



STRESS TESTING IS NEW NDT KIND IN RUSSIAN STANDARD GOST R 52330-2005 AND IN INTERNATIONAL STANDARD ISO-9712

A.A. Dubov

Energodiagnostyka Sp. z.o.o. Warsaw, Poland

Various methods and means of stresses NDT are widely spread in Russia and abroad nowadays. “Stress control” is included in the list of inspection types for personnel training in ISO-9712 (2005).

In 2005 the RSNDDTD President V.V. Kluev approved the “System of voluntary personnel certification in the file of non-destructive testing and diagnostics” where “Stress control” is included in the list of NDT methods.

At present the topic of “Stress control” is actual both for machine-building products quality inspection and in operation at equipment life assessment.

Thus, the necessity of “Stress control” inclusion in the list of NDT methods has become imminent. At the same time classification of certain stress control methods by the type of physical fields used will correspond to classification of flaw detection methods.

GOST R 52330-2005 “Non-destructive testing. Stress-strained state tests on industrial objects and transport. General requirements” was put into effect in 2005 in Russia.

It is known that stress concentration zones (SCZs), occurring due to manufacturing process defects, working loads or their combinations, are main sources of equipment damaging.

SCZs may vary from fractions of microns (product’s micro volume) to sizes comparable to those of the product itself (macro volume).

A SCZ – stress concentration zone – is a local zone of a product, in which large strain occurred compared to the average strain across the entire product’s volume.

For new machine-building products SCZs are determined by structural inhomogeneity and manufacturing technology.

Presence of SCZs both on new and used products sufficiently reduces their life. Therefore inspection of products’ stress-strained state and SCZ detection using non-destructive means is an important national economic task.

This Standard specifies general requirements to application of methods and means of industrial objects’ and transport’s stress-strained state non-destructive testing at machine-building products, equipment and structures life assessment.

The Standard covers products and equipment manufactured of steel and alloys, cast iron and other structural materials without limitations by size and thickness including welded joints.

Energodiagnostika Co. Ltd. specialists first prepared the new National Standard on the above-indicated theme, and it has no analogues in Russia and abroad. This Standard was presented by the Russian delegation as a draft ISO International Standard at the Annual Assembly of the International Institute of Welding in Quebec (Canada).

At present a large arsenal of methods and means for materials’ SSS diagnostics has been accumulated in Russia and other countries. However till date there are no standard specimens, programs and centers for specialists straining in non-destructive testing of equipment and structures’ SSS for objective comparison of these methods and means application effectiveness. Unfortunately, currently the theoretical basis is insufficiently developed as well for objective comparison of SSS inspection methods effectiveness and determination of boundary conditions and scope of their application.



A uniform theoretical basis developed based on modern scientific achievements in the field of fracture mechanics, material engineering, solid-state physics may become a basis for resolution of contradictions occurring nowadays at practical implementation of various methods and means of materials' SSS inspection.

Based on many years' experimental and theoretical investigations, we made an attempt of developing such a uniform theoretical basis for comparison. The book by Vlasov V.T. and Dubov A.A "Physical criteria of structures materials' and elements' stress-strained state assessment" has been published in Russia in February 2007.

Specialists of Energodiagnostika Co. Ltd have developed Program of specialists training in "SSS inspection". Table 1 shows the list of topics of mentioned above Program. At present this Program, upon agreement with SIU "RISCOM", was submitted to Rostechnadzor for consideration.

Table 1.

No.	Topic name	Hours
1	Study of the "Provision about the order of technical devices, equipment and constructions safe operation period prolongation at hazardous industrial objects" (GD 03-484-02)	4
2	Problems of ageing equipment residual life assessment	2
3	Analysis of IO state based on technical documentation (operational, repair, design). Analysis of equipment failures by units and reasons. Reliability criteria.	4
4	Study of the "Methodical guideline for residual life determination of potentially dangerous objects under control of Rostechnadzor" (GD 09-102-95). Study of branch GDs on life assessment.	6
5	Study of standards on engineering diagnostics GOST 27.004-85 and safety GOST 27.002-89.	4
6	Basics of fracture mechanics. Energy criteria.	10
7	GOST R 52330-2005. Non-destructive testing. Stress-strained state tests on industrial objects and transport. General requirements.	4
8	Methods and instruments for stress-strained state (SSS) inspection. Theory and practice.	10
9	The procedure of SSS and metal's mechanical properties inspection methods and flaw detection methods application at life assessment.	8
10	Drawing up of expert conclusions at equipment life assessment.	4
11	Laboratory classes. Sitting for a practical examination in methods of SSS inspection, mechanical properties investigation and flaw detection methods.	16
12	Examinations.	8
TOTAL:		80