

European  
Powder  
Metallurgy  
Association



# Annual Report 2004



# ***Promoting PM in Europe and European PM to the World***

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EPMA is an international trade association representing manufacturers of PM products, suppliers of materials and equipment, users of PM products, and academics/researchers.

The Association collaborates with other European and national organisations to address issues of strategic importance to the global competitiveness of PM technology. These issues include Industry Promotion, Statistics, European Legislation, Education and Training, Research, Standards, Guidelines, and Quality Assurance matters. Further, the Association works to represent the PM industry at the European Union in Brussels. These actions represent a continuous benefit to members.

Members additionally benefit from participation in EPMA activities and networking at EPMA annual conferences, management seminars and courses.

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Dear colleagues,

2004 was a complex year for the European economy, with some of the most powerful EU countries showing very small growth. However, PM showed a better evolution than the general economy, mostly due to an increased usage in the automobile industry.

After the increase of around 7% in the previous year, 2004 presented an increase of roughly 8% in volume of PM products shipped in Europe. This, in turn, helped the situation of the equipment making industry, where we saw also an upturn, even though much of its growth came from orders for Asian countries.

The major economic event affecting both powder makers and parts makers was the drastic increase of the price of raw materials and energy. Driven by unclear forces, but mostly attributed to China's tremendous growth that depleted the world's capacity for many essential commodities, iron scrap surged close to 100%, but Nickel and Molybdenum suffered even higher increases. This situation forced dramatic increases of powder prices which put many parts makers in a very difficult situation due to the reluctance of the customers to accept the consequences and in any case, yielding to the hard facts with a sensible delay. The situation is such that due to today's price instability, powder prices are often reviewed on a quarterly basis, placing the burden on the parts makers' arena to pass the impact on to the end users. The situation remains unstable as of today.

On another front, 2004 was a very good year for EPMA and its services to the PM community. The World Congress PM 2004 in Vienna was a great success in all aspects: attendance, quality of technical sessions, social events and the venue in general. Again, a very nice blend of hard technological and business activity within an incomparable stage and the welcome and magic of the city of Vienna. We should be grateful both to all the organizing committees, to the city of Vienna and last, but not least to the EPMA staff for their hard work. Vienna also saw the largest gathering of people from different countries in the PM world. The emerging economies had a very clear presence from China, India, Middle East, Eastern Europe -and South America, making the Congress a true world event.

Also in the sense of world cooperation, we saw in Vienna the launch of the Global PM Database, an excellent example of cooperation

between the world's three main PM associations, which is sure to help promote PM and unify design criteria around the world. The Global PM Database will be a live project that will evolve with PM technology, becoming a most complete and reliable source of data for designers.

In the aspect of lobbying and legislation, EPMA has continued its work to help correct the misconceptions and problems related to the REACH legislation, which continues its path through EU's legal system. Many countries have expressed their concern with the legislation. It remains to be seen to what extent that will help a more reasonable outcome.

After two years with no financing, EPMA has obtained new budget for the traditional and highly rated PM summer school, which will return in summer of 2005. This is an excellent way to promote PM among the young graduate engineers and technologists.

PM continues to evolve technologically as could be seen in the many papers presented in Vienna. Some of the main drivers are improved furnaces and presses, but new materials play an important role as well and new techniques trying to reach local higher densities are starting to appear in commercial use. We can see the continuous way ahead of our technology, responding to the ever-increasing market demands.

In summary, 2004 was a positive year for European PM and for EPMA in spite of the not very brilliant general economy. Now, with an already enlarged EU, new economic challenges and opportunities lie before us and EPMA will try again to help all its members to take the best advantage of the opportunities and work as the unifying voice before the EU bodies and in the world community.

We want to thank the constant inputs and help from many EPMA members, which make our association a very live and close community. We are sure that this is the best way to proceed. This way, EPMA can speak truly as the voice of the whole community that it represents. We encourage anyone who is not yet involved in the working groups to come and join. EPMA wants to make sure to represent the voices of everyone and the best way is to have the direct participation from industry and academia.

In the sense of gathering all the European PM communities, EPMA will organize this year's EuroPM2005 conference in Prague, one of the new member states to the enlarged EU. We hope to see all of you in Prague.

*Cesar Molins*



**The year was notable from EPMA's viewpoint for the significant workload involved in organising the PM2004 World Congress plus the development and launch of the Global PM Property Database (GPMD).**

Financially 2004 was a very good year overall with a successful World Congress leading a better than

budgeted financial outcome for the association and the number of corporate members at a record level. We will continue to work hard in the coming year to maintain our standards of service for our members.

At the same time the potential negative impact of EU environmental legislation in the form of REACH has remained a constant threat and we have broadened our efforts to include our first pilot project to study the bioavailability of certain PM materials and an increasing amount of political lobbying. We believe that such actions are entirely necessary if we are to continue to fight this unwieldy and unfair legislation.

The promotion of PM is always a priority for us and during the year we were heavily involved in a major tripartite project with the MPIF and JPMA which resulted in the on time and on budget launch of the new GPMD with its own specific web site. There remains much to do in developing and promoting this unique resource for our industry and we need the support of all members in order to achieve this key objective. EPMA also continues to attend exhibitions and conferences to promote PM and this year we visited the successful Aerospace Testing 04 exhibition in Hamburg where a large number of new end-user contacts were made and their details distributed to members.

The EPMA's own web site continues to develop and we had some 200,000 separate visitors looking at the site during the year. The peak of activity around the Vienna congress led to us having 40,000 "hits" on one day nearly double the previous record. All our conferences and exhibitions now feature online booking and we have also reformatted and extended our weekly "email news" service to cover a wider range of contacts within our member companies.

The World Congress in Vienna provided the highlight of the year with an attendance of nearly 2000 delegates/visitors plus over 100 exhibitor companies and nearly 500 oral and

poster presentations. Specific mention must be made of the Awards Showcase, the End User Day and the Gala Dinner. Overall the event was a major logistical exercise which could not have taken place without the hard work of the team in Shrewsbury aided by our EPMA member colleagues in Austria and elsewhere.

2004 saw the ongoing successful operation of our major thematic network DIENET and it included successful workshops in Gothenburg and Kiev. We are still actively seeking ways to continue the network and it will be a sad reflection on the failings of the FP6 programme if we are unable to continue this industry led network. We also successfully completed two other smaller member funded programmes looking at Nanomaterials and Bioavailability.

One area of really positive news was our success in gaining support from the EU's Marie Curie programme for the funding of four Training programmes that will comprise linked summer schools and short courses. The value of this grant is over €500 000 and it will with support from industry and academia enable us to train nearly 300 young graduates over the next four years.

We are now looking ahead to the first of these training events which will take place in Aachen, Germany in early September and which will be followed in October by the EuroPm2005 in Prague. Our first venture into one of the CEE countries has already attracted over 300 papers plus some 80 stands from 50 world wide exhibitors and we hope that members will make it a success by turning out in force.

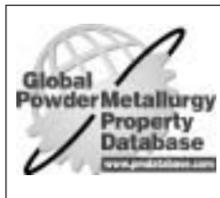
The year of 2004 was hard work but rewarding for us all here at EPMA and we hope that we can continue to maintain your support and positive contributions during a 2005 that will no doubt see many changes and developments.

*Jonathan Wroe*

- Spectacular PM World Congress Vienna
- Global PM Property Database launch
- Successful funding application for education and training
- Climax of DieNet project
- Hardmetals Group launches WINTEREV themed workshops

There is no doubt that the PM2004 World Congress, organised in Vienna in October by EPMA, was a great success with nearly 2000 people attending and the largest PM related exhibition ever held in Europe. Careful planning ensured that the participants were also able to get to know more about and support the work of EPMA's working and sectoral groups.

As a worldwide event it was an ideal platform for the launch of the Global PM Properties database, which is not only the first joint project of its type between the three key regional trade associations but also the largest purely industry funded project undertaken by EPMA so far.



In addition to these highly visible items, resources were also deployed during 2004 over a broad front of activity, as is evident from this Report. A very large effort was invested in funding

applications - with mixed results.

After a series of frustrating failures (the process took three years), EU funding was confirmed for

a significant new phase of Summer Schools/Training Courses.

For involvement in research and development activities, however, the picture was less encouraging. Two applications were narrowly unsuccessful and widespread disappointment is therefore evident about the lack of balance and clarity in FP6, which resulted in the low success rates (around 5% of applications!). Willingness on the part of the European Commission to help identify and recognise the current needs of European manufacturing from the industry's viewpoint is not obvious.

Efforts to introduce scientific and technological realities into the structuring of EU environmental legislation (REACH) have continued with good support from members and a considerable amount of effort expended on contacts across Europe.

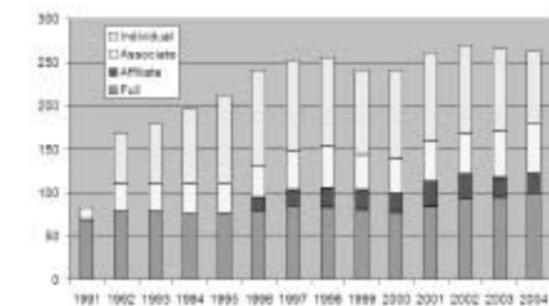
In 2004, there seems to be an even larger population of individuals than usual to whom the whole organisation owes a debt of gratitude. EPMA's leadership is to be congratulated on its ability to motivate so much action.

## Membership

### Membership structure

The membership totals by category at year-end are shown in membership panel. New members joining in 2004 are listed overleaf. This year for the first time the association reached 100 full members from a total of 178 corporate members.

EPMA Membership Numbers 1991 - 2004



## New members in 2004

EPMA was pleased to welcome the following into membership during the year:

### FULL MEMBERS

- Bogoslovsk Aluminium Plant, Russia
- Dieffenbacher GmbH & Co KG, Germany
- Extrude Hone, Germany
- IPS Steel Powder AB, Sweden
- Lasco Umformtechnik GmbH, Germany
- Mimtech Alfa sl, Spain
- Morphic Technologies, Sweden
- Phenix Systems, France
- Precimed, Switzerland
- Shuttleworth, Belgium
- SUMCA sas, France
- TFM SpA, Italy



### ASSOCIATE

- AT&M, China
- CETIM, France
- DaimlerChrysler Corp, USA
- Diamond Innovations, Germany
- M E Schupp GmbH, Germany
- PARS Molybden Co, Iran
- SCM Metal Products Inc, USA
- The Modal Shop, USA



### AFFILIATE

- Uddeholm Tooling AB, Sweden



### INDIVIDUAL

- Dr Didier Bouvard
- Dietmar Noebel

## Membership subscription rates

EPMA has not changed its membership subscriptions since 2002, when there was an increase of under 10%. The general policy has been that fees should not be increased more than once every three years. However, at the 2004 General Assembly it was agreed that, if the Association was to be able to achieve its historical target of a level of reserves roughly equal to one year's fixed costs, future changes in membership fees would be linked, on an

annual basis, to the OECD consumer price index for the EU. In this way the intention would be to reduce the impact of any changes in the level of fees whilst retaining their effective value. Thanks in large measure to a successful outcome from the PM World Congress, the required level of reserves is not in doubt and, therefore, the membership rates for 2005 will show an increase of only 2.4% over those of 2004.

Around 2000 people from 51 countries made the PM2004 World Congress at the Austria Center in Vienna a huge success. The event has a very strong claim to be the largest PM event ever held in Europe - unquestionably so in terms of delegate-days. Delegates were offered a comprehensive programme consisting of about



Dr Peter Mitterbauer and Dr M Bartenstein at the Plenary Session

550 oral and poster presentations, plenary sessions, meetings and social events. The Opening Plenary Session was launched by conference chairman Dr Peter Mitterbauer who was followed by Dr Martin Bartenstein the Austrian Federal Affairs Minister who welcomed delegates on behalf of the host country. After the traditional series of overviews on the status of the world PM industry, EPMA President Dr César Molins presented EPMA Distinguished Service Awards to Mr Jaap Koeleman and Dr Andrej Salak, two leading members of the industry in Europe, for their outstanding contribution to powder metallurgy over many years.



Dancers at the Opening Ceremony

The technical programme was structured in six parallel sessions over four days and included a popular PM Seminar 'The end user meets PM / PM meets the end user'. This brought together 120 delegates including representatives of a wide range of end-user companies such as Daimler/Chrysler, Delphi, Ford, GM, Fiat, Magna Steyr, Renault/Nissan, Rolls Royce, Scania and ZF Sachs.

The PM2004 Exhibition was a total success with over 100 companies occupying over 1800m<sup>2</sup> of stand space in two halls. In addition to the

exhibitors from all over Europe including Ukraine and Belarus, there was strong visibility for companies globally, for example from China, Japan, USA, Singapore and South Korea.

An exhibition highlight attracting numerous visitors was the EPMA's 'Innovation in Powder Metallurgy' showcase, containing entries from the EPMA 2004 Innovation in PM Awards, as well as, for the first time, the winners from both the JPMA and MPIF competitions. There were continuous demonstrations of the newly launched Global PM Property database.

Significantly, the exhibition attracted over 400 industry visitors in addition to the Congress participants. A survey showed that 95% of delegates described the exhibition as either 'good' or 'very good'.

Another highlight of the Congress was the Gala Dinner, a grand finale to which the Mayor of



Visitors at the PM2004 Exhibition

Vienna invited nearly 700 guests to enjoy, along with orchestral entertainment, the splendour of the Festsaal in the Vienna City Hall. This event has left a lasting impression on those who were there.

The EPMA extends its heartfelt thanks to the many people who worked on the organisation of this World Congress. It is impossible to name everyone but all are likely to agree that special gratitude is due to Dr Peter Mitterbauer, Congress Chairman; Professor Herbert Danninger, Hannes Moser and the members of the planning committees who attended innumerable meetings over a run-up period of four years. Finally but certainly not least, thanks to the Session Chairmen who spent much of the summer assessing the mountain of submitted manuscripts!

The Congress Proceedings represent a major addition to the literature. The 5-volume set of proceedings contains the text and key figures of the papers presented, both oral and poster, along with author details and references.

Volumes can be purchased separately, or as a complete set. A CD-R version is available free to buyers of three or more printed volumes. Details are available on the EPMA website in the Publications section.

## Awards for Innovation in PM

The EPMA Awards system is an open competition. Winners are selected by a panel of expert judges from entries submitted by EPMA corporate members. The scheme's popularity was once again confirmed by the 2004 ceremony. At a special Awards Lunch held at the Austria Centre, Vienna, as part of the World Congress, around 1000 people were able to witness the presentations to an outstanding set of winners.

The awards are made in the now well-established categories.



Award winners receive their plaques from Dr Molins



### International Award

Award of Merit: Hitachi Powder Metal Co, Japan  
Highly Commended: Pacific Sintered Metals, USA

### Components

Award of Merit: MIBA AG, Austria  
Highly Commended: Parmaco, Switzerland; Sintermetal, Spain

### Materials

Award of Merit: Umicore, Belgium  
Highly Commended: Eurotungstène, France

### Process Equipment

Award of Merit: Lauffer Pressen, Germany

EPMA warmly acknowledges the Sponsorship of this event by the international trade journal Metal Powder Report,.



## PM Thesis Competition 2004

The EPMA Powder Metallurgy Thesis Competition 2004 attracted an exceptional and very high-quality response in both Diploma/Masters and Doctorate/PhD categories. The aim of this popular and well-established competition is to promote and develop an interest in powder metallurgy among young scientists at European academic establishments and to encourage research at undergraduate and postgraduate levels. This year, applicants were able to download forms from the EPMA website.

Entries are judged by a panel of experts from academia and industry who match academic excellence with immediate industrial relevance, using a range of criteria:

- thesis objectives
- industrial significance
- scientific interest
- stimulation of further research
- presentation standard

These outstanding winners for 2004 received their prizes from EPMA President César Molins as part of the Opening Plenary Session of the PM2004 World Congress, in Vienna.



Diploma Category (EUR 750): Pablo Garcia Esteban, Universidad Carlos III de Madrid, 'Development

of a Fe-NbC cermet from powder obtained by self-propagating high temperature synthesis'. (see above)

PhD Category (EUR 1000): Dr Stijn Put, who obtained his doctorate at the Katholieke Universiteit Leuven, 'Functionally graded materials prepared

by electrophoretic deposition'. (see above)

Short presentations on their theses were then given by the prizewinners, who were also invited to contribute an article for Powder Metallurgy, the official EPMA science and technology journal.

EPMA is grateful to Höganäs AB, Sweden, for their sponsorship of the Prizes for the Competition.



# Working Groups

Working Groups meet regularly to discuss and organise trade association response to industry-wide issues. Typically, therefore, they concentrate on matters best handled on an industry-wide basis, rather than those that are more appropriately addressed at individual member company level. The Groups are, in general, permanent and have a regular membership, but temporary committees or groups can be set up to handle single issues.

In 2003, when meetings of Groups were held in conjunction with a conference, the principle of Open Meetings was found to be extremely successful. Therefore, when meetings of several of EPMA's groups were organised to take advantage of the PM2004 population, the procedure of incorporating tick boxes in the event's registration form was repeated. This resulted in strong support for the 'Open Meeting' principle in which all interested can mix with the permanent membership of the Groups, understand what they are doing and offer ideas.

Further, in some of the Vienna meetings an extra component was added by providing universities and RTD establishments with the opportunity to make presentations and stimulate networking with industry.

## IRDG and ETG

A joint meeting of the Industry Research Development (IRDG) and Education and Training (ETG) Groups attracted the enthusiastic participation of 54 people. The meeting floated the idea of EPMA activities in the areas of nanotechnology and titanium powders and applications. Short presentations on these were followed by a straw poll that showed there was sufficient interest to make it worthwhile consulting a larger population and special workshops will be held on these materials at the Euro PM2005 congress in Prague, with this in mind.

The main subject of the ETG part of the meeting was to consider the final stages of the contract with the EU for the new Training Course series described elsewhere in this Report.

A further welcome development in education and training was the revival of the 'Short Course' action. Following a lengthy planning period, a highly successful Short Course was held at the Politecnico di Torino facility at Alessandria. The population of 60 included representatives of the Italian hardmaterials industry and guest lecturers from France and Switzerland as well as Italy. The Course covered: raw materials, pressing, sintering, and quality control. Participants were also able to visit the

laboratories at Films SpA in Anzola d'Ossola. EPMA is grateful to the Associazione Italiana di Metallurgia, ASSINTER, and especially to Professor Mario Rosso for his leadership of the project and the on-site arrangements.

## Quality Assurance

No Benchmarking Exercise was carried out in 2004, however, it is planned to do so in 2005. The QA Group will continue the provision of the Accreditation Service, which continues to be well supported by members and a complete revision of the listings will be carried out in 2005.

## Standards

EPMA members continue to give strong support to the ISO PM Standards Committees. Per Lindskog (EPMA Past President) retired at the end of the year from the chair of ISO TC 119. His replacement is another EPMA activist Jan Tengzelius (Höganäs AB). Work in 2004 included: discussion with committee 5 'Properties of PM materials', possibilities for a MIM property database, interaction with the Global PM Property Database.

## Sectoral Groups

The Open Meeting principle was also successfully exploited at the PM World Congress for the EPMA's Sectoral Groups

## European Hard Materials Group

The EHMG had an especially productive year. In February, it held the first meeting of its new, themed, WINTEREV series at Teddington, UK jointly with the UK National Physical Laboratory and the Technical Working Area on Mechanical Testing of Hardmetals of VAMAS (Versailles Project on Advanced Materials and Standards). A team of 16 people from industry, academia and RTO's brought together centres of expertise and interested industrial organisations to discuss a range of issues affecting toughness testing for hardmetals.

The general outcome of the meeting was: Fracture toughness tests are viewed as essential by some industrial companies, both for internal and external material comparisons and for trading. However, other companies tend to use these test methods for research and quality control rather than in customer specifications. The reasons for this might include:

- Many carbide producers market their products as finished articles ready for use.

Fracture toughness tests are thought to be relevant in making assessments of fitness for purpose, but are not often used as a design tool because function is usually determined by a suite of properties, and the engineer uses a combination of experience and data to assign hardmetals that fit a specific need.

- Fracture toughness testing that follows the precepts of the conventional fracture mechanics community can be slow and expensive.

There is, however, an increasing tendency for companies to use the Palmqvist test method, where cracks associated with hardness indentations can be used to estimate toughness; because, done carefully, as the VAMAS project has shown, it can give similar results to the more conventional tests and it is cheaper.

The meeting concluded that there is a need for test methods to be rationalised and accompanied by clear guidelines for use.

The WINTEREV experiment of targeting themed issues was agreed to have been a success by the participants and more workshops are planned the next being in Barcelona during February 2005. Each meeting will focus on a specific area of importance to both research and industrial communities and will review research objectives in the light of industry requirements. An open meeting at the Vienna Congress attracted 33 people to discuss the PM Road Map exercise, the 'nano' club project, and reactions to the REACH process.

## EuroMIM

An open lunch meeting at the Vienna Congress attracted 48 people. Following a useful State of Business presentation by Dr Vicenzi, RAPRA (the UK rubber and plastics research association) presented computer simulation of a MIM watchcase. EPMA Executive Director Jonathan Wroe then summarised the MIM Collective Project Stage 2 submission, following the successful first Stage. However he emphasised that the chances of success were only 1 in 4 and, as is reported elsewhere, despite passing its technical threshold, the application failed. The meeting concluded with presentations by five research centres of excellence.

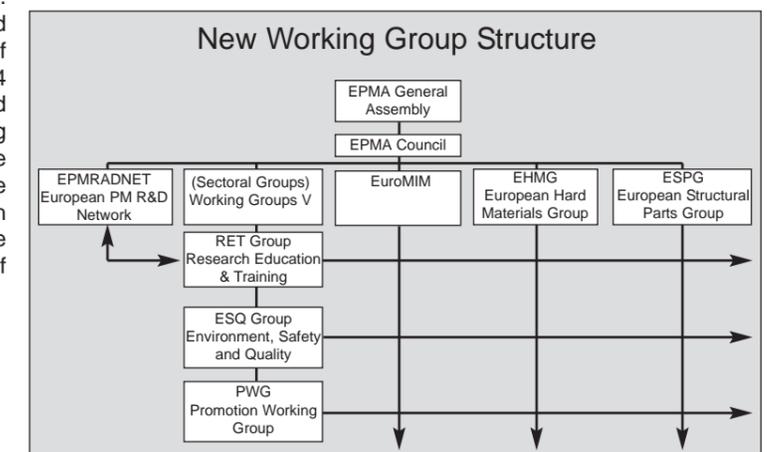
# Changes to Working/Sectoral Group Structures

In order to continue to have working groups and sectoral groups that are both active and representative a number of changes were agreed at the Council Meeting in November 2004. These include:

- the formation of a new European Structural Parts Group (ESPG)
- The merger of the IRDG and the RTG into one Research Education training group (RET)
- The merger of the Quality and Health and Safety Groups into an Environment Health and Safety Group (EHS)
- The planned development of a new Research Network to be known as the EuroPM RADNET which if successful will form a fourth sectoral group.

Details of these changes have already been circulated to members and the first steering committee meetings for these revised groups are planned for April 2005.

Old	New
<b>Working Groups</b> Industry Research Development Education and Training Environment, Health & Safety Quality Promotion	RET EHS Promotion
<b>Sectoral Groups</b> Hard Materials MIM	ESPG Hard Materials MIM EURO PM-RADNET



# EPMA 2004 the Year in Pictures



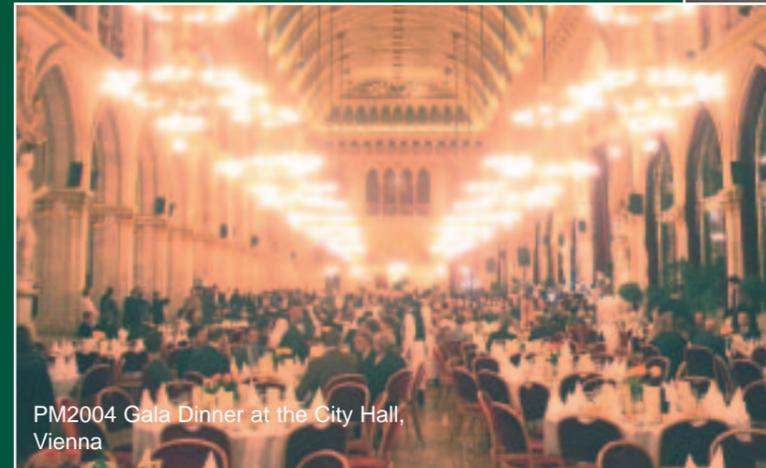
Dr C Molins addresses the delegates



The EPMA Showcase PM2004



Delegates at the Diener Workshop in Kiev



PM2004 Gala Dinner at the City Hall, Vienna



Anja Serneels and Bert-Jan Kamphuis of Umicore, Belgium receive Innovation in PM Award



Dinner in Kiev



Delegates at PM2004



The Conference Centre, Vienna



Education Group Meeting Alessandria February 04



Entertainers at the Heurigen evening PM2004



PWG Meeting at Dunchurch Park Hotel, England



Diener Workshop in Gothenburg



Dr M Bartenstein Speaker PM2004



Students give a product demonstration on the Wolfram Stand at PM2004

## Global PM Property Database

The long-awaited Global PM Property Database went online in October 2004. Backed by EPMA, MPIF, and JPMA, it provides a common, permanently available, database for PM materials worldwide.

The database itself is based upon the 'Iceflow' system developed by nCode International Ltd a software company with experience in fatigue analysis and testing. Mounted on its own registered website ([www.pmdatabase.com](http://www.pmdatabase.com)) where users can register and access the database free of charge.

Data is collected electronically using agreed templates from a variety of sources globally. Assembled material is then independently validated by regional committees set up by the three trade association partners before being passed to the Global Project Manager, Dr David Whittaker, who verifies formatting for loading. Registered users enter the database via a Windows-style interface and in a very user-friendly format are offered search options for the



type and level of properties. Tabulated data and automatically plotted graphs relate variables such as UTS, yield strength, fatigue endurance limit to density for example.

Graphs are downloadable in the form of graphics for insertion, for example an MS Word document. Specific properties (e.g. Young's modulus, density, coefficient of linear thermal expansion) are available for export to popular Finite Element Analysis system materials databases such as NASTRAN, ANSYS, and Abaqus.

Data supplied takes the form of typical and statistical ranges and not guaranteed minimum properties. Considerable effort has been expended on input data quality, but the database alone cannot be a substitute for direct contact with manufacturers. Therefore information is included on the member companies who

produce parts from the specific grades the user has identified.

The database first phase covers: PM steels and stainless steels from 6.4 gm/cc upwards, powder forged steels, and bearing alloys.

This whole process is seen as a major contribution to user understanding of PM materials and their capabilities. Therefore a fundamental principle underlying the database is that it provides information to a designer on optimum use of PM for existing and new applications.

The database was successfully launched at the World Congress with about 2000 data lines. Early user feedback has been very encouraging. The three collaborating and funding trade associations met at the Congress to discuss the future of funding and database expansion and development. Initial reactions showed general support for extension to MIM, but rather less interest in hardmetals.

## DieNet Thematic Network

A considerable acceleration of DieNet work was evident during the year as the end of funding (in February 2005) approached. The main objectives of the final year were to complete case studies on effects of die filling on ferrous materials, and density predictions on



32 participants at Workshop 9 in Freiburg

hardmetals, magnets and structural ceramics. Workshop 7 was held in Gothenburg, Sweden, in April at the Swedish Ceramic Institute and Workshop 8 in Kiev, Ukraine, in September at the Ukrainian Academy of Sciences. Matters discussed included the status of crack prediction and future programmes for research in this important area. A further essential issue was the matter of ensuring sustainability beyond the ending of EU funding and a Technological Implementation Plan seminar was conducted by an external moderator.

Work to date has shown that, given the correct input data, compaction models can predict density distributions and pressing loads to a good degree of accuracy. Simulations, however, rely heavily on the starting conditions including knowledge of the correct fill density and the effect of any powder transfer operations. They must also be given press frame tooling elasticity. The conclusions from the DieNet project therefore are that compaction modelling needs, at the very least, good practice guidelines on powder fill and transfer, and ideally predictive capability on these two key operations.

Another important subject is crack prediction, especially warnings of kinematics, which could give rise to shear cracks. Although outside the scope of the present network, the DieNet project intends to give pointers to future work in this area including the production of constitutive data at low compaction pressures.

The Network agreed to accept the invitation of Springer Verlag to produce a textbook 'Powder die compaction modelling' detailing the work of the whole Project. The likely market for this highly visible output from the DieNet programme includes:

- manufacturers of products using the process (PM, ceramics, hardmetals, magnets, pharmaceuticals and some domestic appliances)
- research and process staff and design engineers
- universities and other researchers using models

The final DieNet Workshop was scheduled for Freiburg in February 2005.

## PowdermatriX

EPMA continues as a partner in a UK Department of Trade and Industry funded programme PowdermatriX. PowdermatriX is a network in particulate engineering, focussed initially in the advanced ceramic, powder metal, hard metal and magnetics industries. The core partners of the organisation in addition to EPMA are CERAM, Birmingham, Loughborough and Manchester Universities, the British Hardmetals Association, the National Physical Laboratory, and the Institute of Materials, Minerals and Mining.

The Partnership aims to promote effective interaction between the science and engineering base and industry. Over 130 companies and 25 UK universities form the network. Activities include industrially relevant research and training programmes, individual company



Joan Hallward (EPMA) and James Tweed (AEA Technology)

support through a team of eight Technology Translators, and a wide programme of meetings and networking events.

## Dissolution rates of powders and sintered products

A consortium of EPMA members has funded a short programme to establish the dissolution rate both of powders and of sintered product as a measure of their potential toxicity to the environment. The final test report was expected by the end of December. In accordance with the rules of EPMA 'Club' projects, the consortium members will then decide on the conclusions and future actions, including the possibility of publication. Potentially this programme will provide data useful in arguing for 'split classification' in which the legislators accept different health and environmental classifications on powders depending upon particle size.

## Measurement Techniques on Nano Sized Materials

For some years hardmetals with substantially improved toughness have been produced commercially using ultrafine/nano powders. The production and processing of nano particulates however presents special challenges in terms of size measurement.

In 2004 a consortium from the European Hard Materials Group funded the second stage of a project to examine size measurement techniques on ultrafine and nano sized materials. The work was carried out by the Swedish Institute for Metals Research and reported in October to the funding consortium."

## PM Promotion

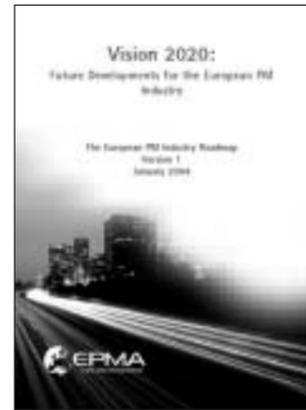
The EPMA's continuing role in the promotion of PM was spearheaded in 2004 by our stand at the Aerospace Testing and Interiors Exhibition held in Hamburg in May. The exhibition was aimed at leading designers, engineers and decision makers from the massive worldwide aerospace industry who are looking for trends guiding developments in material and product innovation in a market where safety, quality and weight saving are essentials. The EPMA presence there was able to ensure focused

be used in support of funding applications, for identifying R&D needs, and as a tool for individual companies in strategic planning.

A rapid iterative process was undertaken to identify drivers and central issues, both negative and positive. The output was a series of key actions and recommendations contained within a 16 page report entitled. 'Vision 2020: Future Developments for the European PM Industry'. The process took place during 2003 with electronic circulation to member companies early in 2004. Discussions are ongoing as to the next stage of development for the roadmap.

## EuroPM2005 Prague

For the first time in 2005 the EuroPM series of conferences and exhibitions will take place in a former CEE country when the Congress Centre Prague will host the event. This modern purpose built centre will host a full topic conference with four parallel sessions and what is anticipated to be the largest exhibition ever held at a European international PM conference with some 50 plus exhibitors from around the world. Special sessions on Nanotechnology Titanium and a DIENET Open workshop will also increase the attractions.



distribution of information packs and a significant number of specific information requests from designers and end-users resulted. These leads were then circulated to members for them to follow up.

As a direct promotional exercise, a special session at the World Congress in Vienna specifically involved some 120 part makers and end-users. New promotional literature for the GPMD, a reprinted introduction to PM and new Case Studies based on the Innovation Award entrants were given to attendees. The feedback from this event was very positive and it is hoped it can be repeated at a future event.

## PM Roadmap

The roadmap exercise was launched in response to the need identified by Council for a document of specific relevance to the industry in Europe. The objective was that by using consolidated thinking and with inputs from a wide range of organisations the roadmap could

## Influencing Regulations and Legislation

EPMA has gradually been able to position itself for attempts to participate in, or at least intervene in, Brussels formulation of regulations and legislation. While EPMA naturally supports the general notion that industry has a central role to play in improved human health and environmental conservation, there is a widespread conviction that there is a parallel need for all such legislation to avoid exerting a negative effect on the competitiveness of European manufacturing capability, which many feel is steadily being eroded by critical and often insufficiently informed social and environmental legislation.

The most prominent case in point at present, which has occupied significant effort on the part of EPMA and its members, is REACH (formerly known as the New Chemicals Policy). EPMA, as a Trade Association member of Eurométaux has been working with that body, and independently, to attempt to modify the REACH procedures. Also, on behalf of all EPMA members, the Secretariat has continued to monitor developments in this legislation (now expected to become law in 2007). In its present form the Regulation still does not recognise the specific properties of metals and alloys, and has serious negative implications for the whole PM sector:

The first reading of the REACH Regulation in the European Parliament is expected to occupy a considerable proportion of 2005 and efforts will need to continue throughout the year.

## Attracting EU Project Funding

EPMA has performed very satisfactorily over recent years in its participation in, and initiation of, EU funded projects.

## Education and Training Projects

Marie Curie programme: Better news finally emerged in respect of funding for education and training activities. The application under the Marie Curie programme resulted in an award of €570 000 for a four-year series of events taking



Delegates from a previous summer school

the novel form of linked summer schools and short courses.

The Summer schools will last seven days each and the short course two days and in all will cater for some 70 young graduate engineers and scientists each year. The events are scheduled for early September each year in Aachen, Grenoble, Kosice and Alessandria. The price for students has been set at a nominal €195 per course. Students also get free accommodation and subsistence, as well as a substantial grant towards travel costs. Full details of the courses will be circulated early in 2005.

EPMA here records its gratitude to the ETG in general and to Dr Bob Moon in particular for their efforts in developing this project, which, following a series of disappointments in the bidding process, will enable EPMA to build on and continue the success of the first phase of summer schools, which began in Meissen/Dresden in 1998 and ended with the school held in Vienna in 2002.

Of course, this excellent record of successful acquisition and fruitful use of EU funds for education and training projects will be followed up wherever possible.

## Research and Development Projects

So far as research and development work is concerned, however, it was clear by the end of 2003 that the immediate future was less promising. For one thing, a good deal of confusion was reported over the thinking behind FP6 (especially with regard to the so-called 'instruments' (Networks of Excellence and Integrated Projects) and there is disappointment about their retention in FP7 and the continuation of the apparent 'top-down' attitude to devising the thematic priorities and work programmes.

Unfortunately, useful progress on several fronts for EPMA is to a great extent dependent on access to substantial funding, in particular from EU sources. Therefore, since experience during 2004 and the feedback on FP7 seems to have confirmed doubts, EPMA's policy during 2004 was to focus its limited resources on projects of express relevance to SME's, where success rates have been higher and where the possible subject areas seem less constrained and 'top down'. In particular, SME's are prioritised in:

- Cooperative Awards (CRAFT)
- Collective Projects

both of which can select technical areas to meet industry requirements and are not confined to the thematic priorities of the main 'instruments'. Therefore, two projects were proposed.

**CRAFT application:** On behalf of the EuroMIM Sectoral group Prof Lars Nyborg of Chalmers University, Sweden, submitted at the end of 2003 an application for the Project MIMZERO. This had the objectives of providing online NDT defect detection system and the development of near-zero defect MIM parts.



**Health and Safety Guide**

The popular 'Guide to EU legislation and Environmental Health and Safety in the European PM Industry' was reprinted during the year and is available at €100 to members and €200 non-members). Details are available on the EPMA website

**Collective Project application:** It was also agreed to make a submission for a Collective Project including seeking funding for MIM Property Data generation and the development of a fault-finding guide. By year-end, it had been learnt that neither application had been successful. This was despite the MIM Collective project having passed the eligibility threshold only to find there was not sufficient funding available.

## The General Assembly

Under the Constitution, authority is vested in the General Assembly of members, which meets annually. A Council, directly or through its Executive Board, implements policies and decisions of the General Assembly and ensures effective operation between Assemblies. Day-to-day management is in the hands of the Executive Director and his staff [EPMA staff panel].

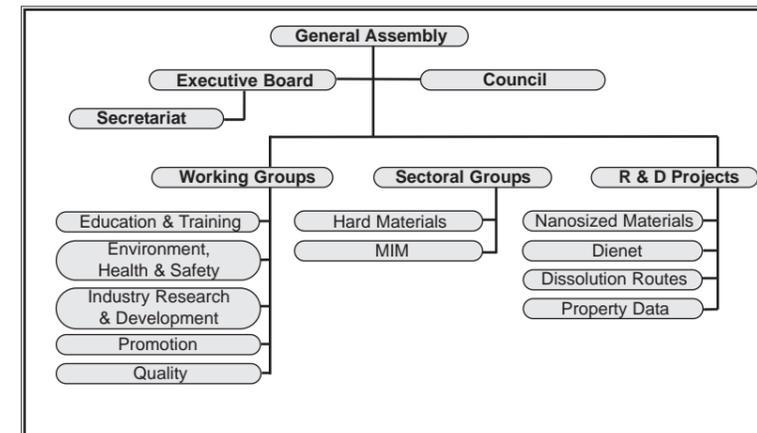
The general structure of the EPMA and its various components is shown [EPMA structure panel].

## The Council

The EPMA Constitution requires the Council to be composed of a minimum of seven individuals with voting power and appointed by the General Assembly. At least one Council member must be of Belgian nationality. In practice, the Council has always been larger than its permitted minimum. Initially, it was constituted with 12 members; the 3rd General Assembly (1992) increased that to the present 15.

Seats on Council are allocated according to the number of Full Members in each of the sectors making up the EPMA's spectrum of interest; at the same time, consideration is given to ensuring an equitable geographical spread of Council members around Europe. Members in 2003 represented 25 countries in Europe (and 10 outside Europe).

Following the retirement from the Board of Vice President Mr Christian Note at the end of 2002, the appointment of two new Vice Presidents was approved by the 14th General Assembly: Dr Volker Arnhold, Senior VP R&D and Advanced Technology, GKN Sinter Metals GmbH, Germany, and Mr Thomas Lambrecht, VP Sales, Dorst Maschinenbau, Germany, thus making three Vice Presidents of EPMA in place of the former two, and strengthening representation among EPMA leadership of the equipment supply sectors.



## Annual Meeting



Dunchurch Park Hotel, Rugby

The 15th General Assembly and 10th Management Seminar were held in Rugby, England, on 13-14 May and there was a good attendance of representatives from some forty organisations. The Management Seminar followed the customary plan of a programme of papers relating to the PM industry, with special focus on the host country.

The UK national review was presented by David Greaves, Höganäs UK.

Other contributors were: Kevin Johanson, Concentric Pumps Ltd: 'PM - the user view'.

Dr Mike Hicks, Rolls Royce plc: 'Future requirements for PM in the aerospace industry'.

There were also a number of sector and working group meetings held at the event and the EPMA annual Dinner was held in the historic town of Stratford upon Avon. The delegates were later able to take part in a visit to the Peugeot factory at Coventry where the 2006 is produced..



Members listen to presentations at the Management Seminar

## EPMA Council/Executive Board

### Executive Board

President: Dr Cesar Molins  
 Vice Presidents: Dr Volker Arnhold, Mr Jaap Koeleman, Mr Thomas Lambrecht  
 Treasurer: Mr Hannes Moser

### Council

#### Representing PM Parts Sector

Dr Volker Arnhold, GKN Sinter Metals GmbH, Germany  
 Dr Ian Edmondson, Federal Mogul Sintered Products, UK  
 Dr Michael Krehl, Sinterstahl GmbH, Germany  
 Dr Cesar Molins, AMES SA, Spain  
 Mr Hannes Moser, Miba Sintermetall AG, Austria

#### Representing the Powder Sector

Mr John Boyle, QMP Metal Powders GmbH, Germany  
 Mr Nicholas Herdon, Pometon, SpA, Italy  
 Mr Jaap Koeleman, Eurotungstene Poudres, France

Dr Jan Tengzelius, Höganäs AB, Sweden

#### Representing the Equipment Sector

Mr Thomas Lambrecht, Dorst Maschinen und Anlagenbau, Germany  
 Mr Daniel Pfister, Osterwalder AG, Switzerland

#### Representing the Refractory & Hard Materials Sectors

Dr Günter Kneringer, Ceratizit Austria AG, Austria

#### Representing the PM Semi-Product Sector

Dr Gérard Raison, Aubert et Duval Holding, France

#### Representing the Metal Injection Moulding Sector

Dr Martin Blömacher, BASF AG, Germany

#### Member for Belgium

Mr Jan Walraevens, Wood Appleton Oliver, Belgium

**EPMA Secretariat**

			
Frances Holland <i>(Conference Management, General Admin)</i>	Pauline Davies <i>(PM Publications, General Accounts)</i>	David Wiggin <i>(Exhibition Manager, Marketing &amp; Promotion)</i>	Beverly West <i>(PM Summer Schools, Statistics)</i>
			
Joan Hallward <i>(Network Coordinator, Membership Promotion)</i>	Peter Brewin <i>(Technical Director)</i>	Jonathan Wroe <i>(Executive Director)</i>	

## Outlook

Trials of new ideas for added value in conferences - open meetings of groups, user seminars - have demonstrated a fair degree of enthusiasm for these extras and EPMA will now include them in planning wherever appropriate.

By year-end, the EuroPM2005 Exhibition was showing promise of repeating the success of PM2004. Stand reservations of over 70% of the available space have been confirmed. Prospects for EuroPM 2005 (Prague, Czech Republic, 2-5 October [www.epma.com/pm2005](http://www.epma.com/pm2005)) are good.

The 'European' component of the EPMA name was never intended to be limited to the membership of the EU. There has always been close involvement with the countries of Central and Eastern Europe - some of whom are now, of course, EU member states. It is indeed timely that the next big event should be in one of those new member states. As ever, for PM, growth may be driven by the automotive industry as component manufacture and assembly bases shift in global terms.

The EPMA continues working with most European metals industries in continuing to call for metals and alloys to receive more appropriate treatment under the REACH

legislation. EPMA member reports on the results of their lobbying activities indicate that while there were strong arguments for continuing to lobby for exemption for metals, a genuine 'single industry voice' could be critical to success - and this is regarded as by no means certain overall. The important thing will be to avoid losing momentum.

Promotion of the Global PM Property Database to end users will need to be undertaken not only by the three trade associations supporting it but critically by EPMA members. An introductory pack for potential users is available and it is hoped that members will take positive action and recommend it.

The launch of the new series of Summer Schools / Short Courses offers a tremendous, bargain-price opportunity for training promising younger people. Full support of the programme by EPMA member companies through encouraging and subscribing will make an enormous contribution to the quality and commitment levels of scientific and technical staff throughout Europe, which in turn makes a contribution to competitiveness. It is hoped therefore that member companies will take a long view, look at the four-year programme, and plan accordingly.

Income	2004	2003
	€	€
Membership fees	361,395	326,371
Publications and promotions	10,558	23,385
Conferences, seminars and courses	1,249,716	412,286
EU and other projects	444,225	285,773
Miscellaneous income	5,777	5,370
<b>Total</b>	<b>2,071,671</b>	<b>1,053,158</b>

Expenditure	2004	2003
	€	€
Salaries social charges and pensions	313,533	281,079
Office overheads	40,866	35,640
Subsistence and travel	16,228	26,052
Publication costs	5,698	17,720
Conferences, seminars and courses	924,775	253,888
Professional and membership fees	23,439	24,385
Consultancy fees	-	6,083
Council and meetings expenses	10,077	5,743
Annual report	3,214	3,051
Competitions and awards	34,552	5,952
Promotions and internet	18,217	9,401
Powder metallurgy journal	8,768	5,085
Working group support expenses	4,969	3,298
Bank and credit card charges	5,565	10,071
Taxation	953	898
Exchange rate differences (note 4)	(3,670)	17,114
Printing, stationery, postage and sundries	27,535	27,365
EU and other projects	465,032	253,640
Bad debts	-	65
Depreciation	4,880	3,949
	<b>1,906,631</b>	<b>990,479</b>
<b>Surplus of income over expenditure</b>	<b>165,040</b>	<b>62,679</b>
	<b>2,071,671</b>	<b>1,053,158</b>
<b>SURPLUS/DEFICIT AFTER ADJUSTMENT FOR 2004/2005 EXPENSES</b>		
Expenditure relating to 2004/5	34,571	102,789
<b>Surplus of income over expenditure</b>	<b>130,469</b>	<b>(40,110)</b>
	<b>2,071,671</b>	<b>1,093,268</b>

EPMA is governed by Belgian Law of 25 October 1919, as amended by that of 6 December 1954. The Association, *un Association internationale poursuivant un but scientifique*, is therefore exempt from Belgian income tax. The Secretariat, situated in the UK, registered for UK VAT on 1st December 1993, in order to regularize the situation with regard to new Single Market regulations.

EPMA works to a calendar year. The Articles of Association require that members contribute towards the expenses of the EPMA through an annual subscription; the generation of funds from other sources and activities compatible with its objectives is permitted.

Belgian law requires that the EPMA Council shall submit the accounts for the past year and the budget for the following year for the approval of the General Assembly. Set out above are the accounts for 2004, with those of 2003 for comparison.

#### ACKNOWLEDGEMENTS:

The EPMA is indebted to Mr Robert B Wood both for his assistance in the operation of the RET Group and in the compilation of the Annual Report. Accounts prepared and audited by Turner Peachey Chartered Accountants, Shrewsbury, UK.

## BALANCE SHEET AS AT 31 DECEMBER 2004

	NOTES	2004		2003	
		€	€	€	€
<b>FIXED ASSETS</b>	1		14,260		11,715
<b>CURRENT ASSETS</b>					
Debtors	2	1,063,085		443,674	
Bank accounts		487,083		302,213	
		<b>1,550,168</b>		<b>745,887</b>	
<b>CURRENT LIABILITIES</b>					
Creditors	3	1,244,378		568,021	
			305,790		177,866
			<b>320,050</b>		<b>189,581</b>
<b>REPRESENTED BY:</b>					
Accumulated fund at 1st January 2002			189,581		229,691
Less: Surplus of expenditure over income					40,110
Add: Surplus of income over expenditure			130,469		
			<b>320,050</b>		<b>189,581</b>

## NOTES TO THE FINANCIAL STATEMENTS - YEAR ENDED 31 DECEMBER 2004

	2004	2003	
	€	€	
<b>1. FIXED ASSETS</b>			<b>4. EXCHANGE RATES</b>
Equipment brought forward	11,715	9,806	The figures in the Balance Sheet are converted at the closing rate of £1 to €1.41528 (2003 - £1 to €1.41637)
Additions during the year	7,239	5,759	The figures in the Profit & Loss account have been converted at the rate of £1 to €1.4711 which equates to the average for the year (2003 figures are converted at the rate of £1 to €1.4528).
	<u>18,954</u>	<u>15,565</u>	The differences arising, due to the use of different exchange rates, is shown in the Income & Expenditure account under 'exchange rate differences'.
Less: depreciation @ 25%	4,694	3,850	
	<b>14,260</b>	<b>11,715</b>	
Disposals	-	-	
Less: depreciation @ 25%/loss on disposal	-	-	
<b>Net Book Value</b>	<b>14,260</b>	<b>11,715</b>	
<b>2. DEBTORS</b>			
Sales ledger balances	307,574	361,013	
Other debtors	440,262	16,800	
Expenses in paid in advance	-	-	
EU projects	315,249	65,861	
	<b>1,063,085</b>	<b>443,674</b>	
<b>3. CREDITORS</b>			
PM conference amounts due	247,514	6,429	
Purchase ledger balances	113,539	6,552	
Membership fees received in advance	368,511	344,953	
Owed to customs & excise	-	5,935	
PAYE owed to inland revenue	21,475	15,307	
Taxation	5,974	5,061	
Professional fees	4,878	3,824	
EU and other projects	274,653	179,960	
	<b>1,244,378</b>	<b>568,021</b>	

