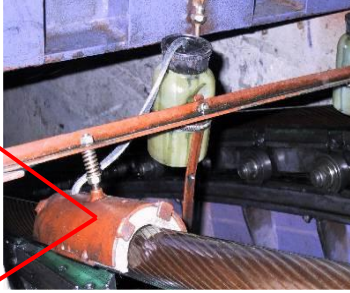
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Lubrication of specific rope areas




Roller chain




Attention
▲ Permanent lubrication on bending points

Note: The lubricant must have good penetrate properties.

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Hazards

Track rope break

- No solid lubricant



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Conclusion

- ▲ We have different fatigue over the rope length
 - ▲ We need different type of lubricant
 - ▲ If one section of the rope achieve the discard criteria's, the track rope has to be changed
 - ▲ The most track ropes are changed by corrosion or local defaults (fatigue)
- ➔ Your effort with re-lubrication creates lower costs

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