

5.3.12. ON THE WAY FROM DEFECTOSCOPY TO DEFECTOMETRY

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Necessity of revealing of defects of designs has arisen during the expansions of a batch production of military and industrial equipment in middle XX of a century. Long time the technology of search and an estimation of defects had the name “Defectoscopy” (in Russian) or Non-destructive Testing (NDT – in English).

Problem NDT was detection of defects in testing object. Results of the NDT estimated by comparison of the conditional sizes and number of defects with norms of rejection. In that case when estimated parameters exceeded rejection level, object throw out or repaired. Just in case rejection level chose rather rigid, i.e. with greater safety factor. At use of such scheme takes place significant over rejection. Now it is the out-of-date approach.

The modern approach to industrial safety demands an establishment of communication between NDT, fracture mechanics, forecasting of a resource and an estimation of risk of failure. Transition from normalization of defects to calculation of strength of object (static, cyclic, long-term, etc.), an estimation of safety and forecasting of a resource is the basic problem in our activity. It is possible only at transition from “Defectoscopy” to “Defectometry” (DM).

In the report actual problems of DM which decision will allow to enter it in system of maintenance of industrial safety naturally are considered. The scheme of use DM contains following basic components in system of industrial safety:

1. Revealing defect;
2. Identification of the nature of defect (a kind of damage);
3. Measurement of parameters of defect for strength calculating;
4. Calculation of object strength;
5. Forecasting growth of defect;
6. The estimation of degradation of reliability of object;
7. The estimation of failure risk;
8. Definition of the period of safe operation.

NDT over Russia is included into the system of technical diagnostic. Now technical diagnostic is a characterization of a technical condition of object with the purpose of an estimation of its safety (strength) and forecasting of a resource. The necessary volume of the information at performance NDT is defined by requirements of fracture mechanics for an estimation of strength of object with defect. Data are mandatory for this purpose about sizes of defect, its coordinates, form and orientation. Now these parameters are not measured with necessary accuracy.

In the report requirements to NDT are formulated. The system of parameters which transforms “Defectoscopy” to “Defectometry” is entered. Set of calibration and accuracy characteristics, the probability of detection, reliability of the testing concern to these parameters. The analysis of latest parameters and requirements to techniques of the NDT is lead.

Reasonable use of the specified characteristics allow to raise safety of object by means of increase in quantity of the information on a condition of object and defects of its structure. The increase in quantity of the information is possible also by increase in quantity of parameters of the testing. Except for the mentioned parameters it is necessary to

use in addition repeated testing, increase in number of used frequencies, varied angles of examining of defect (a tomography, etc.).

“New” approaches and requirements to NDT, considered in the report, scientifically and technically are completely worked out. For performance of modern problems of industrial safety it is necessary to introduce the considered approaches in practice of industrial diagnostics purposefully to use in again created standards.

Transition from defectoscopy to defectometry is an inevitable step in development NDT. The following step is a creation of systems of monitoring. Ultimately it is possible to expect, that the system of diagnostic monitoring for industrial object becomes in future the same system (will play the same role), as nervous system for the person.