



The Institute of Materials, Minerals & Mining

# MATERIALS SCIENCE AND TECHNOLOGY BOARD ANNUAL REPORT FOR 2012

## 1. Board membership

The current MSTD Board is comprised of the Chairs of the technical committees, the Chairs of the Surface Engineering, Functional Materials and the Light Metals Divisions, the Chair of the Incorporated Engineers and Technicians Committee (IETC), the vice-chair of the Sustainable Development Group. Dr Mike Winstone was appointed Chair of MSTD from January 2012.

Early in 2012, IOM3 decided to provide a new focus for the functional materials community. Three committees, (Functional Materials, Nanomaterials and Nanotechnology, Smart Materials and Systems) were moved from MSTD to form the Functional Materials Division. Hence the business of these committees will no longer be covered in MSTDB reports.

Two new committees have been established by redefining the scope of pre-existing committees. The Advanced Sheet Metalforming Committee broadens the scope of the former Superplasticity Committee to include all aspects of sheet metal forming. Similarly the former Rolling Committee has been re-launched as the Bulk Metalforming Committee to include other processes, such as forging and extrusion. By re-scoping these committees MSTD now provides a more complete coverage of the technologies of importance to IOM3 members.

The MSTD technical committees at the end of 2012 were as follows:

- ASFC: Advanced Sheet Metal Forming Committee. (Chair: Rajab Said)
- BMC: Bulk Metalforming Committee (Chair: Mick Steeper)
- DSSC: Defence, Safety and Security Materials Committee. (Chair: Eoin O'Keefe)
- HTMC: High Temperature Materials Committee. (Chair: Gordon McColvin)
- MCC: Materials Chemistry Committee. (Chair: Andrew Watson)
- PEC: Particulate Engineering Committee. (Chair: John Dunkley)
- SPMC: Structure and Properties of Materials Committee. (Chair: Brad Wynne)

Details of scope and activities of each committee can be found on their websites.

## 2. Board meetings

The MSTD Board met twice during 2012. The summer meeting was kindly hosted by QinetiQ at their facility in Farnborough. The technical committees held a total of 22 meetings, split between CHT and 'guest' locations. Attendance was typically 60% of the committee membership, although a few recent meetings have fallen below 50%.

### **3. Activities during 2012**

#### **3.1. Technical programme**

There has been a decline in the number of conferences organised by the division and several events in 2012 were postponed or cancelled. DSSC, HTMC and MMC have all held successful and profitable events. The technical committees continue to generate new ideas and the Appendix 1 lists recent and future activities. An increasing proportion of the events are organised in collaboration with other organisations. Co-sponsorship provides benefits for IOM3 members without risk to IOM3, but IOM3 gains no income.

#### **3.2. Web-site developments**

Each technical committee has a microsite. The exploitation of this resource is variable. Probably the most active is the DSSC which organised a photographic competition with over 1000 hits. The MCC contains a repository for downloadable information related to phase diagrams and thermodynamics – books, teaching materials, etc. Maintenance of the sites can be a problem due to lack of resource. The recruitment of younger members with the role of committee webmaster has proved useful.

#### **3.3. Engagement with technical community and/or local societies**

A major part of MSTDB strategy is to strengthen co-operation between its constituent committees and with other technical communities within IOM3. In addition the committees of the Division continue to benefit from strong national and international links, examples include:

- MSTDB chair represents IOM3 on the IMechE Structural Technology and Materials Group.
- ASFC has a strong association with the European Superplasticity Group with whom it organises the EuroSPF series of meetings.
- MCC provides the UK representative on the Alloy Phase Diagram International Commission (APDIC).
- HTMC has links with TMS. Efforts are in progress to reinstate the link with NAMTEC.
- BMC maintains strong links with the Rolling Guild with several members of the committee being active members of that group.
- ASFC is recognised as a BSI committee for superplastic forming.
- PEC maintains an active link with the European PM Association (EPMA). Two PEC members are participants in a major collaborative project called Dira-Green on digital radiography of PM parts, funded by FP7 bringing together several PM organisations and societies including the Turkish Powder Metallurgy Association (TPMA) TPMA.
- The chair of the Advanced Power Generation Task Force Materials Sub Group and the Mats UK Energy Materials Working Group is a member of the HTMC.
- MCC work on thermodynamics and phase equilibria work is regarded by NPL as an integral part of the National Measurement System.

- PEC collaborates with the Powder Metallurgy sector of the Materials KTN and hold joint meetings.
- DSSC is intimately involved with the Government's work, This alignment is reflected in the make-up of the committee membership which includes representatives of MOD and the Home Office.
- ASFC has links with the Advanced Forming Research Centre (AFRC), which itself has direct links with Scottish Enterprise and TSB.

Industry / Academia programmes, such as TSB and the KTNs, provide potential sources of income for collaborative projects. A number of committees and individual members are involved in such projects and it is felt that there is further scope for this, particularly through the KTNs.

### **3.4. Contributions to IoM3 house journals**

Members of the MSTD committees have produced articles for Materials World including:

- Peaceful partnerships - air vehicle technical review March 2012,
- Steel-good factor - superbainitic steel armour, March 2012
- Hard target - Advances in Protective Clothing conference report.

An article is in draft to announce formation of new committees – ASFC and BMC.

Proceedings of APDIC WRRS will be published in *Materials Science and Technology*. Two MCC members have published in *Materials World* this year.

### **3.5. Other**

Teleconference facilities have been trialled by MCC to facilitate invited presentations. This was very successful and enabled a presentation from Germany to be included in an MCC meeting. Other committees are recommended to explore the potential of this facility.

## **4. Strategy and Objectives for 2013 and beyond**

MSTD will maintain its position as one of the most active Technical Divisions of IOM3. The Division will collaborate with other IOM3 Divisions in areas of common interest and work with the cross-cutting technical groups, such as the Sustainable Development Group and the Natural Materials Association. MSTD will continue to work with the funded networks, particularly the KTNs, either jointly organising or co-sponsoring meetings. This may result in a reduction in the number of IOM3 events.

All MSTD Committees will review their terms of reference in the light of recent developments both inside and outside of IOM3. ASFC and BMC will issue new terms of reference that define their enhanced scope. All should be consistent with the guidelines issued by the ITPB in 2012.

IOM3 will be offering improved teleconferencing facilities in 2013. MSTD will seek to use these facilities to increase participation in committee activities. However face-to-face meetings will remain the primary mode of delivery to encourage networking.

The MSTD web-site provides each of the committees with a micro-site. This resource is under-utilised at present but usage is growing. Committees will be encouraged to appoint a webmaster who will keep the site current and delete old data.

Maintaining a vibrant conference programme has been difficult given the current economic conditions and IOM3's cautious approach to financial risk. Nevertheless MSTD did play a major role in 5 events during 2012. Current plan is to run a similar number of events in 2013.

#### **4.1. Opportunities and constraints**

The World Titanium Conference is held approximately every 4 years. Attendance can exceed 1000 delegates and bids for the location in 2018 are to be discussed at the next meeting of the International Board. This is a major opportunity and both MSTD and LMD have recommended that IOM3 should bid to host the conference in 2018. Professor Malcolm Ward-Close will lead the bid.

On a smaller scale, the Parsons Turbine Conferences have built a world class brand. The next conference in the series is due in 2015 and the HTMC has initiated discussions on a new format and scope to refresh the event. Target attendance would be ~100.

The "Integrity of High Temperature Welds" conference series is likewise developing a "brand" identity. HTMC will be looking to develop a follow on meeting (5<sup>th</sup>, in 2016?) after the success of the recent joint event including Creep & Fatigue at High Temperatures.

The ASFC and BMC are both planning launch events, giving them and IOM3 an opportunity to address a new audience and increase participation.

The activities of the sectors supported by the DSSC overlap Materials, Physics and Engineering. With this in mind there could be opportunities working in collaboration with either the IOP and/or the IET. DSSC is working with the Forensic Society to include a session on Materials in their conference in 2013.

#### **4.2. Specific targets**

Hold 5 technical conferences in 2013

Support one or more Materials KTN event

Provide three or more articles for Materials World in 2013

### **5 Awards/Prizes**

- The Kroll Medal and Prize, in recognition of a significant contribution that has enhanced the scientific understanding of materials chemistry as applied to the industrial production of materials, normally inorganic, was awarded to Professor J Coleman. Professor Coleman is a physicist who has made major contributions in the field of low dimensional nanostructures.

- The Hume-Rothery Prize, in recognition of distinguished achievements concerned with phase relationship in metallic materials or non-metallic materials of metallurgical interest, was awarded to Dr Gunter Effenberg. Dr Effenberg specialises in the provision of critically assessed phase equilibria to assist practical problems for commerce and industry.
- The Dowding Medal and Prize, in recognition of a major contribution to the invention, development or design of metallurgical plant, particularly rolling and finishing, leading to improved economy, yield or quality in metal production was awarded to Professor Zhongyung Fan FIMMM. He is a Professor of Metallurgy at the University of Brunel and the Director and Principal Investigator of the Liquid Metal Engineering unit (LiME).
- The Rosenhain Medal and Prize, in recognition of distinguished achievement in any branch of materials science was awarded to Professor Stephen Eichhorn, Chair in Materials Science at the University of Exeter. Professor Eichhorn is an internationally leading expert in the mechanics of natural materials.

Mike Winstone  
Chair, MSTD Board  
10/01/13