EF European Federation for Non-Destructive Testing
NDT NEWS

Forthcoming Meetings & Events

EFNDT Board of Directors Meetings

12/09/2011 – Telford, UK
1/11/2011 – Split, Croatia

National Conferences and Exhibitions

NDT 2011 and Materials Testing Exhibition
50th Annual British Conference on NDT
13-15/09/2011 – Telford, UK

AIPnD National Conference
26-28/10/2011 – Florence, Italy

MATEST 2011 International Conference
2-5/11/2011 – Split, Croatia

Defektoskopie 2011 – 41st International Conference and Exhibition
9-11/11/2011 – Ostrava, Czech Republic

Volume 1 Issue 4 **June 2011**

PRESIDENT'S MESSAGE

Drive to collect membership data

I appreciate your contribution to EFNDT's Europe-wide partnership and would like to thank you for your continuous support.

At the General Assembly in Valencia we will accept one new full member society and one more associate member society to give a total of 32 full and seven associate member societies.

New member societies bring new experiences, extend our pool of skills and broaden our reach through their respective members. Members are a key to our success and I cannot stress enough the importance of member acquisition and retention.

As we are trying to achieve the goals defined in the EFNDT Statutes and extend our influence in different industries and territories, we often have to demonstrate our current achievements and strength. We have to 'sell' EFNDT to the current members and help them reaffirm their decision that EFNDT is something they should invest their time and money in. New members assessing the benefits of joining, as well as old members deciding if they should extend their membership, are often asking: How big are you? How many members do you have? Who are the biggest members in the industry? In which sectors are you involved? More questions arise when EFNDT is to be included at some official European level of influence or approach new partners.

We should have accurate and up-to-date answers to these questions.

- EFNDT is an organisation that stands for precise and timely measurement and reporting. EFNDT is advocating innovation and technology and removal of technological barriers.
- EFNDT does not currently have a standardised procedure for member administration; each member society uses different processes to manage its members and aggregated numbers do not help in our representation of EFNDT.

As President, I believe my role is to spearhead an effort to provide EFNDT with a platform that will enable collection and aggregation of standardised, reliable and timely membership data. While member societies should continue to own and manage their members, EFNDT should provide a structure that will enable seamless upward reporting and consolidation of relevant data.

Over the coming months, therefore, you will be receiving more requests for data and you may be asked to participate in the effort to build a common member data platform. I would appreciate your support and participation and I am certain you will all be pleased with the progress and our continued effort to extend the 'Working Together' culture within EFNDT.

I hope to see you in Valencia, where important meetings of the EFNDT General Assembly, the EFNDT Board of Directors and the Certification Executive Committee will be held.

Professor Vjera Krstelj, President, EFNDT

Marine Forum at MATEST

The Croatian Society for Non-Destructive Testing (CrSNDT) is organising MATEST 2011, an international conference that will include a special forum on NDT and condition monitoring in the shipbuilding and maritime sector, to take place 2-5 November 2011 in Split, Croatia.

Conference Programme Chair and current President of the European Federation for NDT (EFNDT), Professor Vjera Krstelj, invites all interested parties, delegates, paper presenters and exhibitors in order to "exchange knowledge, experiences, thoughts and ideas, and for getting together in a friendly atmosphere with other members, friends and co-operators of the CrSNDT."

CrSNDT is a full member of EFNDT and the conference is sponsored by EFNDT.

The Marine Forum is being organised by Professor Nikša Krnic of the University of Split, who is also convenor of the EFNDT Forum on shipbuilding and offshore structures.

Those interested in participating in the forum should email Professor Krnic at nkrnic@fesb.hr

The MATEST international conference. which will also have an exhibition running alongside, will cover all aspects of NDT and related advanced technologies.

The conference venue is the Lav Hotel in the beautiful seaside city of Split.

For further information contact:
Tina Ceranić, Tajništvo HDKBR, CrSNDT Secretariat. Tel/Fax: +385 1 6157 129;
Email: hdkbr@hdkbr.hr;
Web: www.hdkbr.hr

EF European Federation for Non-Destructive Testing NDT NEWS

Publisher: The European Federation for Non-Destructive Testing (EFNDT).
Secretariat: The Croatian Society for Non-Destructive Testing (CrNDT), Ivana Lučića 1, 10000 Zagreb, Croatia.
President: Professor Vjera Krstelj, email: vjera.krstelj@fsb.hr
General Secretary: Nikša Krnić, email: nkmic@fsb.hr

Editor: David Gilbert, The British Institute of Non-Destructive Testing (BINDT), Newton Building, St George's Avenue, Northampton NN2 6JB, UK. Tel: +44 (0)1604 89 3811; Fax: +44 (0)1604 89 3861; Email: david.gilbert@bindt.org

Production: Corinne Mackle and Zoe White, BINDT.

Editorial contributions are welcomed. Articles should be sent to David Gilbert, BINDT, email: david.gilbert@bindt.org

Countdown to the 18th WCNDT in Durban

Important dates for your diary

Website for online registration and abstract submission: now open
Deadline for abstract submission: 15 October 2011
Notification of abstract acceptance: 15 November 2011
Preliminary programme: available January 2012
Deadline for full manuscripts: 31 January 2012
Conference: 16-20 April 2012

www.wcndt2012.org.za

Russian conference to commemorate Gagarin

The Russian Society for NDT and Technical Diagnostics (RSNTTD) is continuously arranging scientific and technical conferences, symposia, workshops and exhibitions of NDT equipment and instruments. It provides coordination of projects on further enhancement of NDT methods and means, publishes monographs and scientific journals, and supports training and certification processes in Russia.

In June 2010, it hosted the extremely successful 10th European NDT conference and exhibition, which received very good and positive feedback from both Russian and international participants. In 2011, the RSNTTD arranged several exhibitions and conferences in Moscow, Volgograd, Yekaterinburg and other Russian cities in which foreign representatives also participated. On 25-29 July 2011, the 1st All-Russian research and practice conference 'SibTest' (with foreign participation) will be arranged by the NDT Institute of National Research, Tomsk Polytechnical University and the RSNTTD. This conference will be dedicated to innovations in the field of NDT and will take place in Gorny Altai – one of the most picturesque places in Russia (for details see the website below).

In accordance with the decision of the RSNTTD Board, the next XIX All-Russian NDT and TD conference and exhibition will be devoted to the 50th anniversary of Yuri Gagarin's space flight and will take place from 6-8 September 2011 in Samara city. The host of this conference is the Samara State Airspace University, named after Academician S P Korolev (see the website below for details).

The RSNTTD works in close cooperation with the scientific council of the Russian Academy of Science (RAS) on automated diagnostic systems and tests. Special meetings were held on the problems and tasks of the development of NDT and TD methods and instruments in connection with accidents at the Sayano-Shushenskaya hydro-electric power station, the Japanese nuclear power plant in Fukushima and the recent terrorist attacks at transportation systems.

The RSNTTD also arranged the publication of 15 volumes of textbooks in the series: 'Diagnostics of Safety' that can be used by NDT and TD specialists in the process of training and education.

www.ronktd.ru

Aims and objectives of the EFNDT Working Group: 'NDT for Public Safety and Security'

K Osterloh, Convenor, EFNDT Working Group 5

The preservation of human achievements and progress is undoubtedly a pillar of our society. This includes detecting threats in time to prevent disasters that may occur from forces of nature, defective technology, human failure or malicious intent. In this respect, there is arguably no difference between safety and security, though different institutions are involved in the regulation and control of them. However, the unifying rationale ought to result in the building of bridges between them. This is the Working Group's mission.

Introduction

Prevention is better than cure, an old proverb says. Numerous preventive measures exist, depending on who is in charge of countering which threat rather than which technology may be most appropriate. Rather prominently, X-ray technology is well introduced in medical diagnosis and technical safety, as well as in public security measures as encountered in any airport security check. The split responsibilities inevitably lead to different specifications, definitions and standards pertaining to the specific applications, though the related physical principles and requirements remain rather similar, if not the same. This example shows that it should be conceivable to exchange ideas and experiences between the different application areas. It is the Working Group's commitment to both, providing a common forum for the technical safety and public security areas and initiating cooperative efforts.

The activities are definitely not confined to certain technologies or applications. They should encompass principally all detection technologies pertaining to threats arising either from technical flaws, natural forces in context with human technology, human imperfectness or even malicious intent. The general purpose of all these technologies is to detect signatures indicating a threat in time before a disastrous event may happen, or at least to mitigate the aftermath to be expected. It is rather obvious that the 'malicious intent' is a security matter whereas the other areas mentioned belong to the large field of technical safety, and these two areas are assigned to different responsibilities. The disadvantage of this separation is certainly the lack of communication, preventing the exchange of experiences and of information on new approaches. Furthermore, different terminologies and concepts have been developed in preventive strategies, crisis management, educating personnel, standardisation and certification wherever established, and last but not least in assessing performance and reliability. The Working Group is committed to bridging this gap, enabling a mutual exchange wherever it appears promising, while respecting essential differences. This should also pave the way for new approaches on either side. In any case, the aspect the NDT community could profit from is certainly how to cope with unexpected situations.

The means of achieving such a goal consists first of all in communication, to be organised by means of dedicated meetings and workshops or sessions within larger conferences. This is to discuss both problems to be resolved and detection technologies that might already exist somewhere or may require some further development. All EFNDT members are encouraged to revise their own technologies if they might be useful for security purposes. This definitely includes novel emerging technologies such as terahertz applications. To complete the round, everyone active in the security field is invited to join in, particularly the end-users, but also law enforcing authorities and providers of services and equipment. Such events are also meant for providing an occasion to form consortia for common grant applications.

In a simplified way, disasters could be regarded as releasing uncontrollably either tremendous amounts of energy or harmful materials. As a consequence, any accumulation of high potential energy or dangerous substances already poses a threat and should be therefore under strict control. The cause of disasters could be rather different: natural forces, technical defects of any kind, neglect, human failure or even malicious intent. While the first one may be hard to predict, the latter gives rise to a separation between safety and security in terms of responsibility. However, regarding the outcome of any disastrous event, this differentiation tends to vanish, at least for the victims. This leaves one to assume that the different causes may have some common features, which may be expressed in different ways. One of them consists of the mere presence of a high potential risk in any case. This is why critical infrastructures deserve adequate protection. The other feature could be represented in signatures that do not belong to the site where they have been located while indicating a certain threat. This could be either a crack at a critical site of a construction or a bomb in the luggage destined to be taken on board an aircraft. Both are searched for using X-ray technology – and here we are, a common denominator.

There are various other technologies that could be listed in this context. They may be well established in certain fields of technical safety, but even their existence may not be fully identified in other areas such as those committed to public and environmental security. This already gives rise to the Working Group's intention to invite an exchange of knowledge and experience between the players in each field. This should serve to identify common features that may be transferable as well as different requirements due to a diversity of circumstances or various levels of *a priori* knowledge about the objects to be interrogated. An absolute prerequisite for such a dialogue is a base of common understanding, particularly pertaining to such terms as 'risk', 'safety', 'security', 'uncertainty' and 'mitigation', to name but a few. As a consequence, defining a common terminology should always be an intrinsic part of the collaborative work within the Working Group. As an essential step towards realisation, this dialogue should pave the way for the development of common research tools and programmes, preventing duplication in the basics but also determining the point of specialisation into either direction.

It comprises the improvement of existing technologies but remains open for any novel approach.
As with any technology designed for applications where failing might have drastic consequences, testing for reliability is an absolute necessity. Within technical safety, the requirements are available for everyone in the form of standards, so that even someone who, for example, only intends to offer a testing service or a new device is able to obtain information about the required performance and reliability. It has to be discussed how far open and publicly available standards and guidelines could infringe on classified information that has to be respected in the interest of public security. Performance assessments should encompass whole systems implemented in an environment typical for the intended use, together with adverse conditions for both the instruments and the operators as encountered in any field application, albeit any outdoor non-destructive testing or on-site inspection. Routine scanning procedures with rather monotonous protocols may have problems with overseeing and false indications, either in an industrial production line or at a luggage conveyor belt. The difference might be that the former could be more tiring than the latter because it is always the same sort of specimen passing by.
The Working Group's scope exceeds the technical matters and operational procedures mentioned before by including recommendations for and standards pertaining to performance, quality, reliability and training. While the NDT community has adopted a three-level qualification system in each technological field, this appears to be rather heterogeneously regulated on the security side. There are various education schemes that would certainly profit from some kind of harmonisation based on an exchange of experiences, which could be manifested in the form of standards. In the same way, accreditation and certification processes introduced in one area with success could be transferred into others that are less regulated. On the other hand, caring for public security may involve coping with unexpected situations more so than in the field of NDT, which is dominated by maintenance aspects. Accordingly, the qualification curricula may have different emphases in this respect. At this point, the NDT community would have a distinct chance to learn from the other side. Finally, the importance of preventing disasters obligates to an adequate responsibility that could be manifested not only in profound knowledge but also in certified test and evaluation procedures. For a European Federation, it is adequate, if not compulsory, to achieve all this on a European level.
Achievement of these goals is intended by providing an exchange platform for all parties involved and to aim for common projects, *ie* joint grant applications. It is essential to bring together the different communities, the non-destructive testers on the one hand and developers, providers and users of the pertaining technologies on the other, including all the researchers and the public authorities involved therein. Previously, the Working Group has been active in humanitarian demining. Now, it is the accepted philosophy not to confine activities to a single specific field but to cover all aspects of technical safety and public security. This pertains to dangerous objects such as improvised explosive devices and to remnants of war as well.
Therefore, the Working Group encourages all EFNDT members – and indeed all those involved in NDT – to review the technologies they are acquainted with and consider widening their application in the areas of safety and security, and invites the participation of everyone working in any of the related areas who is seriously interested in the interdisciplinary approach between technical safety and public security. The problems to be resolved are too obvious. It should also be clear that no single technology may have the capability to resolve even one of these problems alone. Therefore, the Working Group strongly emphasises synergistic approaches.
After the armed conflict that restructured the Balkans in the nineties, the remnants of war formed obstacles to the return to normal life. One of them was the presence of unexploded antipersonnel mines, a problem common with several more countries outside Europe. They prevent the economic usage of land; they even make them inaccessible. In order to resolve this problem, approaches had to be considered beyond the existing ones, such as probing with metal detectors, prodding, searching with dogs and mechanical clearing with armoured flails. Since non-destructive testing encompasses numerous searching and scanning technologies, the idea was to ponder if there might be one or the other also suitable in the field of humanitarian demining. Since 2002, this approach has been discussed several times:

- 8th ECNDT, 2002, Barcelona (http://www.ndt.net/article/ecndt02/455/455.htm).
- Articles in ZfP-Zeitung, Germany's NDT bulletin (for example http://www.ndt.net/article/dgzfp/pdf/zfp82-osterlohmuellerewert.pdf).
- Development of advanced devices for mine detection (for example http://www.ndt.net/article/wcndt2004/pdf/materials_characterization/550_krstelj.pdf).

From the beginning, it became evident that some approaches may be helpful, not only in searching for antipersonnel mines but also for identifying improvised explosive devices (IEDs). While the mines are only threatening certain areas, an IED may be encountered anywhere. As a consequence, the scope of the EFNDT Working Group has been extended to also cover the problems of terrorist threats:

- Broadening the scope documents (see WG5 press release and minutes).
- 9th ECNDT, 2006 (http://www.ndt.net/article/ecndt2006/doc/Tu.3.4.1.pdf and http://www.ndt.net/article/ecndt2006/doc/We.3.5.2.pdf).
- MATEST contributions (for example K Osterloh, N Wrobel, H-J Kunte, U Zscherpel and U Ewert, 'Making the world a safer place – some know-how already exists', MATEST 2009, Cavtat, Dubrovnik, 23-26 September 2009, 10. ISBN: 978-953-7283-03-2).
- 10th ECNDT, 2010, Moscow (http://www.ndt.net/article/ecndt2010/reports/2_06.pdf).

Existing problems and challenges

- The antipersonnel mine problem still persists in spite of the Ottawa Convention claiming a world free of mines within 10 years, *ie* by 2011.
- The world experiences a steady change with new power constellations unparalleled in history, with accumulations of potential energies and noxious materials never seen before.

- Coping with unexpected situations is always a challenge in either area. Any mutual exchange of experience may be one of the best preparations.
- Improvised mines and booby traps are encountered that no-one knows how to handle other than those who implemented them.
- Innocent and unprepared citizens are threatened, particularly in public, crowded places since they have become declared targets of intended terroristic or criminal acts.
- The air traffic and nuclear power plants are obviously most vulnerable to such attacks and therefore have the highest degree of security regulations. Other areas also prone are less regulated.
- Each implemented security regulation has an impact on operational efforts, costs and overall efficiency.
- Both technical safety and security measures are requested to be balanced between necessities (however defined) and putative risks (however assessed).
- Reassessment of risks and levels of measures will be necessary over and over again and requires appropriate probabilistic and statistical methods.
- Certain scientific principles suit more than a single field of application, however, one always has limits to be aware of. Different areas such as safety and security may still have divergent requirements and may need alternative parameter settings or variations in the instrumental set-up.
- Equipment and measures have to be sufficiently reliable to protect efficiently (however defined, preferably by accepted standards) sensitive infrastructures.
- Measures should not unduly impede all normal processes. This particularly applies to avoiding an unnecessary false alarm rate that requires certain actions.
- All personnel involved in any safety or security measures must be able to cope with the operational procedures, identifying indications and triggering alarms adequately.
- Further training of personnel and maintenance of equipment, as well as the development of novel approaches due to identified lacks or new threats, is essential to provide appropriate safety and security in the long run.

Standards and agreements

Standards are supposed to:

- define:
  - capabilities and needs
  - substantiated requirements
  - products and services adequate to the demand
  - technical specifications in either direction (lower/upper limits)
  - frames of applications.
- describe:
  - the instrument/method/procedure adequately.
- provide:
  - a catalogue of demands
  - manufacturers with requests
  - a 'checklist' for approvals (criteria)
  - a method of evaluation
  - qualification criteria for manufacturing and testing
  - qualified procurement procedures.
- ensure:
  - quality in products or services, respectively
  - safety/security on a mutually agreeable level.
- prevent:
  - non-realistic expectations ('100% security').
- avoid:
  - blueprints for terrorists and criminals
  - promises that cannot be satisfied
  - setting limits for the future
  - jeopardising research work.

Finally, terrorist attacks are not standardised!

Subjects for future consideration

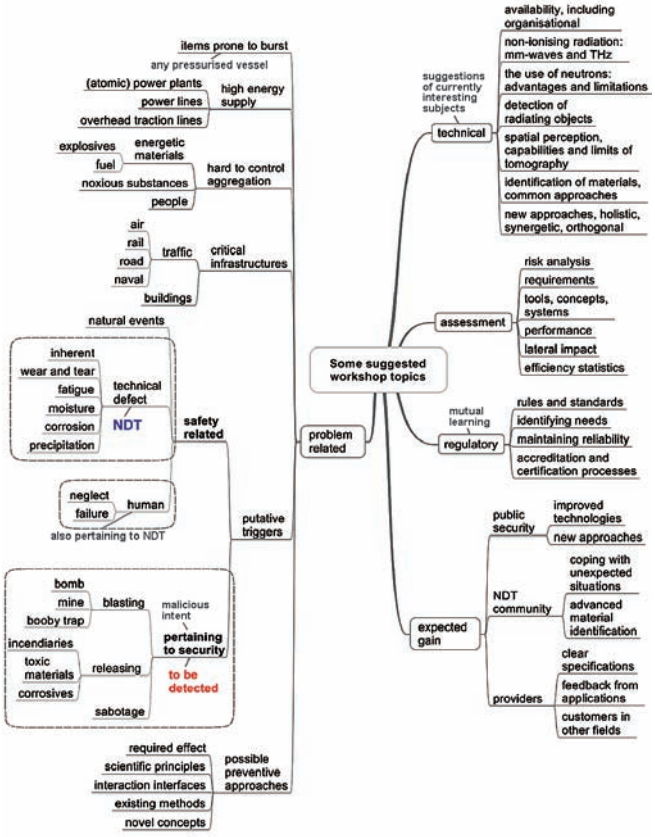


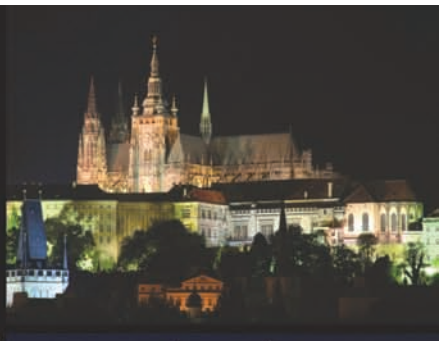
Figure 1. Areas of interest to be considered in the future work of the Working Group. The core activities of both NDT and security are marked with boxes and can be related to any other item listed in this diagram

Concluding remarks

The EFNDT Working Group is committed to providing a forum to serve the exchange of technical knowledge and experience between the two application areas of public security and technical safety. The latter is covered by the EFNDT itself whereas the former should be represented by the end-users of security technologies but also by the providers, the public authorities and by whomsoever may be involved in it. Due to the emphasis on maintaining and securing, the activities should focus on preventive measures rather than reactive mitigation. However, the protection from new threats arising from previous catastrophic events remains in the scope of this Working Group.

INVITATION TO PRAGUE

- CAPITAL OF THE CZECH REPUBLIC



11th ECNDT

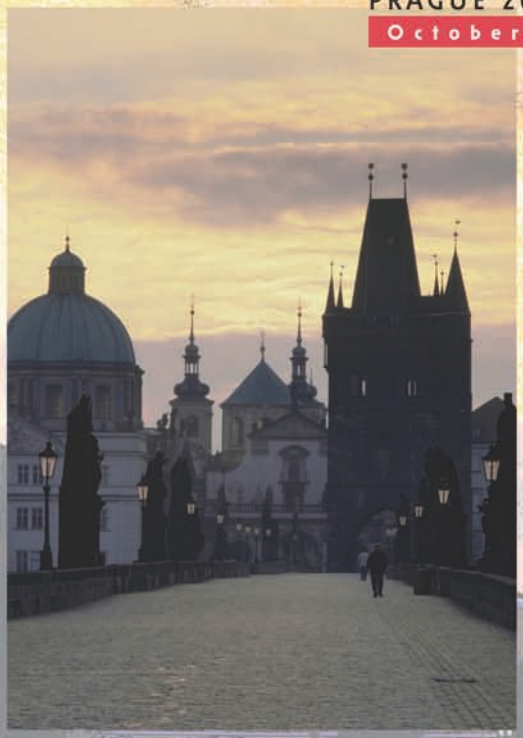
PRAGUE 2014

October 6 – 10, 2014

Czech Republic

EF NDT European Federation for Non-Destructive Testing

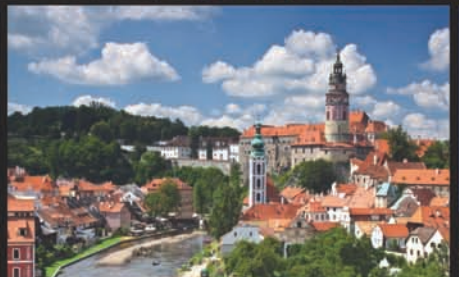
Czech Society for NDT



Prague - the right place to host the 11th ECNDT in 2014

11th European Conference on Non-Destructive Testing

www.ecndt2014.com



Successful Hungarian Conference includes Academia session

The 7th Hungarian NDT Conference and Exhibition, with the theme: 'NDT in the service of technical safety', was held in Eger, Hungary, in the middle of April.

Organised by MAROVISZ, the organisation officially representing the NDT community in Hungary, the event attracted over 100 delegates and comprised a good number of high quality technical sessions, a small but well-supported and well-attended exhibition, and an excellent social programme.

The conference also incorporated a special scientific meeting of the Academia NDT International. This included the following lecture presentations:

1. 'Non-destructiveness and nanotechnology' by Professor N Kroó (Hungary)
2. 'Micromagnetic characterisation of aged steel microstructures in NDT for nuclear power applications – thermal ageing, fatigue and neutron embrittlement' by Dr G Dobmann (Germany)
3. 'The non-linear mixing of waves: the up-and-coming method for transmission, evaluation and metrology' by Assistant Professor S Dos Santos (France)
4. 'X-ray methods for investigation of microstructure and damage inhomogeneity' by Professor J Lendvai (Hungary)
5. 'Corrosion fatigue research on railway axles' by Dr M Carboni (Italy).

Professor Peter Trampus, President of MAROVISZ and Chairman of the organising committee for the 7th Hungarian Conference and Exhibition

Professor Kroó described the considerable and fascinating advances underway in the field of nanotechnology, including nanoscale imaging and the simultaneous images created by a surface plasmon near-field scanning tunnelling microscope. He went on to talk about how devices such as this can be used not only to register images but also for other technological purposes such as the movement of atoms and molecules on surfaces to create stable structures.

Gerd Dobmann described current global lifetime extension strategies and how, as well as the application of standard NDT technology, online structural health monitoring of components by enhanced and intelligent NDT sensors and sensor networks will play an important role in the future. He discussed the micromagnetic, multiparameter, microstructure and stress analysis (3MA) methodology he is well-known for pioneering and explained how this allows highly-accurate materials characterisation.

Professor Norbert Kroó speaking on nanotechnology

Academia NDT International President Giuseppe Nardoni (right) with Professor Norbert Kroó

Gerd Dobmann describing micromagnetic methodology

Serge Dos Santos spoke on the non-linear mixing of waves and how this concept is being developed for the transmission of information and how the image quality, qualitative evaluation and reliability of this transmitted information are linked to metrology aspects of the propagation medium.

Serge Dos Santos spoke on the non-linear mixing of waves

The non-linear mixing of acoustic waves has also shown its interest for the evaluation of microdegradation properties in materials. The various non-linear elastic waves spectroscopy (NEWS) methods are, in practice, difficult in their use, but exploit the same mixing elementary key in their concept. These methods constituted a well-approved perspective in the context of non-destructive testing of complex materials. Their interest comes from the fact that their enhancement sensitivity could also be associated to localised metrology also using advanced signal processing and new tomography processes in the time domain.

Professor Lendvai explained how new X-ray line broadening and X-ray tomography methods can give quantitative information on inhomogeneities in the defect and phase microstructure.

Over the past two decades, X-ray line broadening or X-ray line profile analysis (XLPA) has become one of the most powerful methods for characterising microstructures of crystalline, especially metallic, materials. Diffraction line broadening is caused by different defects present in crystalline materials: small coherent domains, dislocations, other types of microstrain, twin boundaries, stacking faults, chemical inhomogeneities, grain-to-grain second order internal stresses and point defects, especially vacancies. XLPA provides qualitative and quantitative information about defect types and densities at the same time. With modern detectors and relatively easily accessible synchrotron sources, X-ray line profile analysis is an ideal technique to determine dislocation density, grain or subgrain distribution.

János Lendvai explaining X-ray methods

Through a few selected case studies, Professor Lendvai demonstrated that by applying powerful numerical evaluation and simulation methods the data can be used for property and life-time predictions.

Last but not least, Dr Michele Carboni presented some results of his team's research into corrosion fatigue in railway axles. Corrosion fatigue is a damage phenomenon based on the simultaneous application of a corrosive environment and cyclic loads. In the last 20 years, a number of failures of railway axles (documented in the UK, Canada and Italy) could be related to the action of corrosion fatigue, suggesting the need to deeply analyse and study such mechanisms, especially considering that very few scientific contributions are available in the literature on this topic.

Michele Carboni relating some railway studies

The first step of the research consisted of the analysis of the corroded surface of three axles (two freight and one passenger) retired from service. The sampling of the dimensions of corrosion pits was obtained by observing lapped sections and the subsequent statistical analysis showed the possible presence, on real axles, of a maximum defect depth equal to about 250 μm for freight trains and 150 μm for passenger cars. The S-N diagram in a corrosive environment (artificial rainwater) was derived in the lab considering small-scale specimens subjected to rotating bending conditions. The most important results were the disappearance of the fatigue limit, the presence of failures well below the design limits suggested by the relevant standards, and the very good similarity of the reproduced surface damage with respect to the one observed on axles retired from service. Dedicated fatigue tests were then carried out in order to monitor the surface damage development and to apply eddy currents in order to derive an NDT method useful for the in-service maintenance of railway axles. The research also dealt with the numerical simulation of eddy currents and their interactions with corrosion-fatigue cracks.

For further information on the Academia NDT Conference and to download the latest issue of its newsletter, *Lectio Materia,* visit the website at: www.academia-ndt.org