ELSEVIER

SPECIAL FEATURE

All welcome at annual meeting of EPMA Hard Metals Group

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Taking place during the EPMA's 2015 Reims Conference but unrecorded in the formal Proceedings; the annual open meeting of the European Hard Materials Group (EHMG) is noted for its free interchange of ideas, technical updates and reports of current research projects. As usual, MPR reports in depth on this important event.

EPMA overview

Following introductions by joint chairmen Steven Moseley and Leo Prakash (Fig. 1); EPMA technical director Olivier Coube (Fig. 2) presented his regular overview of EPMA activities. Of the five sectoral groups, there was some overlap between EHMG and each of the others, ESPG (structural parts), EuroMIM (metal injection molding), EPHG (hot isostatic pressing) and EAMG (additive manufacturing).

In the past year they had organized or produced between them 9 open and special group meetings, 5 trends and benchmarking surveys, one statistics report, new brochures on MIM and HIP, and a flyer on Additive Manufacturing. A new version of the **Vision** ''roadmap'' publication was now available, as were some 30 videos on PM aspects on Facebook.

At the Reims conference around 400 delegates would be treated to 300 oral presentations and 3 special interest seminars, of which one dealt with state-of-art fast sintering processes for hard materials.

A PM summer school had taken place in Sheffield, UK, an MIM short course in Barcelona, Spain, and a specialized EHMG workshop ('Winterev') in April 2015 on Superhard Materials and Superabrasives, Properties and Characterization, hosted by Element Six at Didcot, UK, with 43 participants. A further such workshop ('Summerev') was planned, subject to confirmation, for 16–17 June 2016 at the Hilti headquarters in Schaan, Liechtenstein, on the subject of Multiphase Hard Materials.

Synergies

What EPMA calls 'synergies activities' comprised both club and European-funded projects, the first of these being updated by other speakers later in the meeting. European-funded projects included 'DIRA-GREEN,' begun in 2011 and 'EFFIPRO,' initiated in 2013. The newest was 'Horizon 2020,' part of the Seventh Framework Program. In each case the EPMA had been responsible for relevant dissemination and management support.

The main aim of EFFIPRO is to develop a significantly shorter PM process using a new concept of hybrid electric current-assisted sintering and hard materials with improved properties, resulting in a more energy-efficient and cost-effective process. In addition, higher performance metallic composites, based on hardmetals, and engineering metallic materials are processed. Tools for machining processes are targeted at both aerospace and automotive products.

Olivier reported that pilot-scale EFFIPRO equipment was now operational at AMES Plant, A registration campaign had recently started to better inform the hardmetals community about project progress and especially about an end-user workshop, to be organized around Q3 2016.

Lobbying

The new version of EPMA's 'Vision 25' roadmap, exploring future developments for the European PM industry, was recommended as a useful tool for external communication. Following REACH and other EU legislation, the EPMA continued to ensure the visibility at REACH meetings of Eurometaux, Nickel REACH consortia and others. In developing new standards, the EPMA liaises between the ISO committee and the PM community. The EPMA also participates in a variety of energy and climate change meetings.

Internet promotions

Finally in his comprehensive presentation, Olivier listed a number of useful electronic references for the PM community. Following are just some of these:

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 http://dx.doi.org/10.1016/j.mprp.2015.12.013

FIGURE 1

Double act: joint chairmen of EHMG, Steven Moseley (left) and Leo Prakash (right).

- YouTube: (30+ Videos !) – https://www.youtube.com/user/EuroPMAssoc
- Twitter: https://twitter.com/EuroPMAssoc
- LinkedIn: https://www.linkedin.com/company/european powder-metallurgy-association
- Facebook: https://www.facebook.com/EuroPMAssoc
- www.designforpm.net
- www.pmdatabase.com

Winterev 2015

Steve Moseley presented an overview of the Winterev meeting on superhard materials, held earlier in the year. Almost 50 attended, the highest ever number at a Winterev/Summerev meeting, which in some participants' opinion moved away from the original idea of informality, with limited numbers sitting around a single table, and made the event more of a mini-conference.

Those attending heard and discussed how the performance and reliability of superhard tool components were controlled by the materials' internal microstructure, and that, despite many difficulties, numerous experimental and modeling techniques were successfully employed to characterize their properties and behavior.

Steve began by pointing out the difficulties in mechanical testing of PCD, particularly size limitations. Diameters were typically <70 mm for thin PCD (tooling blanks) and <20 mm for thicker PCD (oil and gas cutters). Materials have high strength (1–2 GPa) and stiffness (E = 1000 GPa) and are both difficult and costly to process.

Spherical indentation (Hertzian testing) had been successfully implemented for brittle polycrystalline ceramics, layered ceramics and coatings, including cemented carbides (bulk and coated hardmetals). Early work was presented on adapting spherical indentation testing for inducing ''controlled damage'' in PCD to assess microstructural effects on induced contact damage and to evaluate loading mode influence (monotonic/cyclic) on damage characteristics and micromechanisms. It was proposed as a method for controlled pre-damaging for subsequent residual strength and damage tolerance measurements.

The ball-on-15-ball (''B15B'') biaxial bend test (Fig. 3) entails relatively easy sample preparation with low sensitivity to sample geometry and alignment. The strength in biaxial tension is measured and can be supplemented by crack path analysis.

In fracture and fatigue testing, test rankings were compared for four different PCD materials. Single-cutter tests were carried out in reinforced concrete and granite and impact fatigue with shear cutters on hardened steel. Test methods were found to

FIGURE 2

Olivier Coube, EHMG technical director, reports to the EHMG.

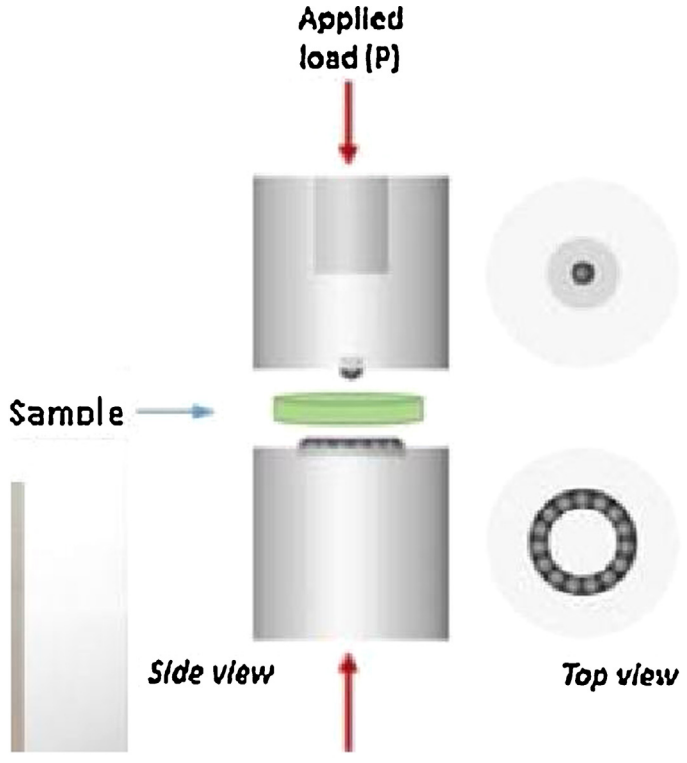

FIGURE 3

B15B biaxial bend test.