

5.2.4. STANDARDIZATION EXPERIENCE OF THE TC-132 COMMITTEE IN THE FIELD OF TECHNICAL DIAGNOSTICS, STRESS CONTROL AND LIFETIME ASSESSMENT

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At present all leading diagnostic centers of the world are occupied with the problem of stress and strain measurement in working structures with the purpose of their state assessment. However it is known that the effectiveness of the inspection methods remains low when they are used in practice. Improvement of the effectiveness of the stress-strain state (SSS) control of technical objects during their lifetime assessment takes on special significance.

The following should be noted among the main organizational-technical problems of the SSS control:

- the lack of the metrological basis for certification and calibration of devices for measurement of products' SSS characteristics (till date there are no unified standards, specimens and techniques both in Russia and other countries);
- the lack of standards specifying the general requirements to the methods and devices for NDT of stresses and strains in real structures.

For the first time such standard was developed in Russia by the experts of Energodiagnostika Co. Ltd in cooperation with TC-132 of the Russian Technical Regulation Body and it was published in 2005 under the number GOST R 52330–2005 “Non-destructive testing. Stress-strained state tests on industrial objects and transport. General requirements”.

It is known that stress concentration zones (SCZs), occurring due to manufacturing process defects, working loads or their combinations, are main sources of metal components damaging. Presence of SCZs both on new and used products sufficiently reduces their life. Therefore inspection of products' stress-strained state and SCZs detection using the non-destructive testing devices are presented in the standard as the most important task during the SSS control.

In 2005 the experts of Energodiagnostika Co. Ltd. developed the draft of the National Standard “Lifetime assessment of potentially dangerous objects based on the quick methods. General requirements”. This standard was officially published in 2008 under the number GOST R 53006–2008.

Figure 1 presents the block diagram of the residual lifetime assessment of potentially dangerous objects being under control of the Russian Technical Supervision Body (Rostekhnadzor).

Quick methods refer to passive NDT methods, which use the internal energy of the structures' metal:

- the method of acoustic emission (AE);
- the metal magnetic memory (MMM) method;
- thermal inspection.

At present these methods are most widespread in practice for the purposes of early diagnostics of damages in metal components and structures.

This standard specifies more specifically the role and the tasks of modern methods of technical diagnostics, namely – 100% inspection and detection of stress concentration zones (SCZs), determining reliability and residual lifetime of metal components and structures, classification of SCZs by the degree of their hazard.

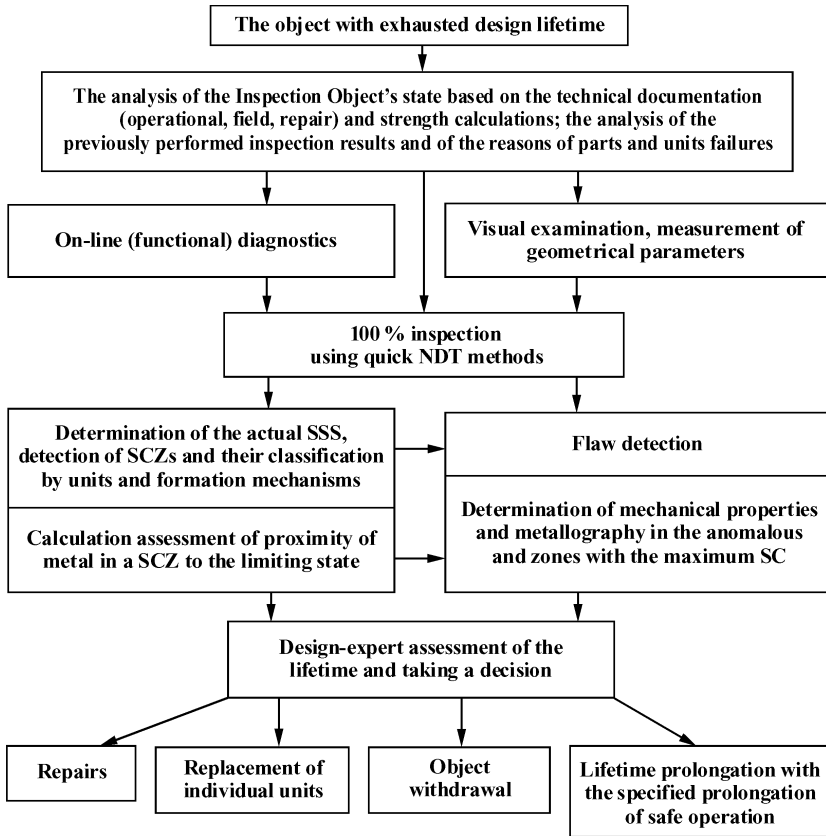


Fig. 1. Block diagram of the residual lifetime assessment of potentially dangerous objects being under control of the Russian Technical Supervision Body (Rostekhnadzor)

It is suggested to carry out calibration strength calculations with residual lifetime assessment for SCZs being in operation, taking into account the actual structural-mechanical properties of the metal, detected during the inspection.