1.1.13. TOTALS OF THE METAL MAGNETIC MEMORY METHOD DEVELOPMENT IN RUSSIA, POLAND AND OTHER COUNTRIES

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The Magnetic Memory of Metal (MMM) – is an effect of the magnetic memory of shape and strain, which is conditioned by the oriented internal stresses in products and structures made of a ferromagnetic material.

The MMM method – is a non-destructive testing method based on the analysis of self-magnetic leakage fields (SMLF) distribution on components' surfaces. It is intended for determination of stress concentration zones, imperfections and heterogeneity of metal structures and welded joints. The considered method uses the after-effect, which occurs in the form of the residual magnetization of metal in components and welded joints formed in the course of their fabrication and cooling in the weak magnetic field (as a rule, in the magnetic field of the earth) or in the form of the irreversible change of components' magnetization in zones of stress concentration and damages due to working loads.

Development of the MMM method, which represents a new direction in the technical diagnostics, is realized in a wide front and in parallel with solution of the following tasks:

- carrying out of experimental works in the laboratory and industrial conditions;
- theoretical investigations and development of the physical bases;
- development of the techniques for inspection of pipelines, vessels as well as various equipment in different industries;
- standardization of the method in Russia and other countries;
- development, manufacturing and certification of instruments;
- development and publication of the Training Handbook, examination tickets and the program for training of experts;
- certification of experts according to the Training Program agreed with the Russian Technical Supervision Bodies (Rostechnadzor).

Practical implementation of the MMM method and the appropriate inspection instruments is executed, as a rule, on the voluntary basis, which is a clear confirmation of the method effectiveness.

The interest towards the method is conditioned by the unsolved problems occurring in practice during the quality inspection of engineering products as well as at reliability assurance and lifetime assessment of metal components.

As of January 2009, the MMM method and the corresponding inspection instruments are implemented to greater or less extent in 26 countries of the world. The Energodiagnostika Certification Body executed training in the MMM method of:

- 1500 experts in Russia;
- 300 experts in China;
- 70 experts in Poland;
- more than 60 experts from other countries (Australia, Argentina, Byelorussia, Bulgaria, Germany, Israel, India, Iraq, Iran, Canada, Kazakhstan, Latvia, Lithuania, Macedonia, Serbia, Montenegro, Czech Republic, Moldova, Mongolia, Ukraine, South Korea).

Every year the MMM method and the inspection instruments are used at more than 1000 enterprises in Russia.

More than 40 guidance documents and techniques for inspection of various metal components were developed. The greater part of them was agreed with branch institutes,

Russian Technical Supervision Body (Rostechnadzor) and joint-stock companies ("Gazprom" JSC, "Russian UES" RJSC, "Transneft" JSC and others).

The interest of Russian and foreign experts, working in various industries, towards the principally new magnetic method of non-destructive testing (NDT) is growing steadily. For the first time great attention was paid to the metal magnetic memory method at the world-level conference (the 17th International NDT Conference, Shanghai, October 25 – 28, 2008) in the Conference Proceedings and during the work of the Technical Session in the "Magnetic NDT methods" section. The work of an individual Technical Session was dedicated to the MMM method. More than 20 reports were made on this topic.

During the period from 1994 till 2008 the International Institute of Welding (IIW) has published 45 documents with favorable Resolutions on the metal magnetic memory method. In January 2006, as a result of the favorable voting among 18 countries – IIW members and more than 10 countries – members of the ISO Committee, the International ISO Standard 24497-1:2007(E), 24497-2:2007(E), 24497-3:2007(E) on the metal magnetic memory method was approved, and it was officially published in November 2007. Thus, the long and laborious 14-year work on promotion of the new NDT technology to the level of an International Standard was completed.