4.1.1. DEFECTS – FLAW DETECTION – QUANTITATIVE FLAW DETECTION – HIGH-RISK FACILITIES SERVICE LIFE

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Type and category (potential hazard) of defects and imperfection of test objects (TO) predetermines the formation of efficient system for non-destructive testing (NDT) of these objects within the cycle of their production, operation, current repair and restoration [1]. NDT systems based on the ultrasonic NDT methods are the most efficient. During formation of NDT system on the basis of ultrasonic methods, it is not proper to specify instead of defect type and category the equivalent areas of defects as materially non-existed and related physically with neither the type of a defect, nor with its potential hazard.

NDT system purpose is to ensure TO operational reliability at maximal admissible service life due to the ***timely*** elimination of defects detected by NDT system.

Flaw detection tasks consist in the search of defective zones in TO.

Tasks of quantitative NDT are: measurement of characteristics of detected defects in a volume necessary and sufficient for evaluation of defect category [1] and adoption of a decision on TO state, i.e. service life prior next stage of non-destructive testing (NDT).

Enormous park of modern flaw detection means does not allow evaluation of reflector dimensions and cannot be used for quantitative flaw detection of detected defects. Therefore, in the NDT practice, defects of various types and categories are divided into two classes: “admissible” and “inadmissible”, i.e. ones to be detected and eliminated, which preconditions unjustified over-rejection and reduction of the TO service life resulting in respective economic losses. This drawback can be eliminated by introduction of quantitative flaw detection methods and means disclosed in [2] into NDT systems.

Introduction of quantitative flaw detection means into NDT systems creates the basis for admission to operation of defect containing article under condition of stage-by-stage monitoring of the state of defective zone in article in the process of its operation selecting NDR intervals (remaining article service life prior the next scheduled NDT stage) under the method of successive approximation [3].

References:

1. **Gurvich A.K.** Non-destructive testing systems, chapter 6, vol. 1, series “Non-destructive testing” / under editorship of V.V. Sukharukov. – M.: “Vyshaya Shkola”, 1992. – P. 101 – 127.

2. **Ultrasonic** quantitative flaw detection of metals with application of holographic methods / under editorship of A.Kh. Vopilkin. – M.: Mashinostroenie, 2008. – 368 p.

3. **Gapanovich V.A., Vopilkin A.Kh., Kazantsev A.G., Gurvich A.K., Kononov D.A.** Determination of remaining service life of increased hazard objects. “In the NDT World”, 2006. – N. 4. – P. 75 – 77.