

SCIENTIFIC VISIT TO THE FACULTY OF MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE, DEPARTMENT OF QUALITY, NDT LABORATORY, UNIVERSITY OF ZAGREB, CROATIA.

Mr. Michael Mangala of the Institute of Nuclear Science and Technology, University of Nairobi, Kenya, visited the Faculty of Mechanical Engineering , University of Zagreb, Croatia from 4th to 8th November 2013. The goal of the scientific visit as the IAEA Project Counterpart Coordinator was to:

- To seek and initiate scientific cooperation between the NDT research groups at the Faculty of Mechanical Engineering , University of Zagreb, Croatia and the Institute of Nuclear Science & Technology, University of Nairobi for exchange of personnel between the two institutions in the field of NDT testing methods;
- To be introduced to new practical NDT experiments methods for integration University of Nairobi (UON) engineering training curricular;
- To be introduced to administrative and technical issues related to the management of NDT testing laboratories, which are necessary for the development UON competences and in UON project implementation.

Summary of Visit Details and Discussions

Day One:

- a) A meeting was held on the first morning for introduction to the Host Institution, Department of Quality, where present were: Prof. Damir, Markucic-Head NDT Laboratory; Prof. Josip Stepanic Chair Non-Destructive Testing; Ms Gordana Terzic – Administration; Ms Jelena Cosic – Ph.D student, Mr. Marko Rakvin – Ph. D student/NDT Instructor, Mr. Tomislav Kezele-Technical.
- b) A second meeting was held in the Morning hours at the Office of the Dean, Faculty Mechanical Engineering & Naval Architecture at which meeting, Mr. Mangala was introduced to the following senior administrators in the Faculty, namely : Prof. Ivan Juraga, the Dean; Prof. Zdravko Virag, Vice Dean for International Cooperation, Prof. Toma Udiljak, Vice Dean, Capital Investment, and Prof. Bojan Jerbic. Programs of the Faculty, namely; Mechanical Engineering, Naval Architecture, and Aeronautical Engineering were explained, purpose of Mr. Mangala's scientific visit was explained and understood in relation to the KEN/1004 project on capacity building in NDT competence, collaboration interests of staff and students exchanges were proposed. In general, at which meeting, it was agreed that; requests to be formally communicated on appropriate areas of specialists training and on needs for exchange of personnel in Engineering between the University of Nairobi and the University of Zagreb (To bring to the attention of the Principal, College of Architecture & Engineering(CAE) and the Deputy Vice Chancellor (Research, Production & Extension), University of Nairobi (provide brochures of Department of Quality Facility Of Mechanical Engineering & Naval Architecture). It was proposed that both parties to initiate an MOU between the two Universities on exchange of

personnel and good practices and request the IAEA for support (Michael Mangala and Prof Damir Markucic to prepare a draft document in 2014).

- c) Mr. Mangala held an afternoon meeting with the host; Prof. Damir Markucic , at which he explained to Mr. Mangala his NDT Laboratory activities in the Department of Quality for applications in areas of research, his various collaborations with industry, their education and training programs. I reciprocated with a presentation of UON research activities at the Institute of Nuclear Science & Technology, in Kenya in general, and on the aims and objectives, activities, achievements and on challenges in implementation of KEN 1004 project.

Day Two:

- a) In the morning of day 2, Mr. Mangala was introduced to practical demonstrations of the computerized radiographic processing facilities in NDT quality Laboratory. Various related technical issues in support of the facility, including; long term costs implications of the facility – low costs of analyses, data storage for archival retrieval, real time analyses, and applications studies were explained to him. Mr. Mangala participated and radiographed and analyzed a few specimen of diverse application in industry; archaeological specimen for provenance studies, honey comb aircraft wing for water/moisture inclusion, spent mine detonator for internal evaluation.
- b) In the afternoon of day 2, Mr. Marko presented to Mr. Mangala some of the students' previous projects studies and research thesis studies. He explained to him the applying examinations procedures used in the department. Thereafter, Mr. Mangala visited the materials chemical laboratory for practical demonstrations on corrosion studies and chemical analyses of their facilities used in measurements and studies, such as the portable EDXRF analyzer for elemental content determination.

Day Three

The third day was occupied by visits with the following activities:

- a) Attended Prof. Damir Markucic class of Welding Engineering students on practical applicability of NDT testing methods for defects and flaws detections, whereby Mr. Mangala introduced himself to the class and made a brief presentation of UON programs and research activities to the class of Welding Engineering students;
- b) Attended practical NDT (PT) class demonstration for Engineering students by Marko Rakvin, MSc Eng Mech;
- c) Visited Prof. Doc. Lidija Curkovic, Laboratory for Chemical Analyses – for practical demonstration of various facilities used in chemical measurements of alloys for various industrial applications (WDXF, AAS, etc); visited and was welcomed to the Workshop for Robotics Welding, Laser Welding, Underwater Welding studies facilities (including archival welding equipment) for practical demonstrations;
- d) Visited the Precision Engineering Laboratory for length calibrations measurements, in which nano precisions measurements are achieved; met with Prof. Vedran Mudronja, Head of the Laboratory & Dr. Marko Katic, Technical Assistant;

- e) Attended a presentation class on e-learning by Prof. Damir Markucic (created by LMSsoftware-module).

Day Four

Summary of the activities of day 4 included the following:

- a) Mr. Mangala visited together with his host, Prof. Damir Marcucic , INETEC, Institute for Nuclear Technology, a company that develops technologies for the nuclear power plant examinations and repair, inspection and repair services as well as undertaking various engineering studies using NDE methods and at which meeting attended ;
 - o A presentation by Dr. Zrinka Corak on services company offers: Research & Development/Design and Manufacturing/Preservice and In-service, Inspection/Repairs/Engineering/Quality Control/Consulting, etc,
 - o Practical demonstrations of UT and ET Inspection/Examinations of PWR – RPV,
 - o Practical Demonstration of UT on A Reactor Pressure Vessel Examinations,
 - o Demonstration on Design and construction of UT probes for RPV examinations.
- b) Visited the Croatian Center for NDT headed by Prof. Miloslav Omelic later in the day – at which meeting they discussed several issues related to; NDT training; certification processes and examinations, accreditation requirements and processes, sample examinations papers for various NDT methods.

Day Five

Mr. Mangala held discussions with the host, Prof. Damir Markucic on issues arising out of the Scientific visit for subsequent follow up and implementation at a later date, namely;that should initiate an MOU between the two Universities on exchange of personnel and good practices and that they should request the IAEA for support (Michael Mangala and Prof Damir Markucic to prepare a draft document).