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NON - DESTRUCTIVE TESTS OF THE STEEL WIRE ROPES

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The ropes are one of the important component units used in the transport. The high impact on the rope durability in the operation has its interaction with the equipment, on which it was installed. Beside this interaction proper design of the rope also influences its durability also. Installed steel wire rope durability monitoring is provided by the means of steel wire ropes defectoscopic testing or by monitoring the amount of the rope hoisting work. The rope hoisting work is monitored only at some equipment, on which the rope is installed. In the article the narrow continuity between steel wire defectoscopic tests and performed hoisting work of wire is shown.

***Key words**: rope defectoscopy, magneto - inductive device, tow work of ropes, technical diagnostics*

Defektoskopska ispitivanja čeličnih pletenih užadi. Visoki utjecaj na trajnost užeta u radu ima interakcija s opremom na kojoj je uže postavljeno. Osim te interakcije, na trajnost užeta utječe i odgovarajući oblik užeta. Praćenje trajnosti postavljenog čeličnog užeta osigurano je defektoskopskim ispitivanjem ili praćenjem veličine tereta koju uže podiže. Podizanje tereta se prati samo na nekoj opremi na kojoj je uže montirano. U članku je prikazana uska povezanost između defektoskopskih ispitivanja i izvršenog rada pri podizanju tereta.

***Ključne riječi:** defektoskopija užeta, magnetno-induktivni uređaj, vučni rad užadi, tehnike dijagnosticiranja*

INTRODUCTION

At present, in technical branches the significance of diagnostics of machinery and construction equipment becomes very important. The diagnostic and defectoscopy have their irreplaceable place in finding the real technical conditions of a given equipment and at the same time they create database of information of a design type, which is used in making new machines and buildings, etc.

Defectoscopy of steel ropes by means of magnetic leakage fluxes belongs to the oldest technical methods of non-destructive testing. It is widely spread and belongs to most examined methods. The magnetic defectoscopy makes it possible to achieve a high reliability in estimation of technical condition of an examined object [1 - 3].

Defectoscopic inspections of steel ropes are carried out by magneto - inductive devices from various producers. In Slovakia there is no producer of such a device and that is why magneto-inductive devices-MID, produced in VVUÚ Ostrava Radvanice are mostly used [4].

These devices are reliable but they are quite heavy (38 kg and more) which causes problems in handling.

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Our test laboratory carries out defectoscopy with the MID-1 device on ropes of towing equipment, personnel cableways, tows and bearing towers. For each type of the named technical equipment different regulations apply but for all of them one thing is common-to determine the loss of metal cross section of the rope [5, 6].

DEFECTOSCOPY OF NON-MOVABLE ROPES

A separate group of ropes are the non- movable ropes. In this case we speak about inspection of bridge and roof construction ropes and about bearing ropes of cable ways. In inspection of these ropes the cross section of ropes is observed again, which is determined from the safety factor, external load and nominal strength of wires for a given rope of a construction. The cross section of the inspected rope must not drop below calculated minimum metal cross section of rope. In this area any technical regulation has been worked out in Slovakia, with the exception of bearing ropes of cableways (PTPLD), which would exactly specify the border of minimum metal cross section for a rope according to its construction and use. The defectoscopic inspection of anchorage of non-movable ropes is very problematic. For this reason in our laboratory a new defectoscopic device has been developed with which it

will be possible to check the spots of anchorage. At present two variants of a given device are ready on base of magnetism and mechanical oscillation [7 - 10].

DEFECTOSCOPY OF ROPES ON BORING TOWERS

Ropes used in oil industry are, in comparison to ropes in towing equipment, far more intensely statically and dynamically stressed [5], [6]. The relation of the diameter of a pulley to the diameter of a rope is also more unfavorable and causes further increase of stress because of higher bending stresses.

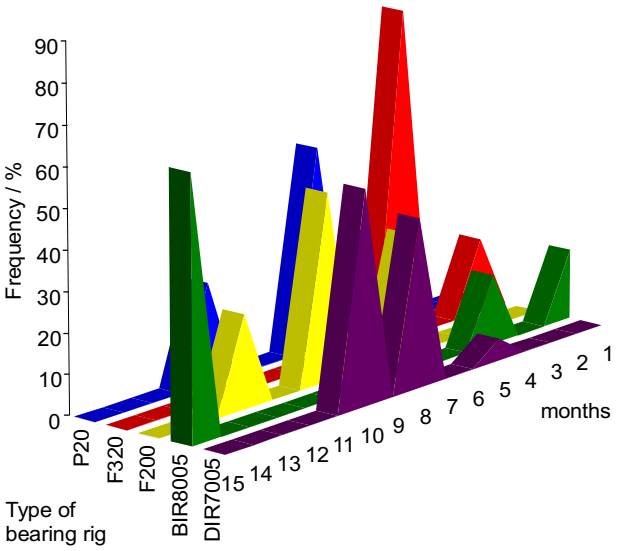

Figure 1. **Space diagram of eliminated ropes length in view of the time of their use and equipment on which they were used**
Slika 1. **Prostorni dijagram elimininranih dužina užadi sa stajališta uporabe i opreme kojom se koriste**

The static stress is given by minimum safety, which is in comparison to other mechanical equipment, very low. So, for example, for crane the prescribed safety is 5 to 9, while for pulley ropes of boring rigs the prescribed safety is minimum 2.5. The breaking of pulley rope can cause serious accidents, resulting in loss of a complete bore and there is also a high risk of serious injuries. For this reason it is necessary to devote appropriate attention to work condition of these ropes, especially by monitoring the real degree of wear. According to knowledge gained from literature, but especially from our own experiences in defectoscopic measurement, the service life of pulley ropes is proportional to their heavy work, expressed in MN.km, as a product of axis strength and trajectory covered by the rope. This heavy work is in majority of bearing rigs automatically registered , though not quite exactly , but the data gathered my serve assessment purposes.

CONCLUSION

Based on given facts it is possible to conclude that monitoring of heavy work of a rope is of great significance. Defectoscopic inspections of pulley ropes confirm that if a given rope volume accepted such amount of deformation energy which it is not able to accumulate, breaking of wires follows.

These theorys has been confirmed by observations on oil rigs where there is no pulling of a rope. If a defectoscopic inspection of a rope precedes closely before the time of its pulling, e.g. it is closely before the date, when the portion of the rope in pulley block has done the amount of work stated by the regulation, there are on that given portion of the rope such cross sections whose metal cross section dropped below permitted limit stated by this regulation.

In Figure 1. is given the statistical processing of data of defectoscopic inspections of pulley ropes of boring towers which confirm previous assertion.

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