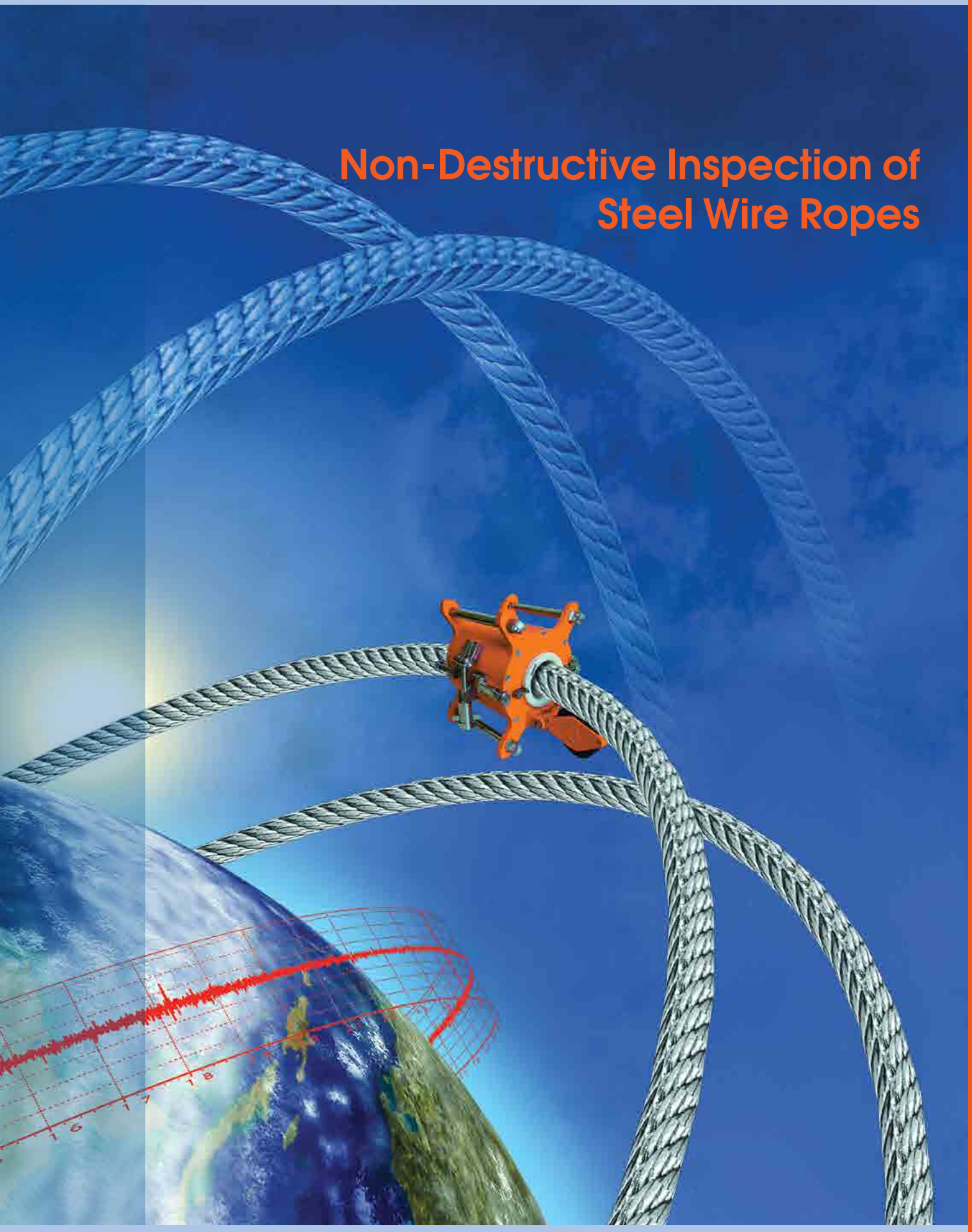
Non-Destructive Inspection of Steel Wire Ropes



INTRON®

INTRODUCTION

INTRON PLUS is a leading supplier of MFL equipment and specific services in the field of Non-Destructive Testing (NDT) and presents modern instruments INTROS® for inspection of ferrous wire ropes. Being in the NDT business from 1988 our company has developed state-of-the-art instruments that enable to non-destructively inspect wire ropes of whatever construction and dimension, wherever they are in service. INTROS® can be used for rope inspection in mines, cranes, elevators, ropeways, bridges, overhead transmission lines, etc.

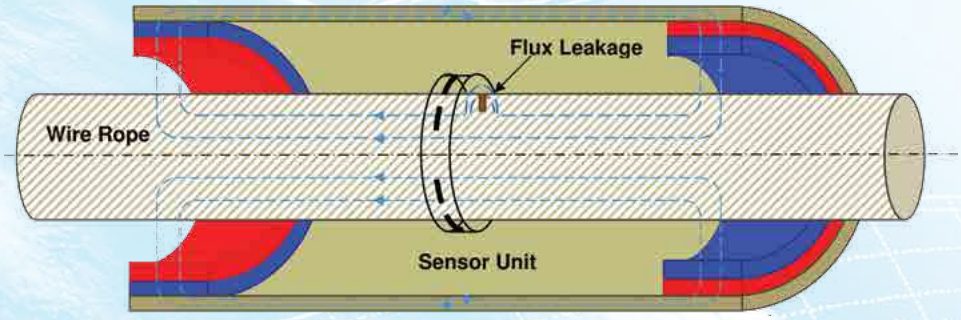
Ropes deteriorate for many reasons and their strength reduces during life time. For safe operation wire ropes should be periodically inspected and timely discarded - premature discard of wire rope is wasteful and costly. Inspection data enables to make a reasonable decision whether the rope must be discarded or can remain in service. INTROS® is dual function instrument, i.e. non-destructively measures loss of metallic area (LMA) and reveals local flaws (LF).

LMA is a relative measure of the amount of material missing from a location along the wire rope and is measured by comparing a point with a reference point on the rope that represents maximum metallic cross-sectional area, as measured with an instrument.

LF is a discontinuity in a rope such as a broken wire or a corrosion pit that degrades the integrity of the rope at that position.

PRINCIPLE OF OPERATION

The instrument operation is based on magnetic flux leakage (MFL) principle.



The rope portion inside the magnetic head is magnetically saturated with strong rare earth magnets in the longitudinal direction. The magnetic field above the rope surface (flux leakage) remains uniform whilst the rope contains no irregularities. Coils and/or Hall Effect sensors surround the rope and pick up the signal which is of a constant value. When there are changes in ferrous cross section of the rope or broken wires occur, the magnetic field is distorted and flux leakage increases locally. These irregularities register by creating a signal in the sensors. Signals from the sensors are transmitted to an external basic unit for storage and further processing.

FEATURES

INTROS® is suitable to inspect stranded, spiral, half-locked, full-locked ropes made from bright and galvanized wire, with fiber or steel core. It meets requirements of ASTM E1571, EN 12927-8, IMCA SEL 022, M 194; SEL 023, M 197.

INTROS® consists of a basic unit and magnetic head connected with a special cable 5 or 8 m in length. Magnetic heads designed to inspect ropes with diameter from 6 to 150 mm. Monoblock MB 8-24 is designed to accommodate magnetic head and basic unit in the same body. During inspection the rope moves through the magnetic head or the magnetic head moves along the rope. INTROS® simultaneously measures LMA and reveals LF in form of inner and outer broken wires, pitting corrosion, welding spots, etc. It also displays the speed of the rope and the current instrument position along the rope. The basic unit is compatible with all magnetic heads and has downloading capability. After inspection data are downloaded from basic unit to computer with software Wintros© as LMA, LF, inspection speed traces. Data also can be registered on-line on a screen with software Wintros RTV©.

Basic unit and magnetic heads for ropes up to 64 mm diameter are stored in carrying cases with shoulder belt. Larger sizes of INTROS® equipment are stored in rugged boxes. The instrument operates at ambient temperature from -10 to +50°C. Explosion-proof version of the instrument is also available.

In certain cases, e.g. inspection of guy ropes with limited access, the magnetic head moves along the rope while the basic unit is switched on and attached to the head for collecting data. Wireless mode allows receiving data from basic unit on-line on the computer. INTROS® can be implemented into the system for monitoring of wire ropes. Level of ingress protection of the basic unit and MH 20-40, MH 40-64 corresponds to IP65, other magnetic heads have level IP54.

BASIC UNIT INTROS®

Basic unit INTROS® is compatible with each of the magnetic heads. The intrinsically safe built-in data logger is capable to store inspection data from ropes of up to a total length of 30,000 m. The LMA and LF data are displayed on two displays: LMA in % and LF in mV. Besides LF number per lay length, current distance on rope and speed of the rope are also displayed and stored. The basic unit is battery powered with an energy-saving feature. The rugged membrane keypad and leather pouch securely protect the unit from dust and rain. The basic unit INTROS® is a hand held device with light weight, and can be easily attached to magnetic head to travel along the rope; in this case basic unit can be connected to the head with short cable. Telemetric system provides wireless connection of basic unit with computer.

Dimensions	85x35x230 mm
Weight	0.7 kg
Power supply	AA rechargeable batteries
Continuous work	6 hours minimum

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MAGNETIC HEADS INTROS®

The Magnetic heads consist of two halves connected together by the hinges. Prior to the inspection, the magnetic head is installed on the rope and the two halves closed together. The heads MH 60-85, MH 80-120, and MH 100-150 have dismountable halves and are assembled on the rope in a different way. Sensor units inside the magnetic head contain Hall Effect sensors and/or coils. Sleeves of different sizes used within magnetic head to align the rope in the head and protect the sensor units. Ropes in the larger heads i.e. MH 60-85,MH 80-120, MH 100-150 are aligned with special spring loaded wheels. Each magnetic head is equipped with a distance counter to provide an accurate measurement of the current position of the head along the rope.

Monoblock MB 8-24 has magnetic head and basic unit accommodated in the same body with a front panel display and membrane keypad.

Diameter of ropes	from 8 to 24 mm
Dimensions	348x88x224 mm
Weight	3.5 kg
Inspection speed	from 0 to 1 m/s
Sensor units	1 pair
Sleeves	8 pairs

Magnetic head MH 6-24F is equipped with detachable sensor units and sleeves.

Diameter of ropes	from 6 to 24 mm
Dimensions	264x188x66 mm
Weight	3 kg
Inspection speed	from 0 to 2 m/s
Sensor units	3 pairs
Sleeves	6 pairs

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Magnetic head MH 20-40 is equipped with a not detachable sealed sensor units and changeable sleeves.

Diameter of ropes	from 20 to 40 mm
Dimensions	330x205x190 mm
Weight	8.7 kg
Inspection speed	from 0 to 2 m/s
Sensor units	1 pair
Sleeves	4 pairs

Magnetic heads MH 24-64, MH 40-64 have similar design, dimensions and weight. The MH 24-64 is equipped with detachable sensor units and the MH 40-64 is equipped with not detachable sealed sensor units.

	MH 24-64	MH 40-64
Diameter of ropes	from 24 to 64	from 40 to 64
Dimensions	330x235x195 mm	330x235x195 mm
Weight	15 kg	15 kg
Inspection speed	from 0 to 2 m/s	from 0 to 2 m/s
Sensor units	3 pairs	1 pair
Sleeves	8 pairs	5 pairs

Magnetic head MH 24-64M3 is equipped with detachable sensor units with built-in Hall Effect sensors and coils, and has increased LF sensitivity.

Diameter of ropes	from 24 to 64 mm
Dimensions	330x235x195 mm
Weight	15 kg
Inspection speed	from 0 to 2 m/s
Sensor units	8 pairs
Sleeves	16 pairs

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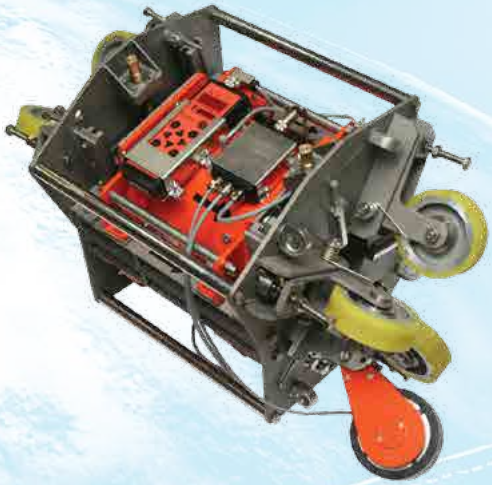
Magnetic head MH 60-85 consists of two separate modules which are connected on the rope with special tools, supplied in the kit. The MH 60-85 is equipped with not detachable Hall Effect sensor units and detachable coil sensors. The head is aligned on the rope with adjustable wheels.

Diameter of ropes	from 60 to 85 mm
Dimensions	690x526x288 mm
Weight	60 kg
Inspection speed	from 0.2 to 1.5 m/s
Coil sensors	5 pairs



Magnetic heads MH 80-120 and MH 100-150 have similar design, and differ in dimensions and weight. These heads consist of two separate modules which are installed on the rope with a special roller system and tools, supplied in the kit. The heads are aligned on the rope with adjustable wheels. The Hall Effect sensor unit is not detachable and the coil sensors are detachable. Special compartment is provided on the heads to attach basic unit.

	MH 80-120	MH 100-150
Diameter of ropes	from 80 to 120 mm	from 100 to 150 mm
Dimensions	895x520x440 mm	950x550x490 mm
Weight	80 kg	124 kg
Inspection speed	from 0.2 to 1.5 m/s	from 0.2 to 1.5 m/s
Coil sensors	8 pairs	10 pairs

Inspection of hosting rope at offshore crane

Inspection of hoisting ropes in mine

Inspection of bridge stay rope

Inspection of bucket-wheel excavator guy rope

Inspection of carrying rope at ropeway

Inspection of guy rope at mast

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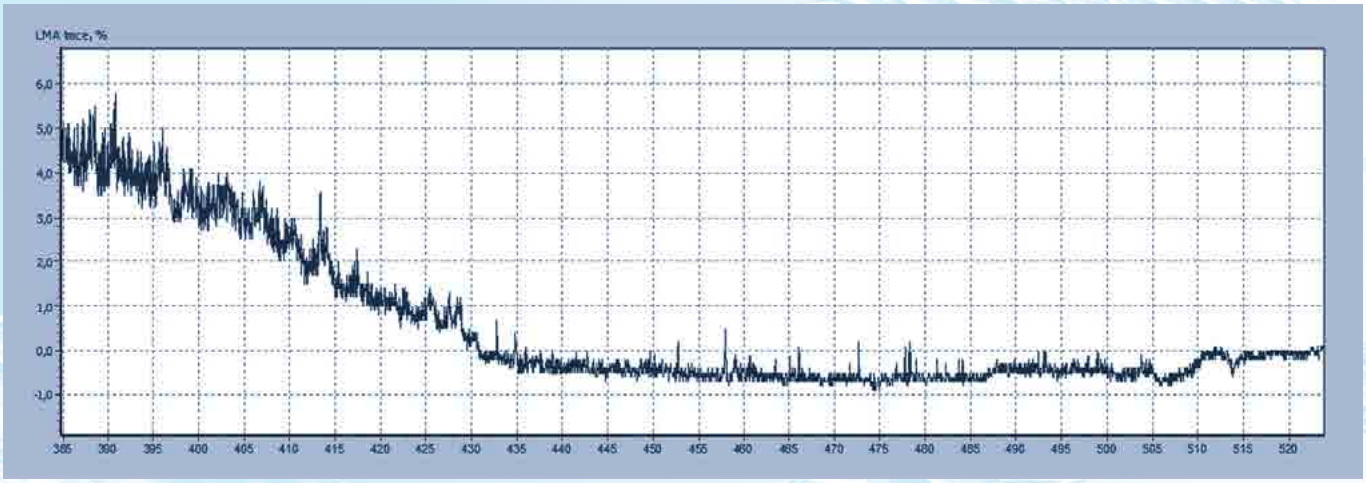
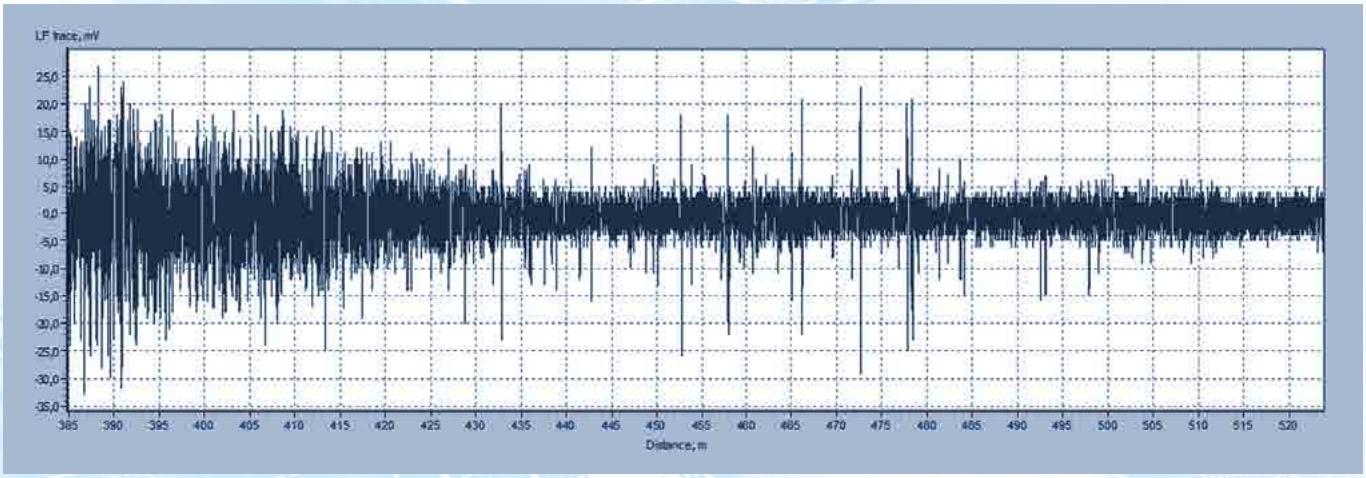
SOFTWARE

Correct interpretation of testing results is the most important issue to make a reasonable decision about the future of the rope. INTRON PLUS provides training of customers at rope laboratory, or at customer' site. Downloading and further analysis of traces are provided with the software Wintros©, and on-line charts registration on computer is possible by using the software Wintros RTV©. Among other useful functions of Wintros© there are settings and calibration of the instrument, chart zooming and filtering, automatic marking the defects, comparison of charts in the same window, cut-off options, etc. Wintros© can automatically generate the rope inspection report. Rope Strengh© software is developed to asses rope residual strength in terms of NDT data.





INTRON PLUS also produces equipment and provides services for non-destructive inspection of steel plates, e.g. above storage tank floor and shell, and steel-cord conveyor belts.

IMCA Member

ASNT Corporate Partner

OIPEEC

INTRON®
ISO 9001:2008 certified

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