

ROBOSCOPI VTM-5000/RT

LASER SCANNING AND FLAW DETECTION TEST BENCH

plate frames of subway and tram car bogies



1 APPLICATION

Roboscop VTM-5000/RT laser scanning and flaw detection test bench (hereinafter **Roboscop VTM-5000/RT**) is designed for automated measurement of geometric parameters and complex non-destructive testing (NDT) of metro car bogie frames.

Roboscope VTM-5000/RT provides the following methods of non-destructive testing:

- geometric parameters laser measurement;
- ultrasonic NDT;
- eddy current testing.

2 TECHNICAL FEATURES

Roboscope VTM-5000/RD is an automated software and hardware complex capable to operate autonomously or to be integrated into technological chain of subway cars maintenance and repair. General view and dimensions of **Roboscope VTM-5000/OR-M** are shown in Fig.1, Fig.2

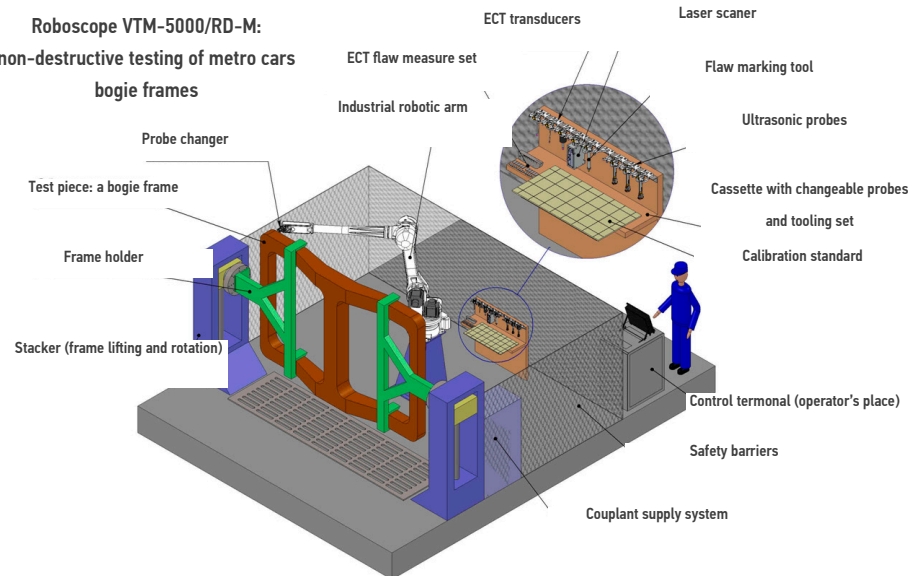


Fig.1

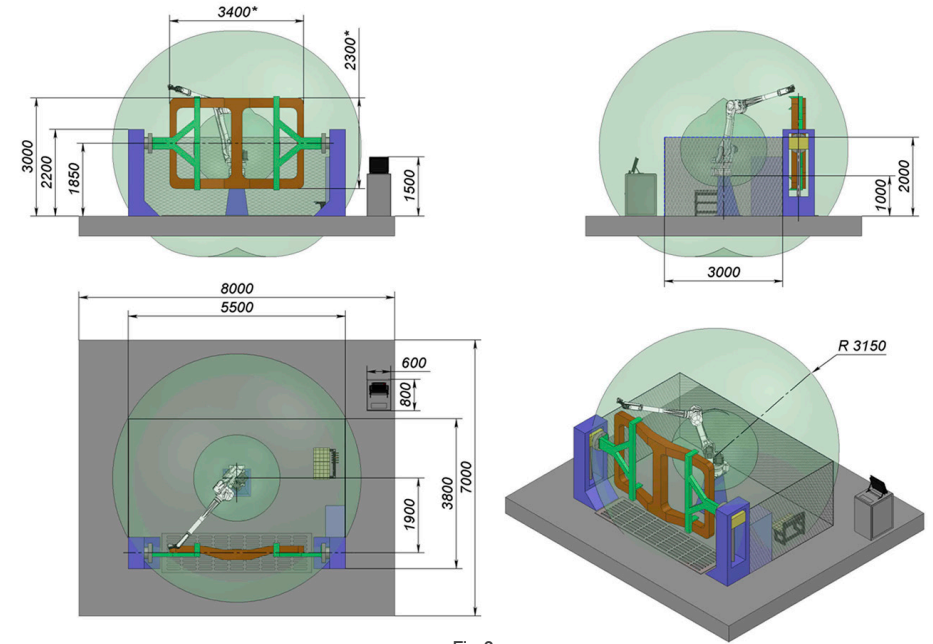


Fig.2

2.1 General specifications of **Roboscop VTM-5000/RT** are shown in **Table 1**

Features	Value
Power supply - mains voltage, V - frequency, Hz	380 50 ± 1
Maximum power consumption, kVA	15
Time of operating mode setting, min, not more	10
Supported simultaneously NDT methods: geometrical parameters laser measurement, ultrasonic, eddy current	+
Full cycle test time, min, no more	20
Continuous operation time, hours, at least	24
Probe speed on a test piece, m/s	0 ÷ 1,0
Mean time between failures, h, not less	20000
Test piece maximum dimensions, mm	3500x3500x1000

Features	Value
Total weight of the entire equipment set, kg, not more	3500
Control cabinet overall dimensions (length, width, height), mm	800x600x1500
Mechanical part overall dimensions (length, width, height), mm	7000x8000x5000
Control, display and information processing tools (industrial computer, general control terminal, touch display of information processing)	+
Automatic gain control to provide required sensitivity rate of ultrasonic channels	+
Self-diagnosis system	+
Sound and light defect detection alarming	+
Automatic acoustic contact check	+
Reliable probe fixation on a test piece	+
Automatic probe change	+
Automatic couplant supply	+
Operating temperature, °C	from +10 to +40
Relative humidity (at 35°C), %, not more	80
Safety barriers	+
Atmospheric pressure, kPa	86÷106

2.2 The features of laser scanning module **Roboscop VTM-5000/RT** are presented in **Table 2**.

Features	Value
Operating range of measured distances in the direction of a laser beam, mm	100÷350
Measurement tolerance limits, mm	±0,01
Basic coordinate system (axis number)	XoZ (2)

4 ■ Roboscop VTM-5000/RT

Features	Value
Wave length, nm	660
Frequency of data updates, profiles/sec, not less	1200

2.3 The features of **Roboscop VTM-5000/RT** NDTsystem are presented in **Table 3**.

Features	Value
Ultrasonic testing is carried out by the contact method	+
Couplant	water
Measuring range of signal amplitudes at a receiver input, dB	67÷107
Absolute tolerance of signal amplitudes measurement at a receiver input, dB	±0,5
Absolute tolerance of threshold indicator setting (dead zone), dB	±0,3
Temporary instability of threshold indicator trigger level for 8 hours of operation, dB	±0,5
Time full automatically re-set, min, not more:	1
Nominal excitation pulse amplitude values at resistance of 50 Ohms, V	75; 150; 225
Reference tolerance of amplitude pulse setting, %	±20
Half-wave duration of the excitation pulse generator (EPG), ns	25÷1250
Reference tolerance setting of EPG half-wave duration, %	±10
Discreteness of pulse duration EPG setting, ns	12,5
Pulse repetition frequency of EPG, Hz, not less than	1000
Receiver sensitivity adjustment range, dB, not less than	150
Receiver bandwidth should be at minus 3 dB, MHz	1÷10
Receiver sensitivity adjustment range, dB, not less than	90
Number of points for plotting a time sensitivity adjustment curve	256

2.4 The features of Roboscop VTM-5000/RT eddy current scanning module are presented in Table 4

Table 4	
Features	Value
Eddy current testing for surface and subsurface defects in all parts	+
EPG operating range, kHz	(1÷1000) ±10%
Pulse repetition frequency of the generator, Hz, not less	1000
Nominal amplitude of excitation pulses at an equivalent load of 150 Ohms, V	9±2
Minimum depth of a detectable defect, mm	0,2
Full automatic reconfiguration time, min., max.	1
Gain control range, dB	0÷50
Signal representation methods	1) on a complex surface, 2) amplitude-time
Separate signal scaling	by OX and OY axis
Supported modes	1) static 2) dynamic
Types of displaying of automatic defect alarm (ADA) zone	1) horizontal gate 2) ring sector

2.5 TECHNICAL FEATURES

Technical features of Roboscop VTM-5000/RT main components.

2.5.1 Industrial robotic arm

- axis number.....6
- movement accuracy, mm.....±0,15
- maximum tool travel speed, m/s.....19,9
- manipulator body protection class.....IP67, IP65
- working area radius, mm.....3150
- power supply:**
- voltage, V.....380
- frequency, Hz50
- power, kW.....10,00

2.5.2 Stacker

- lifting capacity , kN.....30,00
- motor power supply:
- voltage, V.....380
- frequency, Hz.....50
- power, kW.....1,50

2.5.3 Control terminal (the operator's place):

- NDT tools;
- touchscreen display;
- Roboscop VTM-5000/RD component servo controllers;
- emergency power off facility.
- enclosure class - IP40.

3 SUPPLY SET

- industrial robotic arm, pcs.....1
- bogie frame stacker, pcs.....1
- control terminal, pcs.....1
- cassette set (UT, ET) NDT probes, pcs.....1
- laser meter.....1
- calibration table with measures of defects and standard blocks, kit.....1
- operation literature, kit.....1

4 RELIABILITY

Life span is not less than **10 years**.

Average life of equipment before an overhaul (update) is not less than **5 years**.

5 WARRANTY

Warranty period - **18 months** from delivery date, excluding consumables (connecting cables and probes).

Warranty storage period - **6 months**.