# DIGITAL SOLUTIONS

RESEARCH INSTITUTE OF INSTROSCOPY

WE ARE PROUD OF OUR PAST, WE DESIGN FUTURE



## DIRECTOR'S FOREWORD



Calkin Denis Igorevich General Director, Cand. Eng., Member of Executive Board of RSNTTD The non-destructive testing credibility is ensured by skilled personnel, high-quality equipment and testing technology. For this purpose, our NIIIN engages in R&D in all three disciplines and implements an integrated approach.

The Institute develops and manufactures testing equipment for magnetic, eddy current, acoustic, radiation NDT methods. Devices by NIIIN have long proven to be reliable NDT equipment allowing to achieve consistent results in the industries of national strategic importance for our country which require accurate and unambiguous solutions: aviation, space, railway, oil & gas and other industries. Products of the Institute are also used by expert organizations providing technical inspection of hardware, buildings and structures.

In cooperation with industry and corporate institutes, we work on improving conventional NDT technologies by increasing their information content and reliability.

In respect of the NDT personnel, the specialists of NIIIN are actively committed to the creation of the Non-destructive Testing System of RSNTTD. NIIIN is the methodical center of Hazardous Production Facility NDT System and NDT Personnel Voluntary Certification System of RSNTTD, and due to this together with our partners (SRO Association NAKS, TC 371) we determine and regulate in detail the rules which shall govern the gualification centers and certification authorities during competency

assessment of NDT personnel and laboratories. Our aim is to provide market players with actual means by using which enterprises will be able to restrict the admission of underqualified personnel to NDT operations in particular industries.

A quantum leap in the NDT digitalization development in Russia and use of particular Industry 4.0 means in the NDT process may be achieved through the creation of a digital Ecosystem incorporating all interested parties involved in NDT activities: customers, service organizations, regulatory authorities, specialist personnel qualification and certification authorities, equipment manufacturers, metrological services, technical committees for standardization.

It will open the door for effective solution of operational issues relating to the admission of contractors to NDT operations, ensuring NDT traceability and credibility, inclusion of NDT results in digital data sheets of facilities, data visualization for quick analysis of performance efficiency, justification and setting of quality assessment criteria, minimization of human factor impact on NDT results, automation of data processing procedures (drawing up records, reports, etc.), optimization of dispatching procedures, overhaul planning, equipment operation mode switching. A combination of NDT cloud data and information about equipment operation modes will, through the use of artificial-intelligence technology, provide for the transition from the analysis of single historical documents to the predictive analytics and implementation of a risk-based approach in technical condition evaluation.

# MISSION, GOAL, OBJECTIVES

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NIIIN deems its mission to be involved in the creation of the National NDT Data Cloud which may be used to minimize the impact of organizational and technical factors and human factor on NDT results at highly hazardous and other facilities.

National NDT Data Cloud (NDC) will allow to incorporate NDT service customers, contractors, regulatory authorities, NDT equipment and technology developers, training and qualification (certification) centers, metrological services within the framework of digital infrastructure.

Each of the digital NDT ecosystem members can transmit to and receive from the National Data Cloud the information required to improve the efficiency of decisions made both through increasing the amount and quality of the information on the basis of which the decisions are made, and through the use of powerful supporting analytical systems with access to the National NDT Data Cloud.

## GOAL

MISSION

Improving the competitive ability of products by domestic industrial enterprises, their operation safety and reliability through the introduction of impartial feedback on their technical condition.

# OBJECTIVES

- Development of NDT smart-devices
- Determination of uniform requirements for a set of data attributes in the national NDT Ecosystem (in cooperation with partners)
- Development of smart-standards on the basis of NDT standards executed in hardcopy
- Arrangement and practical implementation of NDT systems for an objective competence assessment of NDT laboratories and specialists
- Classification of NDT equipment and technology, units under tests, NDT parameters, rejection criteria based on NDT results (in cooperation with partners)

# NATIONAL NDT ECOSYSTEM



# NDT ECOSYSTEM. DATA SOURCES

![](_page_4_Figure_1.jpeg)

# NDT ECOSYSTEM. CLOUD

# NATIONAL NDT CLOUD – COMPUTING INTERNET RESOURCES PROVIDED TO DATA PROVIDERS.

- Information may be sent to the cloud both in real time operation and when devices are connected to the Internet.
- National NDT cloud is not a point solution of one supplier, as the data transmission is carried out via open protocols. Solutions for incoming data filtering, packing, systematization, storing, qualification, protection and access arrangement may be applied to the data stored in the cloud via API. Pre-encryption of data will ensure keeping the proprietary information confidential.
- To ensure additional information security, an option of direct data transmission from the Customer's CDP providers may be considered.
- The apparent advantage of data storage in the cloud is device independence, access from any location and from any system.

# NDT ECOSYSTEM. WHAT APP CUSTOMERS GET?

Capability of rendering big data received from NDT devices for quick analysis of performance efficiency, technical condition of a facility.

Capability of assessing contractors' organizational and technical readiness for NDT operations at a particular facility.

Capability of remote monitoring of contractors' performance at a facility (completion of necessary work stages, software-based restriction of actions inconsistent with regulatory documents).

Capability of including NDT results in digital data sheets of facilities will provide for:

- transition to smart-operation: optimization of dispatching procedures, overhaul planning, equipment operation mode switching;

- justification and setting of quality assessment criteria for facilities;

- conducting industrial risk-oriented monitoring taking into consideration performance parameters and characteristics of the physical condition of metal of a unit under tests and using artificial-intelligence technology.

![](_page_6_Figure_8.jpeg)

# NIIIN IS THE INSTITUTE WITH GREAT HISTORY

нпо "Спект

velocity variations.

welding.

use of advanced image intensifiers.

### **1960**s

Integration of research, development, and engineering work on all methods of diagnostic imaging inside opaque items.

> The world's first multielement (100 and 1000) microwave imagers are developed based on the multipurpose converter UNIKON-60. The first domestic electromagnetic acoustic transducers providing for contactless input in a unit under tests were designed and manufactured.

Creation of the first high-speed thermal imaging cameras IK-10P based on a liquid nitrogen cooled IR photoresistor and an optomechanical mirror-based scanning system. The first domestic thermal profile (IR pyrometer with linear scanning) is developed and implemented successfully at technical glass factories. A package of works on standardization of NDT methods and equipment was initiated in all disciplines: terms and definitions, methods, instruments, flaw detectors, thickness gauges.

**1970**S

photofluorographic units with reduced radiation guantity through the

items with smooth parallel surfaces, and the world's first reference-free

ultrasonic thickness gauges with automatic fine tuning in case of sound

An automated ferrite meter FM-1 is created for the first time ever which is

used for testing of pipe welds at pipe electric-welding skids for argon arc

Development of the first domestic ultrasonic thickness gauge with

digital display of readings UT-30K which is used for testing of thin

Development of X-ray units for medical application and

### **1980**S

More than 55 % of the turbine generator sets within the country are equipped with monitoring and signaling devices VVK-331 developed by the Institute in cooperation with other specialist organizations. The developers were awarded the prize of the Council of Ministers of the USSR.

IN NDT MARKET

58 years

TYPES OF TEST INSTRUMENTS AND DEVICES MONOGRAPHS

62

# NIIIN IS INDUSTRY-SPECIFIC, LEADING, EXCLUSIVE

### **1980**S

The world's first ultrasonic transducers with dry pin contact were developed.

The Institute took the lead in the creation and was the core member of the USSR Nondestructive Testing Society (since 1964 — RSNTTD).

The 10th World Conference on Non-Destructive Testing was arranged and carried out. The first domestic magnetic flaw detector tool for automated in-line inspection of main oil and gas pipelines (KOD-2 system) was developed.

As part of the Buran program, 123 types of new monitoring and flaw detection devices were created at all stages of production of the ship assemblies and components. Subsequently, many of them were used in the automotive, consumer goods manufacturing, shipbuilding industries and even in the public utilities sector.

### **2000**S

KAMAZ-Master Team uses eddy current flaw detector VD-90NP in the extreme conditions of the Paris-Dakar Rally and the Silk Road Rally.

The 10-th European Conference on Non-Destructive Testing was arranged and carried out in 2010. The Reference Book of all basic NDT methods in 8 volumes was issued under the editorship of Academy Fellow V. V. Kliuev.

### 2021

Commencement of development work on the basis of the existing range of NDT smartdevices.

The Institute took on the role of the methodical center of NDT System of RSNTTD.

### **1990**S

Devices VE-26NTs and VD-89N were used in the experiments and works carried out on the International Space Station MIR. Together with the Railway Research Institute, we developed the eddy current flaw detector VD-12NFM that was implemented successfully and is widely used at the facilities of Russian Railways.

### 2014

Together with Ultrakraft, we developed the automated flow detection system for large-diameter pipes on the basis of the eddy current flaw detector VD-91NM. At the time of its development, the system was unrivaled throughout the world in terms of its specifications.

2 120° 150°

3300

SCIENTIFIC ARTICLES AUTHOR CERTIFICATES AND PATENTS FOR INVENTIONS

# NIIIN IS THE AUTHOR OF NDT REFERENCE BOOKS AND GUIDES

### НЕРАЗРУЩИ АСПИТИТИ КОНТРОЛЬ ДИАГНОСТ И В СПРАВОНИ МАТЕРИАЛОВ И ИЗАСЛИИ СПРАВОЧНИК И В СПРАВОЧНИК И В СПРАВОЧНИК И В СПРАВОНИК В СПРАВОНИК И В СПРАВОНИК В СПРАВОНИК В СПРАВОНИК В СОНИКОНИК И В СПРАВОНИК В СОНИК В СОНИКОНИК В СОНИК В СОО В СОНИ В СООНИК В СОНИ В СОНИК В СОВОНО

# NON-DESTRUCTIVE TESTING. REFERENCE BOOK. Under the general editorship of V.V. Kliuev

Volume 1. Visual and Dimensional Inspection. Radiation Testing

Volume 2. Leak Tightness Testing. Eddy Current Testing

Volume 3. Ultrasonic Testing

Volume 4. Acoustic Tensometry. Magnetic Particle Test Method. Liquid Penetrant Testing

Volume 5. Thermal Testing. Electrical Testing

Volume 6. Magnetic Test Methods. Optical Testing. Radio-wave Testing

Volume 7. Acoustic Emission Method. Vibration-Based Diagnostics.

Volume 8. Environmental Diagnostics. Anti-terrorist and Criminalistic Diagnostics.

# NIIIN IS THE DEVELOPER OF NON-DESTRUCTIVE TESTING INFO LIBRARY

**Youtube channel** is the base of video lectures on all non-destructive testing methods provided by our specialists

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![](_page_10_Picture_2.jpeg)

![](_page_10_Picture_3.jpeg)

![](_page_10_Picture_4.jpeg)

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ИНФОТЕКА НК				
УТОЧНИТЬ КАТЕГОРИЮ:		РЕЗУЛЬТАТ ПОИСКА:		
тип	~	NDT.ZONE >>>	ГОСТ Р ИСО 5817-2021. СВАРКА. СВАРНЫЕ СОЕДИНЕНИЯ ИХ СПЛАВОВ, ПОЛУЧЕННЫЕ СВАРКОЙ ПЛАВЛЕНИЕМ (ИС СПОСОБЫ СРАДКИ) УРОВЫИ КАНЕСТРА	ИЗ СТАЛИ, НИКЕЛЯ, ТИТАНА И КЛЮЧАЯ ЛУЧЕВЫЕ
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Полный текст			Год публикации: 2021	
ТЕХНОЛОГИЯ НК			Разработчик/издатель: ТК 364	
ОТРАСЛЬ	•		Настоящий стандарт рекомендуется применять при разработ Стандарт содержит упрощенную выборку дефектов сварки пл	ке стандартов на продукцию. авлением на основе
ОБЪЕКТЫ И ДЕФЕКТЫ	•			
ПРИМЕНИТЬ			подробнее	
СБРОСИТЬ ФИЛЬТРЫ		NDT.ZONE	АКТУАЛИЗАЦИЯ И ГАРМОНИЗАЦИЯ С МЕЖДУНАРОДНЫМ ПОЛОЖЕНИЙ ГОСТ 7512-82 В ПЕРВОЙ РЕДАКЦИИ ПРОЕК	ИИ СТАНДАРТАМИ ТА ГОСТ Р
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			Год публикации: 2021	
			Журнал: Территория NDT	
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			ГОСТ 7512 по разультатам плительного обсимаеция в рамках	DK-5 TK 371

Info Library of Non-destructive Testing contains thousands of publications, books, thesis papers, standards, patents, graduation papers and course papers on radiation testing collected since 1969 and structurized by tags.

![](_page_10_Picture_7.jpeg)

![](_page_10_Figure_8.jpeg)

## EDDY CURRENT FLAW DETECTOR VD-41P

- It is used for non-destructive testing of pipes, rolled stock, wire, rolled metal products during their manufacturing and incoming inspection.
- It conforms to the standards: GOST, ISO, DIN, EN, API, ASTM.
- It can be integrated into any continuous-production line and provides for peripheral control.
- Detectable defects: discontinuities (poor penetrations, cracks, tears, hair cracks, folds, overlaps, non-metallic inclusions, etc.).
- It is recorded in the National Register of Measuring Instruments of the Russian Federation No. 80850-20.

### MAIN SPECIFICATIONS PARAMETER, SPECIFICATION VALUE Diameter of units under tests 3 to 120 mm Test frequencies 3.0 to 70 kHz Test rate max. 5 m/s Signal phase adjustment 0-359° Transducer current adjustment 50 to 500 mA Operating temperature range 0 до +40°С Automatic operability test • Sorting of rolled metal products based on test results LCD display 10.2" • Supported ECTs: attachable, transmission-type, sector-type • Interfaces: 4 "dry contact" outputs, 2 inputs with galvanic isolation, USB, Ethernet

### SMART-POTENTIAL

- Storing an electronic quality certificate of a unit under tests (batch of products).
- Remote monitoring of operating personnel actions. Equipment setup in on-line mode.
- Monitoring of equipment verification dates, possible restriction of operation or issuing verification records for equipment that has failed verification.
- Generation of a database containing any detected defects with description of a type of defect detected with reference to a unit under tests.
- Remote software updates.

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![](_page_11_Picture_15.jpeg)

![](_page_11_Picture_16.jpeg)

# EDDY CURRENT FLAW DETECTOR VD-90NP

- High flaw sensitivity.
- Ergonomic casing design with high dust and moisture protection rating.
- Capability of operating in extreme conditions.
- Corundum protective tips of eddy current transducers (ECTs)
- Capability of operating through heavy non-conductive protective coatings without any loss of sensitivity and with offset from gap variation effect on the flaw detector readings both in static and dynamic modes.
- Wide range of ECTs and work tooling.

![](_page_12_Picture_8.jpeg)

### MAIN SPECIFICATIONS

### PARAMETER, SPECIFICATION

Inspection of parts with surface roughness of

Capable of detecting defects with depth of

Angle of transducer deviation from the normal to the working surface

ECT excitation frequency range

### Working gap

Wide temperature range

- Data transmission and control via Bluetooth;
- Documenting the inspection results;
- Wide temperature range of -30 °C to +50 °C;
- High dust and moisture protection rating IP 54;

### SMART-POTENTIAL

- Referencing the objective defect data to a section of a unit under tests.
- Capability of automatic loading of a flaw detector settings for inspection operations in accordance with RD.
- Remote processing and interpretation of inspection data.
- Generation of an electronic inspection record and an electronic quality certificate of a unit.
- Automatic check for correct preset inspection modes, flaw detector settings, used gauges and reference blocks.
- · Loading of previous inspection data for comparison or arbitration.

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### VALUE

max. Rz320 min. 0.1 mm max. 60° 1 kHz to 2 MHz max. 10 mm -30°C to +50°C

## HARDWARE AND SOFTWARE COMPLEX "KHAMELEON" FOR **COMPREHENSIVE QUALITY ASSESSMENT OF REFERENCE** WELDS

The complex consists of a high-sensitive flat detector, a rotator and software. The complex provides for automatic exposure and rotating of reference welds (RW). The number of exposures, rotation angles, exposure parameters are calculated automatically. The complex dimensions allow for its installation inside the radiation protection chamber "Kalan-4". The obtained image quality of weld joints complies with class B as per GOST ISO 17636-2-2017 for steel with thickness of min. 1.5 mm.

The complex is controlled from a remote PC.

### MAIN SPECIFICATIONS Flat detector PARAMETER, SPECIFICATION VALUE 12x15 cm Selected area dimensions Technology CMOS Scintillator Csl Maximum energy of radiation source 300 keV Pixel size 50 µm **Reference weld rotator** PARAMETER, SPECIFICATION VALUE Reference weld diameter 108 to 325 mm Reference weld length 200 to 350 mm 0 to 12° with interval 2° Axial tilt Overall dimensions (L×W×H) max. 550x500x450 mm Mains power consumption maximum 20 VA Weight maximum 50 kg

Control through RS485 interface via MODBUS protocol

![](_page_13_Picture_7.jpeg)

### MAIN SPECIFICATIONS

Software allows for:

• determining the required number of exposures with the set values of distance between a radiation source and a unit under test, focal spot size, inspection class as per GOST ISO 17636-2-2017;

• calibration of the electronic ruler according to precisely known sizes of objects in the image (e.g., image quality indicator);

• measuring linear dimensions of defects, distance between defects, distance between any points in the image after completion of calibration;

- calculating area of defects;
- measuring signal/noise ratio by rectangular 22 × 50 at the point below the cursor;
- determining the basic spatial resolution SRb by the image of twin wire image quality indicator;
- recording all obtained object sizes in the inspection record.

### SMART-POTENTIAL

- Significant decrease in human factor impact on inspection results.
- Generating an inspection report containing an X-ray image, as well as linear dimensions of defects, distance between defects, basic spatial resolution SRb, signal/noise ratio determined at the software level.
- Capability of remote interpretation of inspection results.
- Capability of creating an e-library of reference welds for neural network training for subsequent identification of abnormal sections in a weld joint image.
- Objective inspection of compliance with standards and requirements during exposure and interpretation.

![](_page_14_Picture_16.jpeg)

MAGNETIC STRUCTUROSCOPE MS-10 (COERCIMETER)	
<ul> <li>MS-10 fully complies with the requirements of GOST R 58599-2019 and allows for:</li> <li>assessment of metal mechanical properties degradation during operation of hardware, buildings and structures for subsequent calculation of residual operating life during the industrial safety expert review;</li> <li>inspection of heat treatment conditions;</li> <li>determination of material size range;</li> <li>inspection of depth and hardness of surface hardened layers on steel and cast iron parts;</li> <li>assessment of uniaxial elastic stress;</li> <li>inspection of strain-stress state.</li> </ul>	

### MAIN SPECIFICATIONS

PARAMETER, SPECIFICATION	VALUE	
Coercive force measurement range, A/cm	1.060	
Measurement accuracy, A/cm	0.04*Nf+0.1	
Working gap with which the accuracy is ensured, mm	0.5	
Power supply from battery/from mains	220 V/50 Hz	
Operating temperature range	max. 10 mm	
Wide temperature range	-20°C to +40°C	
Weight, kg: electronic module/transducer	1.3/1.5	
Operation time from one battery charge, h	8	
Internal memory capacity	(512 sets) × (512 measurements	5)

### SMART-POTENTIAL

- Measurement reference to particular points of a unit under test for assessment of the unit degradation during operation period.
- Calculation and visualization of strain-stress state using a 3D model of a unit under test.
- Recalculation of direct measurements to controlled parameter values (hardness, steel grade, hardened layer depth, etc.).
- Automatic decision making on a unit operability based on measurement results with generation of an inspection report.
- Automatic inspection of device operability and operator's actions.

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![](_page_15_Picture_11.jpeg)

# PORTABLE MAGNETIC PARTICLE **ALTERNATING AND PULSE CURRENT** FLAW DETECTORS "MANUL"

- High field currents and compact size.
- Long continuous operation time with maximum current values.
- Automatic magnetization and demagnetization.
- Overheating and misconnection protection of magnetizers.
- Microprocessor-based control.
- Saving settings in nonvolatile storage.
- Alternating, pulse and half-wave field currents.
- Wide selection of components and accessories.
- Conforms to the requirements of GOST, ISO.

![](_page_16_Picture_11.jpeg)

![](_page_16_Picture_12.jpeg)

**UNM 2000-6000** 

### MAIN SPECIFICATIONS

PARAMETER, SPECIFICATION	VALUE
Weight	min. 20 kg
Alternating current / pulse current / rectified current	max. 2000 A / max. 6000 A / max. 1000 A
Current pulse recurrence rate	2 Hz
Current pulse amplitude	28 V
Alternating/rectified current voltage	5 V
Field current measurement error	10 % max.
Magnetization time / demagnetization time	1–60 sec / 5–60 sec
Operating temperature range	-10°C to +40°C
Climate version	UkhL 3.1
Operating cycle with maximum capacity	30%

### SMART-POTENTIAL

- Magnetizer control, setup and data exchange via network providing for optional integration of MANUL product range into the non-destructive testing and quality management automation system.
- Automatic loading of magnetization mode settings meeting the requirements of GOST and RD.
- Recording of objective data on preset magnetization modes in the inspection report.
- Remote control of magnetic particle testing process via the local network.

![](_page_16_Picture_20.jpeg)

![](_page_16_Picture_21.jpeg)

### COMPARISON OF VARIOUS UNM UNITS

	Parameter value for equipment by NIIIN								
Parameter	UNM-1000	UNM-300/2000	UNM-5000i	UNM-2000/6000	UNM- 2000/6000 01				
Type of power supply unit (hand-held, portable, transportable)	Н	Р	Ρ	Ρ	Р				
Type of current (multiple selection: $DC - direct$ current, $AC - alternating current$ , $RH - rectified half-wave current$ , $RF - rectified full-wave current$ , $PC - pulse current$ , $UC - undulating current$ , $RT - rectified three-phase current$ )	AC	AC, PC	PC	AC, PC	AC, PC, RH				
Connected load	Cables, electric contacts	Cables, electric contacts; solenoids AC, RF; electromagnet AC, RF	Cables, electric contacts	Cables, electric contacts; solenoids AC, RF; electromagnet AC, RF	Cables, electric contacts; solenoids AC, RF; electromagnet AC, RF				
Rated RH field current in unreeled cable 6 m × 100 mm2, root mean square value, minimum, A.		-	_	_	2000				
Rated alternating field current in unreeled cable 6 m × 100 mm2, root mean square value, minimum, A.	1000	1000	_	2000	2000				
Maximum alternating current with which the device can operate continuously, root mean square value as per GOST R 56512-2015, minimum, A.	600	800	-	800	800				
Adjustment range of alternating current in cable and at electric contacts, A	301000	301000	<u>   <del> </del>   </u>	502000	502000				
Rated pulse field current in unreeled cable 4 m × 10 mm2 and at electric contacts, peak value, minimum, A.	_	2000	5000	6000	6000				
Adjustment range of pulse current, A	-	1002000	tocable6m 100mm²— minimum5000A	tocable6m 100mm²— minimum6000A	to cable 6 m 100 mm²—minimum 6000 A				
Overall dimensions of device (W×H×D), maximum, mm	300×180×400	267×320×465	310×320×420	267×320×465	395×320×465				
Device weight, maximum, kg	20	50	50	50	60				
Demagnetization	automatic, smooth to 0	automatic, smooth to 0	automatic, about 15 sec	automatic, smooth to 0	automatic, smooth to 0				

### MAGNETIC PARTICLE TEST STAND

- Easy switching between circular and longitudinal magnetization modes.
- Easy movement and locking of solenoid and electric contact for placing a unit under test in the stand operating area.
- Single-part clamping of a part under test during circular magnetization.
- Platform with removable protection grid enhances the accessibility for inspection after magnetization.
- Possibility of installation on a fixed or mobile magnetic particle testing station.
- Protective back plate preventing slurry splashing out of the operating area.
- Easy drainage of waste slurry.
- Safe operating voltage of 5 V.

![](_page_18_Picture_10.jpeg)

# NIIIN IS THE MEMBER OF NDT GUILD

![](_page_19_Picture_1.jpeg)

The Guild of Russian Manufacturers of Equipment and Technology for Non-Destructive Testing, Technical **Diagnostics and Condition Monitoring** was created for the purpose of developing the NDT, TD and CM hardware and technology at various facilities of this industry both in Russia, and on a worldwide basis.

The NDT Guild is a voluntary association of NDT specialists who accept the rules established for the Guild members, share the Guild goal and agree to participate in the implementation of the specified objectives.

GUILD OF RUSSIAN MANUFACTURERS OF EQUIPMENT AND TECHNOLOGY FOR NON-DESTRUCTIVE TESTING

CONTROL

The key goal of the NDT Guild is creating a positive image of domestic NDT equipment manufacturers as reliable and highly skilled suppliers to Russian and international users of NDT and TD equipment and technology.

The NDT Guild members acknowledge that the NDT development will be associated directly with the practical implementation of digital solutions and are committed to contributing to making these NDT easily available, transparent and objective.

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# NIIIN IS THE PARTICIPANT OF NDT GUILD PROJECTS

# MOBILE NDT LABORATORY

Mobile NDT laboratory mounted on a Ural truck is equipped with hardware manufactured by the Guild members, and designed for non-destructive testing and technical diagnostics performance in the field. The mobile laboratory equipment package is designed on a case-by-case basis in accordance with a particular customer needs.

The laboratory includes both an accommodation space for NDT specialists, and an operating area. Development of the smart-potential of the mobile laboratory equipment will provide for

informing any interested parties of the results of inspections carried out in hard-to-reach places in real time.

# TEST AND TRAINING LABORATORY FOR COLLEGES AND UNIVERSITIES

A demonstration interdisciplinary laboratory of the NDT Guild will be created on the basis of NIIIN and equipped with hardware by domestic manufacturers.

In addition to equipment, the laboratory will be provided with all necessary materials for training process management: samples, guidance materials, video courses on equipment handling and operation.

The laboratory may be used by students and post-graduate students of various academic departments in the disciplines of welding production, mechanical engineering, instrumentation engineering for both practical sessions and research work.

The list of laboratory equipment will be selected considering the needs of the organizations that are major employers of graduating students in the relevant disciplines in the region.

The following organizations have shown their interest in this form of cooperation: Far Eastern Federal University, Kuzbass State Technical University, Altai State Technical University n.a. I.I. Polzunov, Ufa State Aviation Technical University, Tomsk State University.

# NIIIN IS THE METHODICAL CENTER OF NDT SYSTEM OF RSNTTD

![](_page_21_Picture_1.jpeg)

NIIIN was appointed as the methodical center of NDT System of RSNTTD, with its primary objective being the development of a unified approach to be used by qualification centers during competency assessment of NDT specialists and laboratories

NDT System of RSNTTD incorporates the Qualification System of Hazardous Production Facilities subordinated to Rostechnadzor (HPF NDT System of RSNTTD) and the NDT Personnel Voluntary Certification System (NDTP VC System of RSNTTD).

It covers all industry sectors which require a verification of qualification and skills of specialists and laboratories performing non-destructive testing operations. Data on specialist and laboratory qualification breakdown by NDT methods in the HPF NDT System of RSNTTD (as of August 3, 2022)

	UT (16%)	RT (10%) 880	
	1470	PT (7%) 609	
VDI (47%) 4335	other (14%) 1305	ET (6%) 559	

Ultrasonic testing 148	Visual and Dimen¬ sional Inspection 147	Penetrant testing 117	Radiation testing 90	Magnetic par- ticle testing 84	Leak de- tection 49	Electro- magnetic testing 47	1	1
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# NIIIN IS THE DEVELOPER OF THE PROCEDURE FOR ALL-RUSSIAN COMPETITION "NDT SPECIALIST"

### All-Russian Non-Destructive Testing Competition arranged by RSNTTD "NDT Specialist"

is carried out by the Russian Society for Non-Destructive Testing and Technical Diagnostics (RSNTTD) with support from the Ministry of Industry and Trade of the Russian Federation, Ministry of Labour and Social Protection of the Russian Federation, Rostechnadzor. National Agency for Qualification Development (Autonomous Nonprofit Organization NARK) is the partner for information support and promotion of the Competition.

Data on the number of competitors in various qualification centers (the circle area is proportional to the number of competitors) as of September 1, 2022

![](_page_22_Figure_4.jpeg)

# NIIIN IS THE LEADING ORGANIZATION OF SC4, SC5 OF TC 371 "NONDESTRUCTIVE TESTING"

![](_page_23_Picture_1.jpeg)

 NIIIN is in charge of subcommittees SC 4 "Eddy Current Methods" and SC 5 "Radiation Methods" of TC 371 "Non-Destructive Testing".

In order to increase the efficiency of developing draft national standards, NIIIN created an electronic platform which is a software solution for automation of the operations of the subcommittee SC 5 of TC 371 to the extent of discussing draft standards in work groups.

![](_page_23_Figure_4.jpeg)

# NIIIN IS THE DEVELOPER OF A DIGITAL PLATFORM FOR NDT STANDARDIZATION

Currently, the digital platform is used by SC 4 "Eddy Current Methods" and SC 5 "Radiation Methods", SC 3 "Ultrasonic Methods".

### EFFICIENCY INCREASE

Each participant can state their opinion, comment on the opinion of other specialists and receive feedback from experts in real time

### INSPECTION ACTIVITY

Evaluation of the activity and commitment of the participants of draft standard development process; regulated development process timing

# DIGITAL PLATFORM

### DIGITAL TECHNOLOGY

The platform enables the use of generally accessible digital space for arranging the standard development process

### COMMON INFORMATION SPACE

It enables integration of all interested participants of the standard development process into a single information network

### NOTIFICATION

Automatic reminder to all participants about the need to take an action / comply with the commitment

# DISSERTATION COUNCIL IN NIIIN

Over the years of its operation, NIIIN has become a leading scientific organization in the field of NDT and TD in the disciplines of industry-related, anti-terrorist, environmental and medical X-ray diagnostics. Dozens of types of flaw detectors, structurescopes, thickness gauges have been created, certified and mass-produced that subsequently have been used in technical processes of product manufacturing at factories in the aviation industry, automotive industry, thermal and nuclear power engineering, ferrous and non-ferrous metallurgy, railway and pipeline transport.

The Dissertation Council operates on the basis of NIIIN in the specialty 05.11.13, which has shown significant results and contributed to training of top-rank academic personnel over the years of its operation 2000–2022.

![](_page_25_Figure_3.jpeg)

# NIIIN IS THE ACADEMIC PERSONNEL TRAINING CENTER

When considering the subjects of thesis papers to be defended, special attention was given to the results of the implementation of the solutions developed by a graduate in the production process. Subsequently, many of these solutions were used when stating requirements in national standards, were reflected in monographs and reference books intended for process engineers, personnel of QC departments, factory laboratories, maintenance and repair services of industrial enterprises. Particularly:

They are implemented at JSC NPO Energomash n.a. V. P. Glushko in the production process of liquid rocket engines They form the basis of standards OST 929521-82 Measurement of Screw Tightening Forces Using Acoustic Methods, and GOST R 52889-2007 Nondestructive Testing.

Ultrasound Measurement of Screw Tightening Forces. General Requirements They are used for dimensional inspection of equipment and pipelines of primary and secondary circuits of NPP reactors, inspection of oil and gas pipelines of various diameters and purposes They are used as the basis of remote NDT and technical condition diagnostics of steel structures by means of infrared thermal mapping of deformation temperature field of the surface

![](_page_26_Figure_7.jpeg)

![](_page_27_Picture_0.jpeg)