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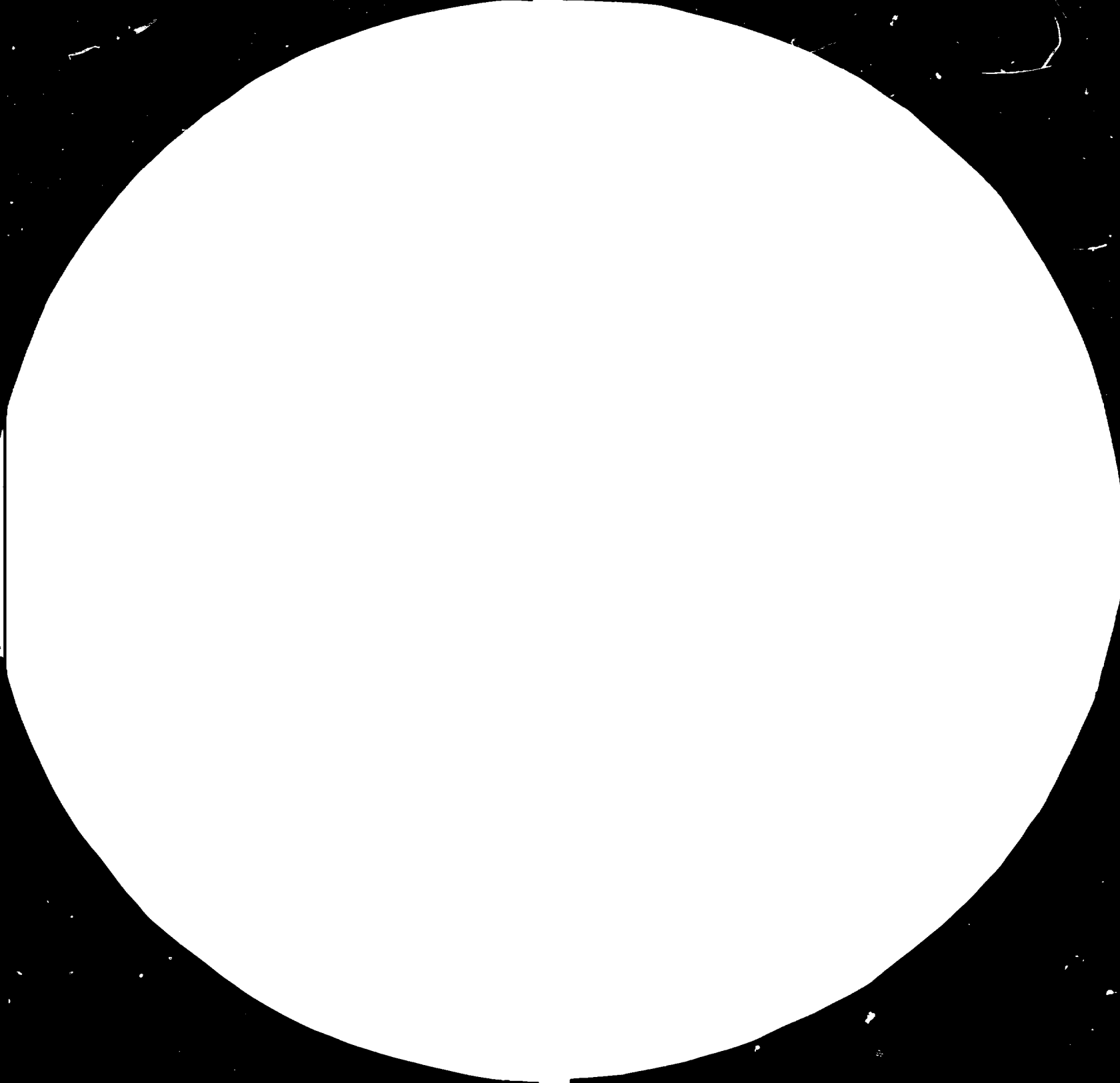

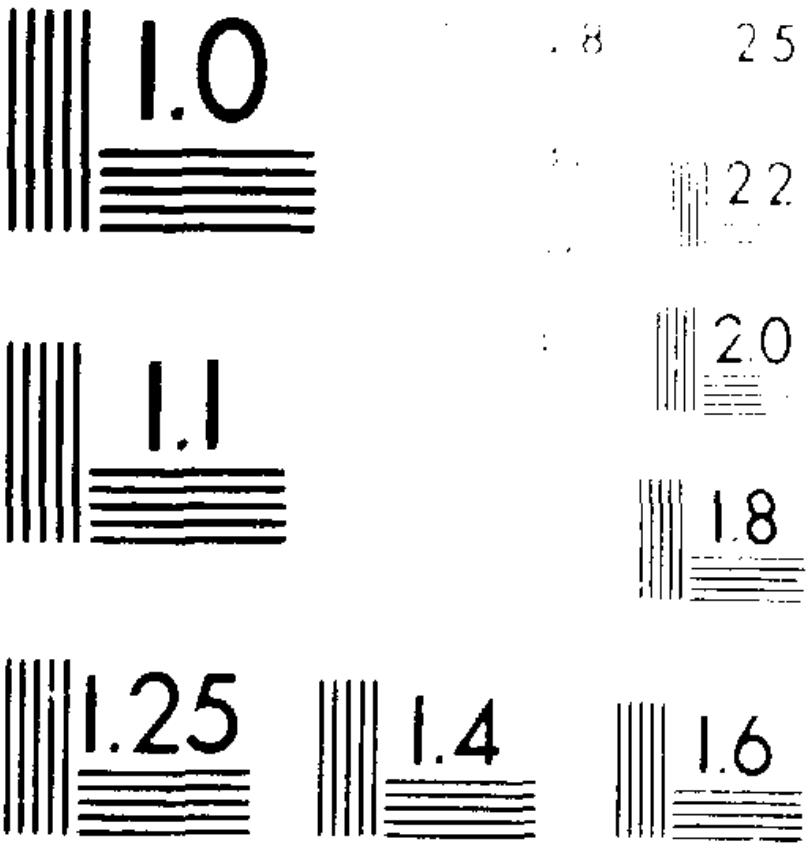
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GENERAL DEPARTMENT FOR STANDARDIZATION, METROLOGY AND QUALITY CONTROL

DP/VIE/81/006/11-52/31.3.K

14170

Report on

Viet Nam.

NON DESTRUCTIVE TESTING AT

TESTING CENTRE I - HANOI

and

TESTING CENTRE III - HO CHI MINH CITY

by

Krishna C. Srivastava

UNIDO Consultant for

the Government of Socialist Republic of Viet Nam

Hanoi and Ho Chi Minh City

VIET NAM - November 1984

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INTRODUCTION

The purpose of the present mission is to assist the Government of Viet Nam in strengthening and developing the national network of quality control laboratories in the field of non destructive testing for the General Department of Standardization, Metrology and Quality Control (GDSMQ).

The Consultant is a member of the team of experts attached to the Testing Centre I - Hanoi and the Testing Centre III - Ho Chi Minh City to work under the general guidance of the Chief Technical Adviser in the field of non destructive testing.

The time allotted for this mission is two months out of which the Consultant has to work for the first three weeks at the Testing Centre I and the next three weeks at the Testing Centre III and the last weeks again at Testing Centre I to complete his mission, according to the job description (annex I) and the work plan drawn up in consultation with the Chief Technical Adviser of the project.

OBJECTIVES AND WORK PLAN

As mentioned in the job description the main objectives of this mission were :

1. Assist in installation and operation of the non destructive testing (NDT) equipment and, where required, preparation of instructions for operation.

2. Advise and assist in developing the methodology for testing, reporting and analysis of the test results and record-keeping.

3. Prepare and conduct short-term training courses combined with practical training of the laboratory personnel in the application of various NDT methods, especially ultrasonic, magnetic, eddy current, liquid penetrant and radiography.

Work plan. The Consultant had a meeting with the Vietnamese Project Director and the Director of Centre I who briefed him about the stage of development of industries in the country. The major industries, such as machine tools, diesel engines, agricultural implements and other heavy and power industries were mostly in the northern part of the country, while the southern part has mostly the light industry such as bicycle tires and tubes, rubber, textiles and consumer goods. To cater to the needs of these industries, the Government of Viet Nam, through the General Department of Standardization, Metrology and Quality Control, has established Testing Centre I at Hanoi in the northern part, while Centre III at Ho Chi Minh City was established in the southern part. These testing centres are being equipped by the assistance of UNIDO/UNDP.

Both of these testing centres have NDT equipment and the personnel have to be trained in the theoretical and practical aspects of these instruments (more emphasis on practical use), and they should also be given an idea of the modern developments in the field of NDT. The Consultant shall therefore spend his time in both of these testing centres.

Keeping the above in view the work plan was drawn up in consultation with the Chief Technical Adviser (see annex II).

IMPLEMENTATION OF THE PLAN

Part I at Testing Centre I - Hanoi from 3 to 20 October 1984

The counterpart in this centre was Dr. Nguyen Nghia, Head of the Mechanical Testing Section. Among the others were Mr. Hoang Nghia Thanh for ultrasonic and Mr. Le Anh Tuan, engineer for magnetic and dimensional methods. There were a number of supporting personnel for the testing of materials.

Introduction to NDT methods was started with the discussion of a paper on what is NDT, what it entails and what is it used for (see annex III). This created a lot of interest among the staff. To give them basic theoretical understanding the recent literature specially prepared for training on the following NDT topics was discussed and handed over to them.

1) Liquid penetrant testing - principle of the process, development of the method, equipment required for the test and its use in the industry for the detection of surface cracks in ferrous and non ferrous metals, ceramics, glass and porcelain.

2) Radiography by x-ray and gamma-ray - application, advantages and limitations; principle of x-ray and gamma-ray radiations and their use in the detection of internal defects in materials; x-ray equipment, gamma-ray Ir-192 and Co-60 sources and method of taking radiographs, x-ray films and their development; what is a good radiograph, sensitivity and density of the radiographs; radiation and its protection for the radiographer; radiation survey meters and film badge service; type of defects and discontinuities that can be evaluated by radiography.

3) Magnetic particle inspection - There was one magnetic particle tester PDM-70 from USSR. It was an old model machine but could give 1000 amp and 1500 amp current for magnetizing by prod, coil and solioniod system.

It was being used for testing automobile parts, heat-treated parts and also castngs for the industry. It had both coloured magnetic powder (black) wet method and also fluorescent powder for making fluorescent fluid for use with black light. Some test pieces were actually tested by this machine.

The principle of magnetism and its use in crack detection, as well as different methods of magnetization; equipment both portable and stationary were discussed.

4) Ultrasonic method. This was the most important method which could be discussed and practised, as there were two ultrasonic testers - one UD-10-UA from USSR and the other was USIP-11 from Krautkramer, recently received with both normal and angle probes. It was used for testing in the industry for weld examination, castings testing and also in-service examination of machine parts and machine tools.

The principle of ultrasonic testing, applications and limitation of the ultrasonic tester were discussed. Actual testing practice was done on samples, forged rolls, and welded joints by normal and angle probes. DGS dcales were also procured and tried with normal probes for exact location and sizing of the cracks in the test pieces. The staff has fairly good practice on this instrument.

It was expected that further ultrasonic equipment on order, such as digital thickness gauge DM-2 and wall thickness meter CL202, would be received for practical testing.

REVIEW OF STANDARD SPECIFICATIONS AND TESTING TECHNIQUES

NDT techniques have greatly advanced and are in practical use in most of the countries of the world; accordingly, standard specifications for testing methods have been produced by ISO (International Standards Organization) and other national standard organizations in India, Japan, GDR, UK and USA. Some of these commonly-used standards for NDT methods were compared and discussed, such as:

- ultrasonic testing of welds, casting, plates, pipes and specifications for reference blocks for calibration of ultrasonic flaw detectors;
- magnetic particle testing of steel crankshafts, ferrous pipes and tubes, flaw detection of welds and specifications for magnetic flaw detection inks and powders;
- radiographic examination of fusion welds, image quality indicator and safety code for industrial radiography practice;
- liquid penetrant flaw detection - code of practice.

A list of Indian standards on non destructive testing was given for procurement of these standards.

Testing techniques and procedures for existing equipment such as ultrasonic flaw detector, magnetic particle tester and thickness tester were derived from the operation manuals supplied by the manufacturers of this equipment. These were further modified in light of the practical tests performed by these instruments.

The technique and procedure for the ultrasonic flaw detector USIP-11 with normal probes and angle probes and also the use of the DGS scale for location and size of defects was developed for these instruments. It could be further modified for use in the laboratory.

RECENT DEVELOPMENTS IN NDT AND SYSTEMS OF EDUCATION, TRAINING AND CERTIFICATION

The recent developments in the methods of :

a) liquid penetrants, such as fluorescent and radioactive methods, were explained,

b) magnetic methods, such as use of plastic tape and plastic film for making permanent records of the tests, were discussed,

c) radiography; dynamic radiography, neutron radiography and coloured radiography, and xeroradiography, were discussed,

d) ultrasonic; signal processing, continuous testing of plates, pipes, automatic scanning of rail tracks with the use of computers, etc. were discussed,

e) new methods, such as acoustic emission, optical holography, infrared inspection, were also discussed.

EDUCATION AND TRAINING AND CERTIFICATION OF NDT PERSONNEL

NDT is being widely used for assessing the soundness of materials, equipment and pressure parts. The most important single factor in the successful application and evaluation of NDT is the personnel who are responsible for the application and interpretation of the results of tests. The success of NDT depends upon the ability of the personnel to demonstrate the selection of the most suitable method, its application and finally ability to judge and interpret the test results. It is, therefore, essential that the personnel connected with NDT should have proper education training, and be certified to ensure that they have adequate competence.

With the above in view most of the countries where NDT is widespread have formulated schemes for the training and certification of NDT personnel on a national level. This helps industry to identify proper persons who can carry out NDT work reliably and with integrity. Such a scheme also confers a status of "career" in NDT and makes an independent profession.

This idea was impressed upon the management of the Centre, and they also felt the need of formulating a scheme of "Training and Certification in NDT". In order to give an idea of this type of arrangement and to have the scheme on a national level, a copy of the "Scheme for Training, Evaluation and Certification of NDT personnel - 1984" for India was given to the heads of testing section of the Testing Centre I and Testing Centre III for their study.

A draft scheme could be made on the basis of the training and certification schemes operating in other countries such as India, German Democratic Republic and USSR.

The draft scheme should be in line with similar schemes in other countries of the world. It shall have the basic three NDT personnel categories, such as :

i) Level I - Operators
ii) Level II - Inspectors
iii) Level III - Superintendents.

They should have significant basic education to understand the theory of the method.

They should be given organized training for such periods as necessary for the use of the instrument.

The certification should be done on a national basis for which the scheme should be formulated.

PRACTICAL TRAINING WITH THE INSTRUMENTS

The staff was already using these instruments, but with the theoretical knowledge they should do much better. The finer practical points in testing were also explained and a methodology of recording test results was also discussed.

Part II at Testing Centre III - Ho Chi Minh City - from 21 Oct, to 11 Nov, 1984

The counterparts were Dr. H.V. Quang, Deputy Director, and Mr. Dinh Van Thu, Head of the Mechanical Testing Laboratory, with a number of supporting staff.

1. The introduction to NDT method here was also the same as in Testing Centre I and the various methods - a) liquid penetrant, b) magnetic particle, c) radiography and d) eddy current - were covered. The review of standard specifications, recent developments in NDT and system of education, training and certification was also on the same lines.

2. Practical training and testing work. Here most of the work consisted of actual training with the test instruments, such as:

a) Ultrasonic flaw detector - practical training was given on the use of normal probes, angle probes and TR probe. Written instructions were given for the calibration of the flaw detector with IIW standard block for normal and angle probe and also for actual setting up of the instrument for the testing of the test samples. Sufficient practice was given and it is expected that the staff shall be able to carry out the actual testing for the industry.

b) Magnetic Particle inspection on the magnaflux testing machine. It had both coloured particles and fluorescent particles and fluorescent system. A number of samples were tested by various combinations of longitudinal and circular magnetization. The method of taking photographs of the flaw (crack) indications was also developed, and some photographs were taken.

c) Boroscope - The laboratory has a 6 m long boroscope which was put to practical use. The staff was trained to examine inside pipes and tubes for internal defects such as lack of welding, corrosion pits, and their location could be measured by the boroscope.

d) Eddy current tester - The principles of eddy current testing to measure conductivity in aluminum and Al-alloy, copper alloys and bronze and coating thickness of non-conductive material on conductive surface was explained. The instrument in the laboratory is an old model, and they were trained to calibrate and find out percentages of conductivity and thickness of coatings with standard samples.

Methodology of report test result was also given and actual forms were prepared for their use (see Annex IV).

A seminar on NDT in India, quality control and NDT in pressure vessel manufacture and recent developments in NDT method was arranged for the inspection staff and testing staff of the laboratory.

Part III - at Testing Centre I - Hanoi - from 12 November to 23 November 1984

Centre I had started a training course on ultrasonic method, and about 30 participants were called from industries, boiler plants and technical institutions. The Consultant gave a series of 3 lectures of 3 hours' duration each on various aspects of NDT.

A lecture was delivered on "The present development and future prospects of NDT" to an invited audience of university professors, heads of institutions, industry and ministries of science and industry. It also included discussion on the present state of NDT in India and Viet Nam and suggestions for the development of NDT activities in this country.

FINDINGS

A. Testing Centre I

1. The staff members are willing workers, eager to learn to increase their capability and therefore it is expected that they will develop the section to a high level of technical competence.

2. They have experience in the use of NDT equipment and if encouraged shall be capable of delivering the goods to the industry for the benefit of the country.

3. They have organized a training course on ultrasonic method for the NDT personnel from the industry and technical institutions.

4. As such this Centre can be developed into a national centre for training and certifying NDT personnel.

5. All the NDT equipment except ultrasonic flaw detector USIP-11 are of very old model and have become outdated. These should be replaced with modern equipment in order to keep pace with the present state of the technology.

6. Further the thickness gauge DM-2 and wall thickness meter CL-202 are being added. These will not only be useful for testing but also for demonstration.

7. The seminar organized for the invited audience from the technical university, research institution, metallurgical institute, heads of technical sections of factories and safety inspectors for the Government was conducted by the Consultant. The modern developments and future prospects in the NDT field were highlighted. The organized training and certification scheme of developing countries and state of NDT in Viet Nam was discussed. This should give the nucleus for the formation of a national scheme for the training and certification of the NDT personnel, as this is the most important requisite for the development of NDT systems in the country.

8. In the visits to technical institutions and industry it was found that there was great enthusiasm for the adoption of NDT Systems.

B. Testing Centre III

1. The young and enthusiastic staff was given theoretical and practical training in the use of the NDT instruments. They learnt the methods and shall be able to carry out NDT for the industry.

2. They were getting a number of samples for checking the coating thickness and the eddy current instrument was not able to give correct and reliable results, with the result that other metallurgical methods were used.

3. There was great need to strengthen the section specially for the eddy current method for industrial testing.

4. The staff strength and equipment should be increased so that this place as well becomes the national centre for the south to impart organized training for the NDT personnel.

5. The library of the Centre has standards on NDT from various countries, and the latest list of Indian standards was given for addition to the library.

6. The lecture and seminar organised during the stay created great interest in the participants who learnt about the wide development in all the methods of NDT and also modern advanced system of NDT. This type of lectures should be arranged more often.

RECOMMENDATIONS

1. The Testing Centres have ultrasonic, magnetic, eddy current, and thickness measurement systems. Radiography with modern x-ray machine of 250 kV and liquid penetrants should be added so they may be able to help the industry better and also become ideal centres to impart training and certification to the NDT personnel of the country.

2. Centre III is getting a large number of test samples for checking coating thickness and therefore modern instruments on the eddy current principle should be added to check and measure non-conductive coating thickness on conductive materials and also conductive coating on conducting materials.

3. An inventory card should be attached to each instrument giveing description and spares of the instrument, calibration and repair history.

4. The staff members should be sent to industry, and personnel from industry should be encouraged to visit the centres to have better link to understand each other's problems.

5. The senior staff should be provided the opportunity to visit advanced countries to get first-hand information in scientific development in NDT.

6. Books, journals and standards on NDT should be added to the library for reference.

7. An NDT society of Viet Nam should be organized. It should have its membership from industry, technical institutions and testing centres. It should serve to disseminate information and organize seminars for the development of the art and science of NDT.

8. A national scheme for education, training and certification of NDT personnel should be established on the lines as given by the Consultant to both testing centres.

9. NDT is being used in industry and efforts should be made to produce national standards and the present Consultant shall extend all his help and guidance for the same.

10. A scheme should be prepared to encourage industries to produce NDT equipment and the Government should encourage foreign collaboration in the field.

11. Finally a research and development section should be organized in the testing centres so that the country may not be left behind in the fast-growing application and technology of NDT for the benefit of mankind.

ACKNOWLEDGEMENTS

The Consultant wishes to express his thanks to the management and staff of the project for their cooperation and the Director of Centre I, Mr. Nguyen Ngoc Duyet, and his staff, specially Mr. Nguyen Nghia, and the Director of Centre III, Mr. Nguyen Huu Thien, and Mr. H.V. Quang for their personal interest and courtesy during his stay.

A special word of thanks to Mr. Januz J. Cekiera, Chief Technical Adviser, for his guidance and advice in carrying out the work of the mission.

I must thank the staff of UNDP in Hanoi, specially Mr. Wolfgang Scholtes, for their help in the completion of the report.

It has been a great pleasure for me to work with such friendly people and I have fully enjoyed my stay in Viet Nam.

UNITED NATIONS

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

Project in the Socialist Republic of Viet Nam

18 April 1984

JOB DESCRIPTION
DP/VIE/81/008/11-53/31.3.1

Title: Consultant in Non-Destructive Testing

Duration: Two months

Date required: As soon as possible

Duty station: Ho Chi Minh City, with travel within the country

Purpose of project: To assist the Government in strengthening and developing the national network of standardization, metrology and quality testing laboratories.

Duties: The expert will be a member of the international team of experts attached to the Metrology and Testing Centre II in Hanoi and Centre III in Ho Chi Minh City, belonging to the General Department for Standardization, Metrology and Quality Control (TIEUCHUAN). He will work under the general supervision of the Chief Technical Adviser and will specifically be required to:

1. assist in the installation and setting into operation of non-destructive testing equipment including the preparation of specifications for purchase or instructions on workshop fabrication of equipment;

2. prepare and conduct short-term training courses or lectures combined with practical training for laboratory personnel in the application of various methods of non-destructive testing methods (ultrasonic, magnetic, eddy current and others);

3. advise and assist in developing methodology for conducting laboratory tests, results analysis and report writing.

The expert will also be expected to make a technical report setting out clearly his findings and recommendations on further action to be taken.

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Qualifications: University degree or equivalent in engineering, physical science with specialization in the testing of metals and metals products and extensive experience in application of non-destructive methods.

Language: English; French or Russian an asset

Background information: The country urgently needs to increase its export revenues to cover a larger part of the imported goods and services required for the reconstruction and development of a national economy. It also has an important parallel objective of strengthening consumer protection by improving the quality of locally produced products.

The Government is well aware that the introduction of an accurate and correlated system of measurements, references and national standards is the basic precondition for the development of the whole national economy and for progress in industrial efficiency, national and international trade and commerce. Since 1963 state institutions for standardization and metrology have been established and activities undertaken to prepare and publish national standards. In 1971, the Department for Quality Control was also set up. To create a clear formal basis in this field and promote progress, the Government has promulgated a series of legal statutes, i.e. Standardization - ACT 68-CP in 1968, Metrology - ACT 216-CP in 1974, Quality Control - ACT 62-CP in 1976, and subsequently introduced many secondary legal documents, rules and regulations. For better promotion and co-ordination of activities, the GSMQ was established in 1978 by Decree No ACT 325-CP, on the basis of merging three existing organizations in Hanoi and the Institute for Standardization in Ho Chi Minh City.

Proper development of the GSMQ's services to industry has been hampered by a lack of reference standards, high pure chemicals, buildings and properly equipped testing facilities for quality control and certification. The Government has applied for UNDP assistance in this field in the 1977-1981 Country Programme, to strengthen Regional Centre III in Ho Chi Minh City where a high proportion of the country's light and consumer industry is concentrated. Under project RS/VII/76/013 "Institute for Standardization and Quality Control", which was approved in November 1979, laboratories for civil engineering/construction materials, food technology, light industrial products (textiles, rubber, paper etc.), chemical products and electric and electronics in Bien Hoa near Ho Chi Minh City have been strengthened by the provision of equipment, the recruitment and initial training of staff and the introduction of testing procedures. These laboratories, under the technical support to the Quality Control Division of Centre III which works directly with industry, collecting samples for testing, conveying the results to the factories and providing short courses to improve their practices in order to meet the quality established. Long-term counterpart

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have been signed between Centre III and various factories (asbestos, cement, diesel engines, brewery, oil products) providing for the regular testing of raw materials and products, while other arrangements are in force with many other factories producing a wide range of items. To meet the demand from industry, the capacity of the laboratories needs to be expanded through the introduction of additional standards and the corresponding testing procedures, and through the provision of ancillary equipment.

While Centre III serving the south has now been established and needs further assistance largely to consolidate the progress made so far, Centre I in Hanoi serving the north needs considerable development. It consists at present of six laboratories in a large building on the outskirts of Hanoi, a staff of 150 of whom 90 are engineers and 30 advanced technicians, and a very limited and incomplete range of equipment. The Centre is thus not able to carry out certification work but is restricted to quality certification on an advisory basis. The testing facilities in the mechanical, electrical, electronics, chemical and light industrial sectors need to be properly equipped, the staff need extensive practical training and modern testing techniques and quality control procedures need to be introduced and disseminated.

WORK PROGRAM

4.10 - 20.10.1984 : Work at Centre [illegible]

1. Introduction to NDT - methods

a/ Liquid Penetrant

b/ X-ray and Gamma-ray Radiography

c/ Magnetic Particle Method

d/ Ultrasonic method

e/ Eddy Current Method

2. Review of standard specifications and testing technique and procedures with the application of existing laboratory instruments and new delivered with UNIDO Project.

3. Instruction on theory and practice of recent developments and international recommendations in NDT testing methods, systems of education, training and certification.

4. Practical training in testing work with the instruments :

- Ultrasonic Flaw Detectors : USIP-11

- Magnetic particle tester

- Thickness tester UT-30PC

[illegible] : Work at centre [illegible]

5. - Introduction to NDT - methods as item 1

6. Review of standard specifications and testing techniques and procedures with application of instruments delivered by UNIDO project.

7. Instruction on recent developments and international recommendations in NDT testing method

8. Practical training and testing work with :

- Alcoprobe 5- Eddy Current method.

- Ultrasonic Flaw Detector —
- Magnaflux Magnetic Particles method
- Boroscope

9. Conducting the seminar on quality control in metal industry and use of NDT methods.

12.11- 23.11.1 94 : Work at centre I in Hanoi

10. Practical training in testing , recording the results , reporting and interpretations

11. Lecturing on training course prepared by Centre I for industrial personnel in Ultrasonic testing methods

12. Industrial visits

13. Conducting the seminar on ultrasonic and recent developments in NDT.

14. Preparation of Final report ,

NON DESTRUCTIVE TESTING (NDT)

I. 1. What it is
2. What it involves
3. What it is used for
4. What it is not

It includes all the possible (physical, electronic (nuclear)) means of detection or measurement of the properties, performance or capability of materials, without damaging or impairing its properties.

II. It has 3 basic characteristics

1. Indirect measurement of the property or soundness, that is, freedom from defects.
2. Correlation of this measurement with the desired property of the material.
3. Judgement for its use, when there is deviation, based on serviceability.

The purpose of NDT, therefore, is to assure reliability in the item or system that it is as perfect as possible and does not have any defects or deviation from the design requirements.

III. A non destructive test has 5 basic elements

1. A source of suitable probing medium
2. Modification of the probing medium by variation in the test material.
3. A sensitive detector of such changes in the probing medium.
4. A means of indicating or recording the detector signals into interpretable forms.
5. An observer or device capable of interpreting the indications or records to judge the serviceability of the test object.

IV. There are three basic types of non destructive tests

1. Tests involving transport of matter :

a. liquid penetrant test,
b. liquid or gas pressure test for leak detection,
c. filtered particle test.

2. Tests using transmission of energy :

a. x-ray, gamma ray radiography,
b. magnetic particle and magnetic field test,
c. visual, optical or luminous energy test, such as visible light, ultraviolet light, infrared radiation.

3. Tests using combined motion of matter and transfer of energy test

a. ultrasonic test,
b. acoustic emission test,
c. electromagnetic induction - eddy current test

V. Typical uses of NDT

1. Detection of surface defects - cracks, etc.
2. Detection of internal defects - cracks, voids, inclusion or other discontinuities
3. Identification and sorting out of materials.
4. Checking chemical composition.

5. Detection of specific material.
6. Detection of variation in structure.
7. Checking thickness and variation in thickness.

VI. What NDT is not

1. Mechanical measurement of dimensions by micrometers, vernier or scales
2. Electric properties measurements (resistance, capacitance, etc.)

Annex IV/1

GENERAL WEST STANDARD METROLOGY AND QUALITY CONTROL

CENTRE III - NON - DESTTRUCTIVE TESTING LAB

BIEN HOA

DATED ----------

REPORT ON MAGNETIC PARTICLE INSPECTION

1. Report No.....
2. Job No. ----------
3. Part No. ----------
4. Material ----------
5. Stage at Test
6. Test Procedure

   a/ Method of Test - Prod ☐ coil ☐ Yoke ☐

   b/ Magnetising Current - AC ☐ DC ☐ H-DC ☐

   c/ Process of test - Dry Power ☐ Wet fluid ☐

   d/ Diagram of indications -

7. Result of test

   a/ Accept ☐

   b/ Rework ☐

   c/ Reject ☐

Tested by Approved by Inspecting Authority

Annex IV/2

GENERAL DEPT. STANDARD . METROLOAY AND QUALITY CONTROL
CENTRE III - NON-DESTRUCTIVE TESTING LAB

BIEN HOA

DATED .....

REPORT ON ULTRASONIC TEST

1. Report No. _____
2. Job No. _____
3. Part No./Somm No. _____
4. Stage at Test, _____
5. Instrument _____
6. Probe and Frequency _____
7. Calibration Standard _____
8. Technique _____
9. Result of Test

   a/ Accept

   b/ Rework

   c/ Reject

   d/ Sketch of Defect indication

Tested by Approved by Inspection Authority

Annex IV/3

GENERAL DEPT. STANDARD METROLOGY AND QUALITY CONTROL

CENTRE III - NON-DESTRUCTIVE TESTING LAB

BIEN HOA

DATED.....

RADIOGRAPHY EXAMINATION REPORT

Report No._____Job No._____Seam_____Date_____

Customer _____Customer Order No._____

Material Specification _____Thickness _____

Welding Process _____Code of Construction _____

Welder/Operator_____

Source _____ Source strength/KV _____MA _____Time _____

SFD _____Film _____Screen _____Penetrameter _____Shim_____

entification No	RADIOGRAPHS No.1	No.2	No.3	No.4

Tested by Approved by Inspecting Authority