



Newest findings about possibilities and limits of visual rope inspection

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Overview

- Introduction
- Current situatuion
- Field trials
- Evaluation and findings of field trials
- Optical inspection device – Winspect
- Development of a rating system

Introduction – Aim of project

- Determine the reliability and limits of the visual rope inspection type A and C
- Development of a system to improve the visual rope inspection
- Intervals (frequencies) of visual inspections were **not** part of the project
- Recommendation of OITAF Committee No. II regarding visual inspection

Table 18 — Definition of inspection types

Parameter	Type A	Type B	Type C
Speed	<0,3 m/s	0	<1 m/s
Stop on demand	yes	Not applicable	yes

Introduction – Necessity of visual rope inspection

Magnetic Rope Testing		Visual Inspection
<p>Inner wire breaks Wire breaks in strand valley</p>	<p>Heavy corrosion Heavy wire damaging Outer wire breaks Former clamp areas Lightning strike</p>	<p>Notches, scratches, hair lines Touching of strands Beginning corrosion Wire Distortion Disturbance in rope symmetry Lightning strike</p>

Introduction – Necessity of visual rope inspection

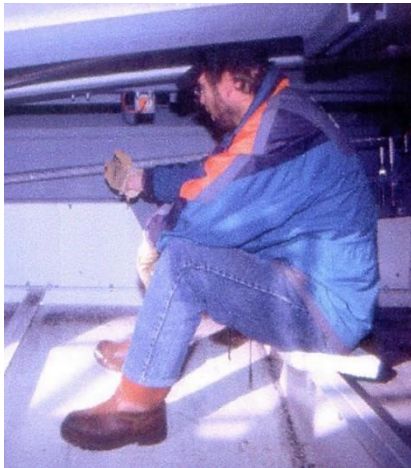
Example: Damage of slipped clamp



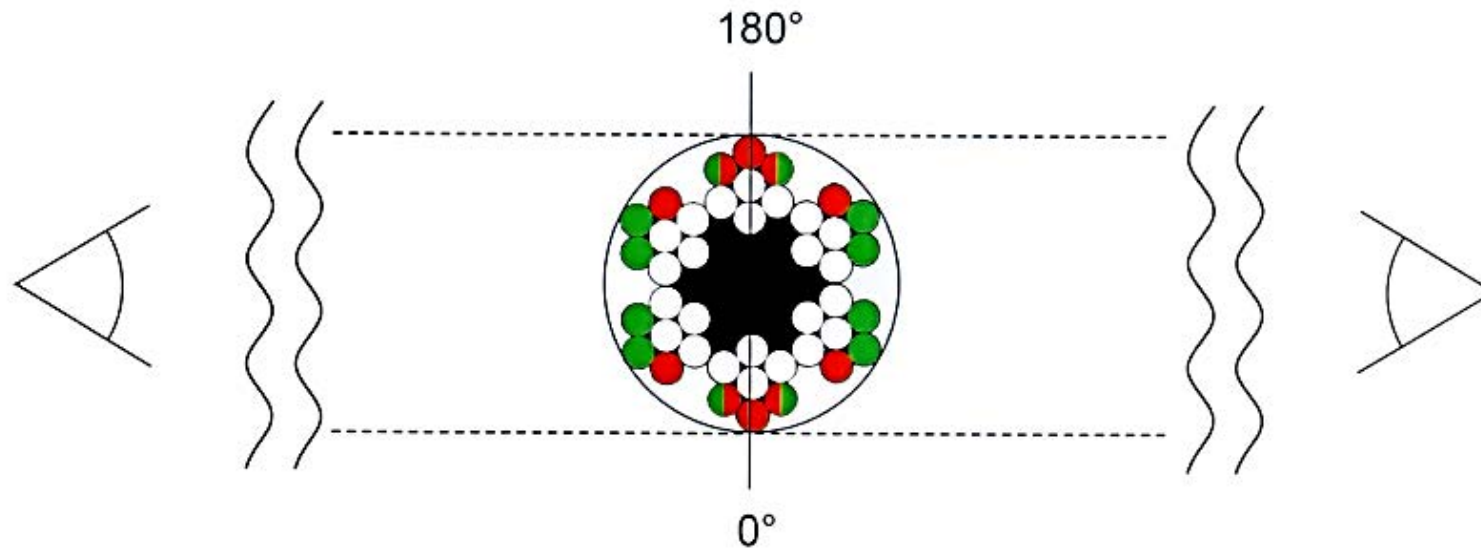
- Martensite and brittle surface at a length of 41 cm
- Discovered at MRT testing → 40 % loss of metallic area

Current situation

- Work environment often not ideal
 - Narrow work platform or no work platform at all
 - Inspection on ladders (could be unsafe if ladder is not permanently installed)
 - Insufficient light situation (blinding sun, dark environment, ...)
- Inspection without any breaks (Decreasing concentration)



Current situation



Inspection with two people: hardly possible to see whole rope circumference

Field trials

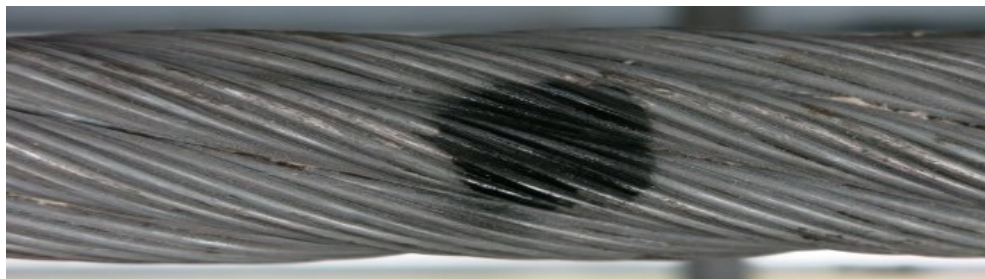
Examples for artificial damages



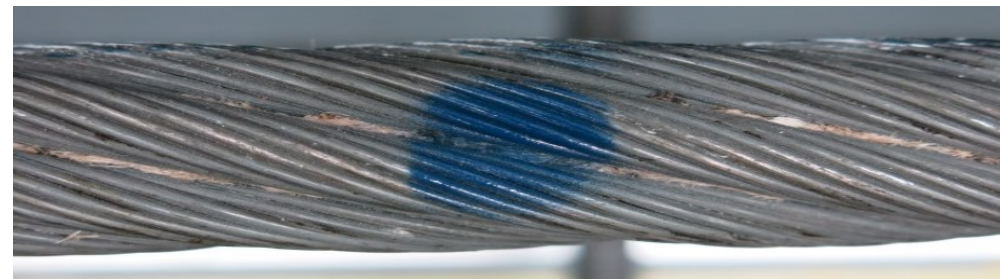
corrosion



hair lines



clustering of wire breaks



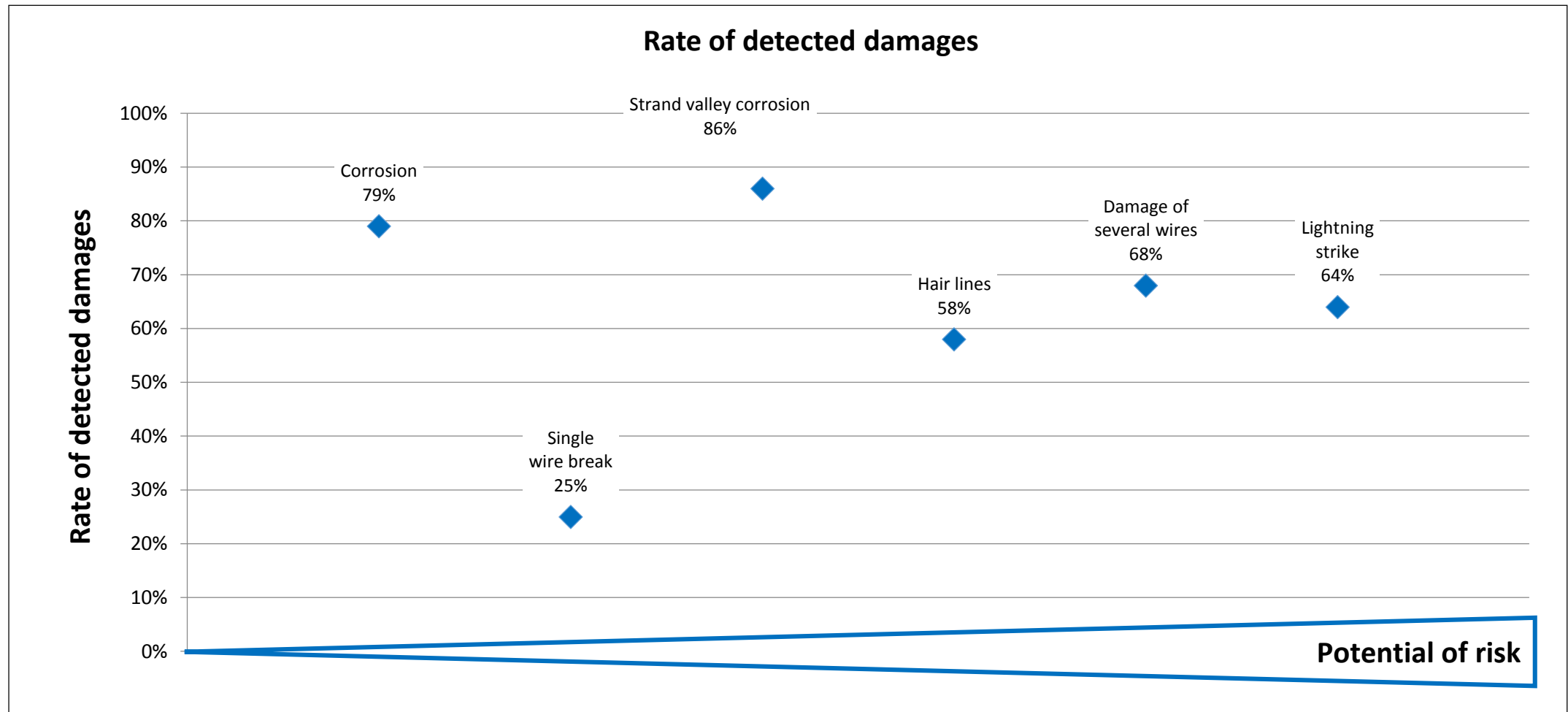
lightning strike

Field trials

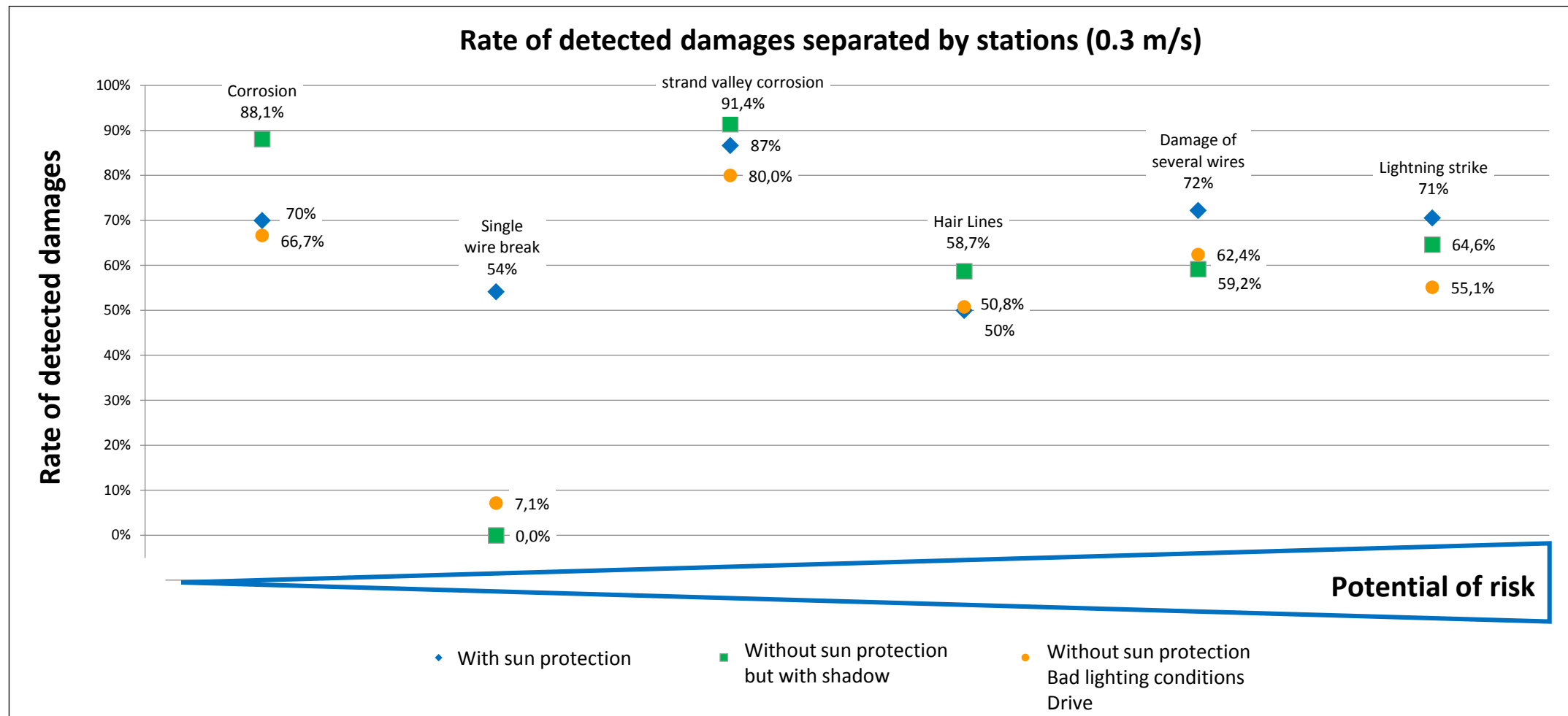
- Inspections at 4 installations / 5 stations
- Different speeds
- Different workplace environments
- With and without tools
- 21 participants



Evaluation of field trials

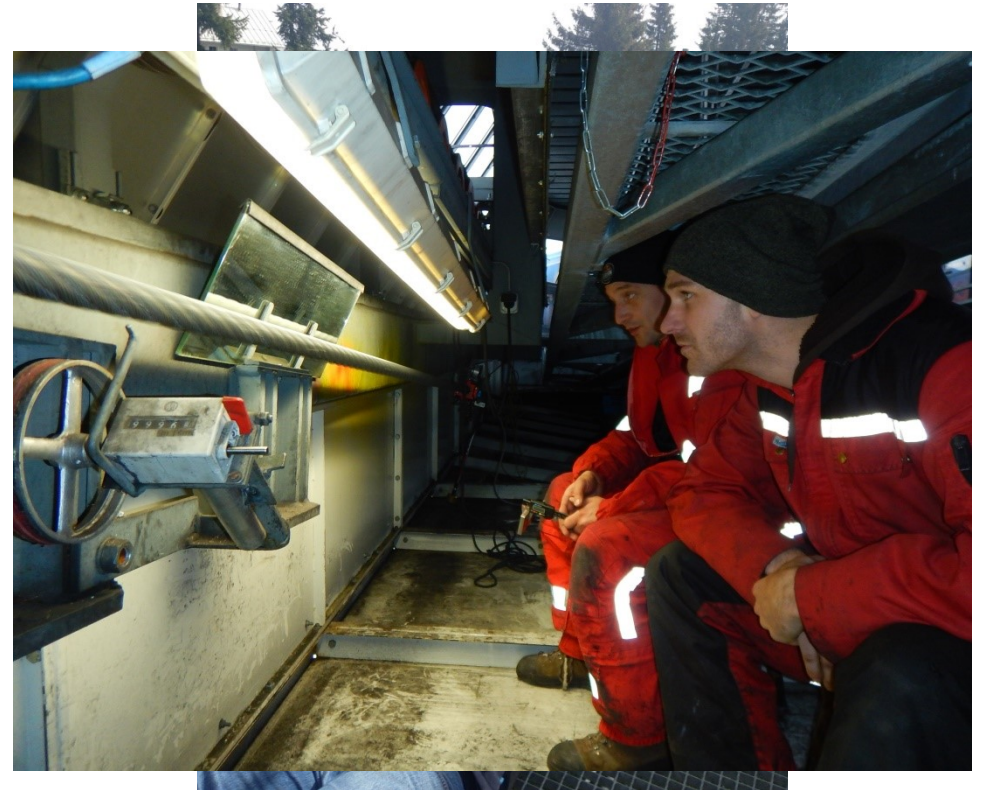


Evaluation of field trials

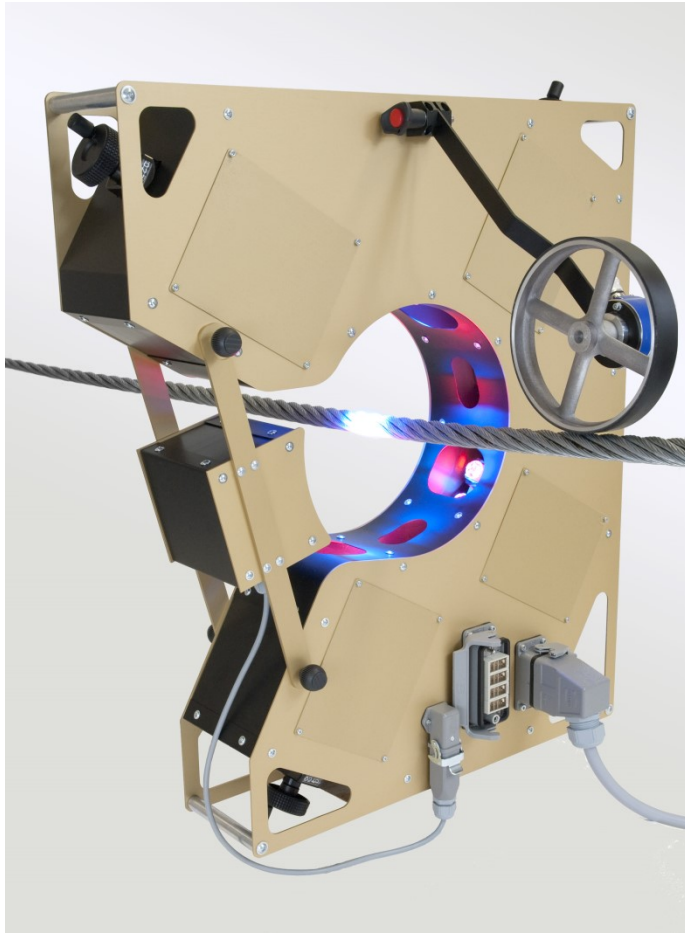


Evaluation of field trials

- Biggest influences during an inspections according to research results
 - Lighting conditions
 - Sun protection
 - Background
 - Workplace environment
 - Possibility to sit or lie down
 - Secure
 - Sufficiently comfortable
 - Sufficient distance to rope



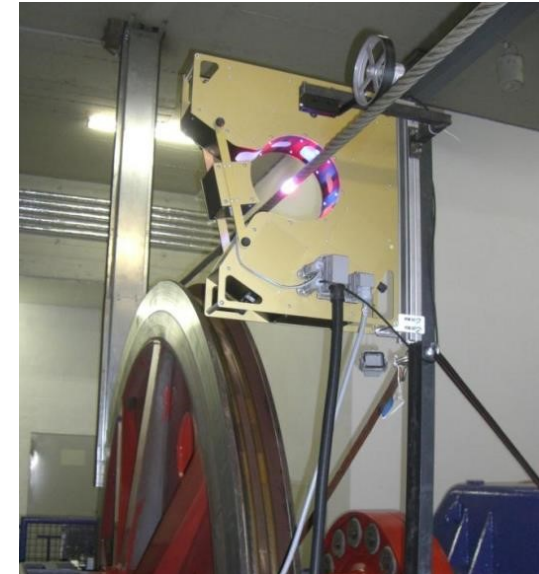
Optical inspection device



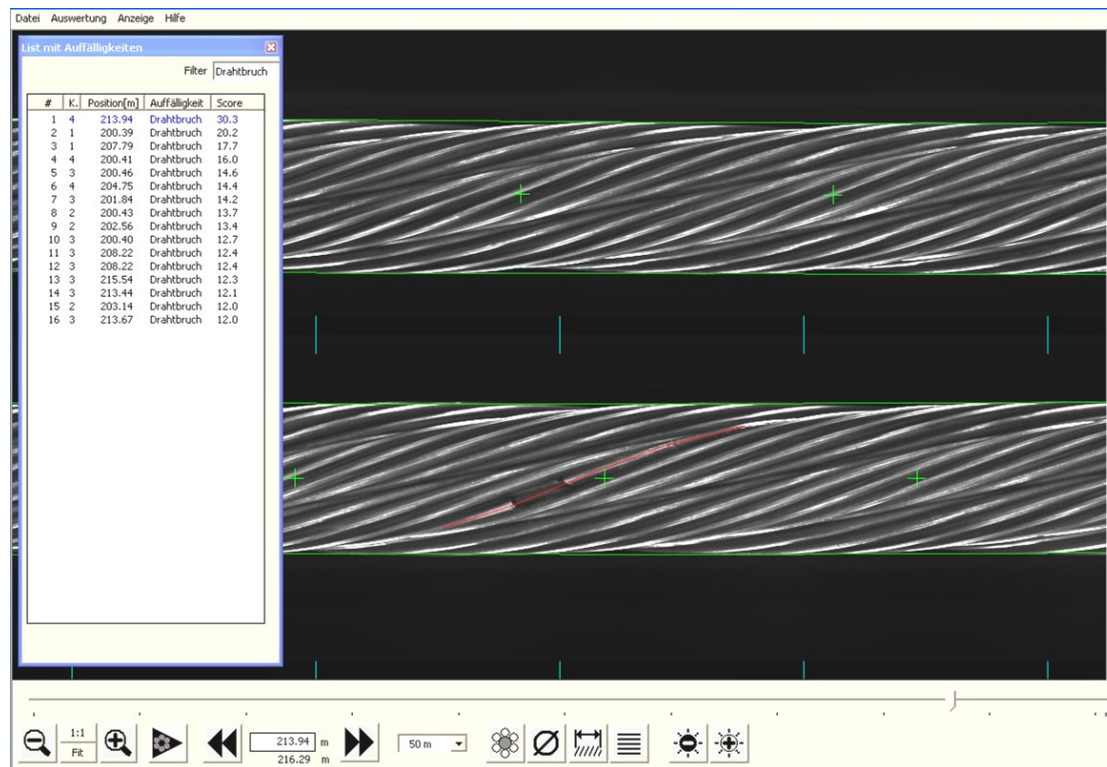
Source: <http://www.winspect.info/>

- Recording of the whole rope circumference by four cameras
- Analysis and Evaluation of the image data by the software
- Advantages:
 - High inspection speed
 - Inspection with one person possible
 - Documentation
 - Extension of inspection intervals possible (depending on local regulations)

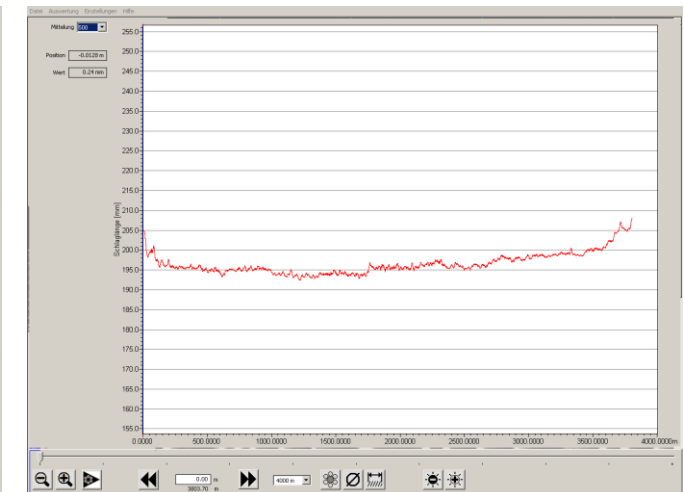
Optical inspection device



Evaluation of the rope



Evaluation of the rope diameter and lay length



Development of a rating system

- Aim: Operator gets an impression regarding the quality of the inspections
- Content:
 - Rating of the workplace environment
 - Rating of inspection conditions
 - Rating of inspector
- Classification of results in three categories

Development of a rating system

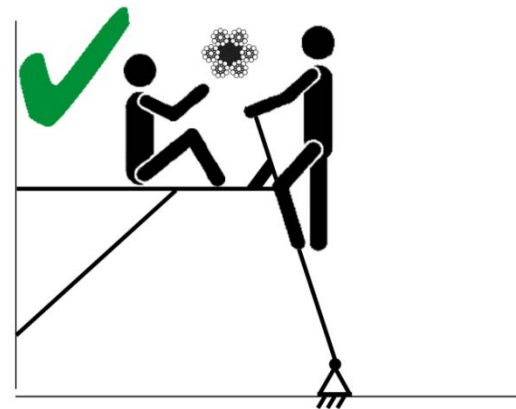
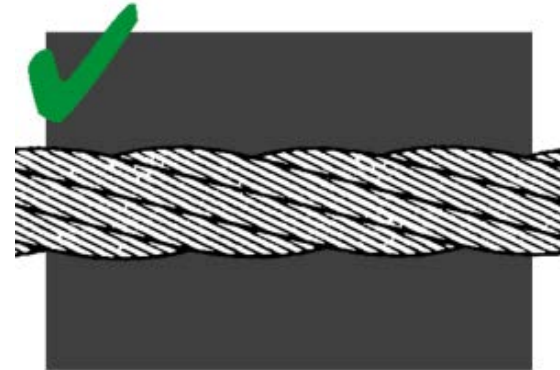
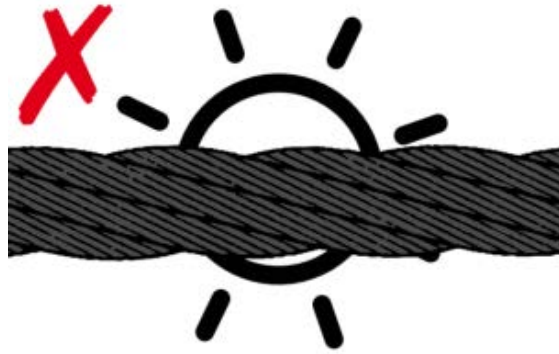
Nr.	Criteria	max. points
2	Sun protection	4
4	Background	4
6	Switch to stop rope	1
8	Distance to rope	2
10	Duration of inspection until taking a break at 0,3 m/s	2
12	Rope alignment	2
Sum		30

Development of a rating system

23-30 points Category 1	17-22 points Category 2	Less than 17 points Category 3
No improvements necessary	Improvements possible to increase rate of detected damages	Improvements recommended, rate of detected damages not sufficient

Development of a rating system

- Useful Illustrations to demonstrate possible improvements for example:



Thank you very much for your attention

