Annual Report 2016
A comprehensive report on EPMA’s activities throughout the year
Dear Members, PM Colleagues and Partners,

As another year closes, it is time to review our Association’s performance and achievements.

Our European PM industry is moving at a brisk pace, experiencing robust and successful growth. With this comes a need to reflect and communicate on current trends in our sectors.

PM part production was up sharply again in 2016, a year of strong dynamics for the PM industry as a whole. Thanks to such vigorous growth, PM is at the forefront of technology and the preferred choice for a number of EU industries, including the Automotive industry as well as the Medical, Aerospace and Engineering sectors.

Through PM, our industries benefit from greater efficiency, cost effectiveness, innovation, and agility. I am convinced that the growth that we have experienced again in 2016 will continue over the coming years. Special mention goes to AM, which has seen spectacular growth over the last decade. Not a week goes by without an EU company advertising a new application, and through AM, we are reaching out to the general public. In other words, powder metallurgy has made the successful transition into daily life.

What does EPMA bring to the table? First, it brings discussion: the EPMA serves as a unique platform on which technical debates and discussions can take place and on which R&D programmes and expertise can be shared. The result: forward-thinking concepts are encouraged for development, which further propel our PM industry to the cutting edge. A real-life case in point is our international PM congress.

Second, through communication: the EPMA is committed to promoting the European PM Industry and PM technology not only across Europe but right across the globe. Drawing on an abundance of communication tools, from seminars and conferences through to online tools and videos, coupled with its shared global property database, our Association has consolidated its position as a thought leader in the PM industry. To cap this off, special praise goes to our events, organised exclusively for young engineers and people new to the PM business.

Third, through innovation: EPMA seeks to shape the future of the PM industry by creating the conditions for exchange. Indeed, our Association serves as a unique platform on which technical debates and discussions can take place and on which R&D programmes and expertise can be shared. The result: forward-thinking concepts are encouraged for development, which further propel our PM industry to the cutting edge. A real-life case in point is our international PM congress.

The standout event in 2016 was, of course, the World PM2016 Congress that took place in Hamburg. I know that I speak on behalf of all the World PM2016 Congress Organisers when I say that it gives us immense pleasure to play host to these types of globally-recognised events in Europe every six years. World PM2016 was a resounding success with a record turnout. We welcomed in excess of 1,900 participants from all over the world over 4 full days.

In 2017, we will see even greater events coverage. First, there will be a large number of seminars in addition to our Euro PM Congress in Milan. The EPMA Sectoral Groups have scheduled 2-day seminars: Design for PM, HIP seminar, MIM seminar and an AM seminar. All of these events will target end users, outlining the vast array of possibilities offered to them by PM technologies. 2017 will also see two new initiatives on training, organised in the form of two ‘PM for non PM Specialists’ seminars: one will be a 2-day long seminar held in Germany and the other will be organised as a session during the Milan congress, scheduled for October.

To round off, I must say that I remain convinced that all the wheels are set in motion for PM to take off in the years ahead. Through our hard work, we are creating an EPMA platform that not only encourages agile organisation and workflow, but also favours the environment and promotes innovative practice in our industry. Through a constant focus on our key missions, we are also creating an EPMA platform that will drive down costs.

Happy reading!

Yours faithfully,

Philippe Gundermann
EPMA President
Activity Report

2016 has seen the EPMA developing its service to members in terms of networking, education and training, lobbying, fostering synergies and promotion of PM.

Regarding networking, nine open and special meetings were organised for the five sectoral groups of the EPMA: ESPG (Press and Sinter), EuroMIM (Metal Injection Mouling), EHMG (Hard Materials), EPHG (Hot Isostatic Pressing) and EAMG (Additive Manufacturing). The sectoral groups are a very important link towards our members and the meetings foster discussions and synergies in each sector according to their specific needs and development areas. EPMA expresses its gratitude to all those members who have participated in the meetings and especially to the steering groups of all five sectoral groups for their great support in the preparation and chairing of the meetings.

The World PM2016 Congress & Exhibition was successfully held in Hamburg with over 1900 attendees from 53 countries and a large exhibition area with 229 booths. 73 technical and special interest sessions took place where more than 400 scientific and technological lectures and posters were presented for the benefit of participants. We also had our third Young Engineers Day, comprising 30 undergraduates, from 5 universities, who discovered Powder Metallurgy. EPMA would like to thank, in particular, our German members for their assistance and also the members of the Technical Programme Committee who provided much useful support.

EPMA continues to maintain its efforts in training and education activities which included the PM Summer School, which was held in Valencia and the Additive Manufacturing Seminar that took place in Bremen. The EHMG also organised its well-known SUMMEREV workshop hosted by Hilti in Lichtenstein. During EPMA’s training events the participants enjoyed a high quality of lectures and all the events proved to be successful.

In terms of our European level activities, EPMA continues to use its membership in Eurometaux and other EU institutions to provide support and information for members on REACH and other EU environmental legal specific legislations, such as Energy and Carbon Taxes.

The success of EPMA’s club projects continues with the EHMG, ESPG and EPHG groups undertaking work on industry specified short term research. By the end of 2016, nineteen projects have gathered the highest degree of scientific and technological interest. Regarding EU supported projects, the EFFIPRO project continued in 2016 and was closed on 1 February 2017 and received a very high mark from the European Commission. A very promising Additive Manufacturing project was launched in November 2016: AM Motion.

You will find in the following pages more information on the different events that happened in 2016 and the forward looking program for 2017.

Finally, I would like to thank all EPMA Members for their continuous support. EPMA is what its Members want it to be.

Lionel Aboussouan  Executive Director
The 29th General Assembly of EPMA took place on 8 April at the Eurometaux Conference Centre in Brussels following the Board and Council meetings and the annual dinner on 7 April.

EPMA President Mr Philippe Gundermann welcomed members to the meeting, which was observed by a Belgian Notary. Revised versions of the Articles of Association (Statutes) and Bylaws (Internal Regulations) were adopted by the Assembly, which allowed the election of 20 Members to the Council for the 2016-2019 term, see page 6 for the appointed Council members. The composition of the EPMA Council members and Board members was also voted on, with Mr Philippe Gundermann as President and Mr Peter Kjeldsteen as Treasurer, both being elected to serve second terms in their roles.

The Sectoral Group Chairmen were invited to present an outlook by sector, which was very well received by the Assembly. These presentations and videos, and all of the presentations given at the General Assembly can be found in the members area: www.epma.com/ga

In his annual address, Mr Gundermann gave an overview of how the global economy has been impacted by the Chinese slowdown in industry. Mr Gundermann brought encouraging news showing the positive trends for the PM industry, particularly in the automotive and aerospace industries. The 2015 accounts as well as the 2017 budget proposals were presented by Mr Kjeldsteen, Treasurer of EPMA, and were approved and adopted unanimously. EPMA’s activity report was presented by Dr Aboussouan. He reported on the continuous increase of membership and gave the status for the preparation of the World PM2016 Congress. The EPMA’s education and training activities were also highlighted, with positive feedback from the participants.

The next General Assembly is being held on 31 March 2017 at the Eurometaux Conference Centre in Brussels.
Council

The EPMA Statutes requires the Council to be composed of a maximum of twenty individuals with voting power and appointed by the General Assembly. Seats on Council are allocated as below.

Current Council Members for the 2016-2019 Period:

Representing the following sectors:

Additive Manufacturing
Mr Ralf Carlström (Höganäs AB, Sweden)

Applications
Dr Steven Moseley (Hilti AG, Liechtenstein)

Hard Materials/Refractory Metals
Dr Lorenz Sigl (Plansee SE, Austria)

Hot Isostatic Pressing
Mr Peter Selbach (Bodycote Hot Isostatic Pressing AB, Sweden) April 2016 – December 2016. Mr Jim Sheard (Bodycote Specialist Technologies, United Kingdom) December 2016 onwards

Metal Injection Moulding
Dr Bruno Vicenzi (Clayver srl, Italy)*

Metal Powders
Mr Michael Rehnig (Höganäs Sweden AB, Sweden)

Plant & Equipment
Dipl Ing Ingo Cremer (Cremer Thermoprozessanlagen GmbH, Germany)

PM Semi-Finished Products
Mr Philippe Gundermann (Eramet, France)

PM-Based Parts
Dr César Molins (AMES SA, Spain)

General Representatives:
Dr Pierre Blanchard (Erasteel Kloster, Sweden)
Mr Martin Blömacher (BASF AG, Germany)

Mr Guido Degen (GKN Sinter Metals, United Kingdom)
Mr Magnus Ekelund (Sandvik Coromant AB, Sweden)
Dr Ing Matteo Federici (Sacmi Imola SC, Italy)
Ms Vania Grandi (Rio Tinto, Germany)
Mr Peter Kjeldsteen (Sintex A/S, Denmark)
Mr Christoph Laumen (Linde Gases Division, Germany)
Mr Thomas Lambrecht (Dorst Technologies, Germany)
Dr Harald Neubert (Miba Sinter GmbH, Austria)
Mr James Shaul (Hoeganaes Corporation Europe, Germany)

Contact details for current Council Members can be found on the EPMA website.

Executive Board Members for the 2016-2019 Term

Seven members of Council have been elected to the EPMA Executive Board:

President
Mr Philippe Gundermann

Vice Presidents
Dipl Ing Ingo Cremer
Mr Guido Degen
Mr Thomas Lambrecht
Dr César Molins
Dr Harald Neubert

Treasurer
Mr Peter Kjeldsteen

* Leaving March 2017
EPMA Secretariat

Day-to-day management is in the hands of the Executive Director and his staff.

Lionel Aboussouan
Executive Director

Olivier Coube
Technical Director

Andrew Almond
Marketing & Exhibition Manager

Kate Blackbourne
Congress Manager

Jacqueline Peters
Accounts & Membership

Joan Hallward
Project Co-ordinator

Scarlett Williams
Event & Project Co-ordinator

Rhianna Jones
Events & Administration Assistant

Tammy Harris
Website Administrator

James Batten
Graphic Communications Assistant

* Retired December 2016
Outlook for 2017: A Year of Innovation

2017 will be marked by a high number of events and several innovations to increase benefit to the Members.

**Euro PM2017 Congress & Exhibition**
The Euro PM2017 Congress & Exhibition takes place in Milan, Italy 1 - 4 October at the Milano Congressi (MiCo).

Several innovations are planned for the event this year, including:

- An increase in the number of participants to the Young Engineers Day. Considering the success of this 2 day event, it was decided to increase the maximum number of participants from 32 to 50.
- There will be a 90-minute ‘PM for non PM Specialists’ seminar dedicated to people wanting to have a first insight into PM.
- End User’s Day: the Monday will be a free day for end users so they have the opportunity to join the plenary session, visit the exhibition, join the EPMA Meet and Greet and participate in the ‘PM for non PM Specialists’ seminar.
- Due to the increasing number of abstracts, we have extended the event into the Wednesday afternoon to enable an extra half-day of Technical Sessions and exhibition time.
- The Congress Dinner will be held on the last evening, Wednesday 4 October. More details will be released via the Euro PM2017 event website in due course.

**EPMA Training and Education**

In 2017, EPMA are introducing a new training schedule with a total of 5 seminars, plus the annual Summer School. There will be seminars relating to sectoral groups raising awareness of AM, HIP, MIM, and Structural Parts. The final event is ‘PM for Non PM Specialists’, which will provide beginner level knowledge of Powder Metallurgy from industry experts. The main target market for the seminars is the end user group to inform them of the range of opportunities PM could provide their business. The seminars in 2017 will also include increased networking opportunities, for example, the MIM Seminar will offer a participant-led showcase of MIM parts to facilitate discussion.

The 2017 annual Summer School will be held in Grenoble and features an increased amount of lab work, based on previous feedback. The week will also be recorded and available to EPMA Members for training along with the presentation slides. Further information and dates for training events can be found online at: www.epma.com/seminars

**Club Projects & European Projects**

Several new Club Projects started in 2016 and will continue through 2017 and at least three new will start in 2017 with the first Club Project in Additive Manufacturing, showing once again the benefit for the members of this collaborative way of working and sharing resources for high value results. The AM Motion project, showing the increasing interest of our members to Additive Manufacturing, was launched in November 2016, and will run for 2 years.

**European Communication Working Group (ECOM)**

To further strengthen the synergy between EPMA Members, a new Working Group on Communication has been formed. The aim of the newly created European Communication Working Group (ECOM) will enable members to provide insight and knowledge on the promotional events, literature and content the EPMA creates for its promotional presence. Any EPMA Member who wants to join the ECOM group can contact Andrew Almond for further information.

**REACH**

Work is continuing at a European level, such as the follow-up of REACH is ongoing. Specifically, with the request from the Dutch Authorities for a Cobalt Classification. This would mean that every alloy containing more than 0.01% Cobalt would have the Carc 1B classification. The EPMA intends to participate in the Public Consultation with the support of its Members and in liaison with the Cobalt REACH Consortium, The Cobalt Development Institute, the Metals Commodities and Eurometaux. The EPMA will follow this issue and keep the Members informed about the next steps through its regular REACH news emails.

**EPMA Websites and Microsites**

2016 saw a major upgrade of epma.com’s website software to the latest version in the Joomla 3.x series, in order to maintain website security, functionality and to ensure future compatibility.

Alongside this also came a new and more modern website design, including a better responsive layout for use on mobile devices and an improved navigation structure.

A busy start to 2017 has seen new developments to the EPMA website such as the Related Document archive and PMRADNET R&D Mapping, both of which will continue to be updated throughout the year.

The Seminar website has grown with EPMA’s increased range of seminars to have a subsection on each current seminar along with an improved online event registration process.

Keeping the websites up-to-date and relevant resources remains a key goal for 2017, along with specific improvements such as the forthcoming update to the Spotlight on PM case studies, improvements to the Publications area and archive sections for the microsites.

**European PM Industry Roadmap: Vision 2025**

In 2015, the EPMA launched the revised PM Roadmap called ‘Vision 2025’. Thanks to the help of our steering committee and with a lot of input from members, the brochure was circulated to all EPMA Members, stakeholders and industry publications. Designed mainly to be a tool to aid in the promotion of the PM industry to government and third parties we also hope that it gives some useful insight into key trends and development areas for the different sectors of our industry.

Available as a download from the EPMA website we have also circulated copies to our contacts in government and funding agencies, both directly and via social media platforms. We encourage you to use the document and the information within it, both internally, and as a support in developing future R&D proposals.

We believe that the new Roadmap will contribute positively to the promotion and development of the industry in the coming years.
Annual Report 2016

EPMA Membership 2016

Membership Subscription Rates

It was agreed at the December 2016 Council meeting that 2017 membership rates should be increased by 3%, the first increase in 8 years. This is to emphasise the increased work done by EPMA for 2017. A new category of ‘European wide Membership’ fees has been created for companies with more than three subsidiaries.

Contact us at: membership@epma.com

EPMA Corporate Members 2016

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
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<tbody>
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<td><strong>Total</strong></td>
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Academic Research Centres 20

Individual Researchers 19

New members in 2016

<table>
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</tr>
<tr>
<td>Individual</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
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</table>

Countries Represented* 30

*24 out of all 30 member countries hold EPMA Corporate Membership
EPMA Membership 2016

New Members in 2016
EPMA was pleased to welcome the following into membership during the year:

Full Members

Associate Members

Individual Members
Dr. Marco Actis Grande
Dr. Kenneth Brookes
Dr. Joseph Capus

Dr. Helen Omotoyosi Famodimu
Dr. Michael Krehl
Mr. Frederic Lecarpentier

Assoc. Prof. Mariangela Lombardi
Mr. Derek Rasmussen
Dr. Pascal Revirand

Dr. Henk van den Berg
Assoc. Prof. Kim Vanmeensel
EU: Regulations and Legislation

The EPMA has, through a process of ongoing lobbying and positive contributions to debate, been able to position itself to participate in and influence, the EU’s formulation of regulations and legislation.

REACH and other EHS Legislation Activities

In December 2016, the EPMA issued its 107th REACH Newsflash. This regular email newsflash informs over 320 interested EPMA member contacts about the latest developments of REACH and related legislation. The EPMA continues to follow the EHS legislation, especially REACH and CLP to assess their potential impact on the PM industry. In parallel, EPMA continues to follow the development of Exposure Scenarios, which establish the threshold levels of metals in our industry. Nickel thresholds for inhalation are especially followed by EPMA who are in close contact with the Nickel REACH Consortia. EPMA also works with and supports other metal institutes in their efforts to defend their sectors since the EPMA is a multi-metallic association.

Thus, among others, the EPMA is following Cobalt Metal CLH Proposal issue, which may have consequences on the PM industry and supports the Cobalt Development Institute and Eurometaux, who defend the metal industry in this special case.

Proposal of new classification of Cobalt Metal

The Dutch Authorities (NL RIVM) have submitted a Harmonised Classification (CLH) dossier on cobalt metal to the European Chemical Agency ECHA. The NL proposes a very strict health classification for cobalt metal in terms of mutagenicity Carcinogenicity and Reproductive toxicity. The NL may also propose a very low specific concentration limit (SCL) for carcinogenicity for cobalt metal (e.g. 0.01%): this means that every alloy containing more than 0.01% Cobalt would have the Carc 1B classification. The EPMA has collected contributions from the PM industry and intends to participate in the Public Consultation with the support of its Members and in liaison with the Cobalt REACH Consortium, The Cobalt Development Institute, the Metals Commodities and Eurometaux. The EPMA will follow this issue and keep the Members informed about the next steps through the regular REACH news email.

Sectoral Groups

European Additive Manufacturing Group (EAMG)
Chairmen: Mr Ralf Carlström (Höganäs)
Dipl.-Ing Claus Aumund-Kopp (Fraunhofer IFAM)

Steering Committee: Mr Ralf Carlström (Höganäs AB), Dr Olivier Coube (European Powder Metallurgy Association), Mr Keith Murray (Sandvik Osprey Ltd, Powder Group), Mrs Adeline Riou (Erasteel SAS)

The EAMG organised its first (Metal) Additive Manufacturing Seminar at the Fraunhofer IFAM, Bremen. It was a successful two-day course focusing on all aspects of metal Additive Manufacturing with ca. 50 participants.

Regarding the World PM2016, the programme included 11 AM specific technical sessions, an open meeting of the EAMG with Keynote Speaker Dr Paula Queipo, coordinator for the new AM-Motion project and a Special Interest Seminar entitled ‘Global Progress of Metal Additive Manufacturing’.

Finally, last November the EPMA welcomed EAMG Members in Brussels for a whole day discussion meeting on the current and future activities of the EAMG. The main objectives of the meeting were to prioritise the activities, get new ideas, allow more involvement from the EAMG members and build a group spirit. Several topics were discussed in depth: education and promotion, standardisation, projects and benchmarking. All participants agreed to join a EAMG team of local supports and it was decided to hold another EAMG meeting soon. The minutes of the meeting were distributed to the EAMG Group in December.

Note: From 1 January 2017, the EAMG has been renamed EuroAM.
European Hard Materials Group (EHMG)

Chairmen: Dr Leo Prakash (WTP Materials Engineering)
Dr Steve Moseley (Hilti AG)

Steering Committee: Dr Olivier Coube (European Powder Metallurgy Association), Prof Luis M Llanes-Pitarch (Catalunya Universitat Politecnica UPC), Dr Steve Moseley (Hilti AG), Dr Leo Prakash (WTP Materials Engineering), Dr Bryan Roebuck (NPL - National Physical Laboratory)

The EHMG activities of 2016 were numerous. In addition to the organisation and coordination of several Club Projects, the EHMG also organised the ‘SUMMEREV 16’ Hardmaterials Workshop on ‘Characterisation of Hardmetals & Superhard Material’ at Hilti AG, Schaan, Liechtenstein (37 participants) on the 16 - 17 June 2016.

For the World PM2016, the EHMG prepared a General Open Meeting on the Tuesday 11 October and a Special Interest Seminar on ‘90 Years of Cemented Carbides – Past, Present and Future’ on the Thursday 13 October. The EHMG also organised a ‘90 Years of Cemented Carbides’ dinner in Hamburg on 12 October to celebrate this milestone of the Hardmetal Industry. The guests were welcomed by Dr Olivier Coube, EPMA Technical Director and coordinator of the EHMG, followed by Dr Henk van den Berg, retired from Kennametal Shared Services, who came back to the history of the Hardmetal birth at WIDIA and offered some historical Hardmetal handbooks to some happy guests. Later on Kenneth Brookes, a historical figure of the PM community, gave his interesting, moving and funny memories about his Hardmetals research at TECO in the 1950s. The dinner was sponsored by Hilti, Sandvik, Extramat, PVA TePla and also the EFFIPRO FP7 EU Project.

European Structural Parts Group (ESPG)

Chairmen: Mr Peter Kjeldsteen (Sintex)
Dr Cesar Molins (AMES)

Steering Committee: Dr Olivier Coube (European Powder Metallurgy Association), Mr Peter Kjeldsteen (Sintex a/s), Dr Cesar Molins (AMES S.A.)

The ESPG held an ESPG General and Parts Makers meeting on the 8 April 2016 in Brussels and an ESPG General and Parts Makers session in October 2016 during the World PM2016. The ESPG held a Special Interest Seminar during the World PM2016 on ‘New Trends in the Automotive Drivetrain and Powertrain and their Impact on the Future of Powder Metallurgy Applications’ co-chaired by Dr Gerd Kotthoff (GKN Sinter Metals, Germany) and Dr Salvator Nigarura (PMG Indiana, United States of America) The ESPG has also launched new Club Projects this year.

European MIM Group (EuroMIM)

Chairmen: Prof Dr Frank Petzoldt (Fraunhofer IFAM)
Dr Bruno Vicenzi (Clayver srl)

Steering Committee: Mr Martin Blömacber (BASF), Mr Keith Murray (Sandvik Osprey Ltd), Prof Lars Nyborg (Chalmer University of Technology), Dr Jack Schwarz (GKN Sinter Metals Engineering GmbH), Mr Poul Verner (Sintex)

The EuroMIM group covers over 80 organisations, with 100 members from across Europe and from all parts of the MIM supply chain.

The current activities are:
Promotion of European MIM: the EuroMIM group continue to run educational seminars.
Technology and Quality Development: During the past years, EuroMIM has undertaken an annual benchmarking exercise for MIM parts makers across Europe.
An annual trend survey was released during the World PM2016 Congress.
Working Groups

Environmental Health and Quality (EHQ)

Benchmarking is a requirement under both ISO9000:2000 and ISO TC16949, and since 2001 EPMA has offered companies the chance to benchmark their operations externally. The procedure comprises questions covering all the productivity benchmarks for the PM industry, such as: delivery achievement, productivity, energy usage, overall equipment effectiveness, wage and absenteeism, etc… The 2016 exercise saw a total of twelve sites participating in the programme.

We also maintain the service of advertising EPMA member quality accreditation on the EPMA website, which remains a popular area amongst the numerous visitors per year to the site.

Following the request of the council at the last council meeting in June 2014, the EPMA has approached two organisations in order to benefit from their activities and their influence at the European Commission regarding the EU Energy and Climate Change legislation. The EPMA is now a member of the Eurometaux Energy and Climate Change Policy Department and an associate member of the Industrial Federation of Industrial Energy Consumers (IFIEC Europe). IFIEC Europe represents the interests of industrial energy users in Europe for whom energy is a significant component of production costs and a key factor of competitiveness in their activities in both Europe and throughout the world.

PMRADNET

This group comprises the 20 leading PM-related Universities and research groups across Europe. Partners continue to work on a bilateral basis on student exchanges, joint projects and use of equipment. They also provide a number of the lecturers for the PM Summer Schools.

The PM RADNET Group organised two meetings in January and October 2016 to discuss the next PM Summer Schools and more generally the future of the PM Academia. Several actions were decided to improve the synergy between the PM industry and the PM academia:

• Choosing and voting for a new name of the group

• Creating an Online Questionnaire within the group to be circulated by the EPMA toward the PM industry.

• Launching a PM R&D Map in the PM RADNET (or EPMA) Website.
EPMA PM Summer School

The first EPMA Summer School took place in 1998, funded by the EU. Since 2009, funding has come from the EPMA, following a council decision to consider training as a high priority topic for the Association. Since 2009, we have held seven successful events in Kosice, Madrid, Dresden, San Sebastian, Trento, Kraków and Sheffield. The very positive results from these Summer Schools meant that we held the 16th residential Summer School in 2016 at the University of Valencia.

Thanks to the input from our 25 guest lecturers and the support of Professor Vincente Amigó Borrás from the University of Valencia, Dr Marco Actis Grande from the Politecnico di Torino and Dr Christian Gierl-Mayer from the University of Vienna, the event was again a great success.

Participants: 32 from industry and 17 from academia, came from 16 countries throughout Europe and worldwide. They had an opportunity to visit the University of Valencia laboratories and the Summer School Dinner, which was held at Restaurant Balandret, a restaurant presenting the very essence of Valencia. The evening was rounded off with the Summer School Singing Contest that continued into the small hours.

Thanks to the ongoing, high level of demand from members, academia and end users, we are holding another Summer School in 2017. It will take place in Grenoble, France, 19 - 23 June 2017, hosted by Professor Didier Bouvard of Grenoble INP.

For more details on the EPMA PM Summer School 2017, please visit: www.epma.com/summerschool
AM Seminar

Following on from the successful sintering short courses in 2012 and 2013, the hard metals short course in 2014 and the EPMA Powder Injection Moulding (PIM) short course in 2015, the EPMA held a short course on Additive Manufacturing, encompassing the entire metal AM process. Forty eight engineers and scientists from throughout Europe joined with ten speakers drawn from both industry and academia to give an overview of trends in the field of AM.

Lectures included: Technology Overview, Part Design, Software, Metal Powders for ALM, Machine Operation, Additive Design and Manufacturing – Products of Tomorrow, Quality Control/Product testing, Standards and Case Studies amongst others. Participants also had the opportunity to partake in a tour of AM facilities and a Seminar Dinner at Ständige Vertretung.

Due to the success of previous years, EPMA will again be holding an AM Seminar in 2017, to be held in Coventry, UK from 18 - 19 May. The first day of this course will focus on the fundamentals of powders and processes with technology-based lectures on metal powder characterisation, end user perspective and metal powder handling amongst others. The second day will be devoted to understanding the manufacturing context for processes and powders with lectures including post-processing, AM inspection and design for AM.

www.epma.com/amseminar

Young Engineers

Following the success of the first two Young Engineers’ Events in 2014 and 2015, the programme was repeated during the World PM2016 in Hamburg. Five universities took part (University of Hamburg, Aalborg University, University of Bremen, Dortmund University and Ruhr Universität Bochum) totalling 32 students, who undertook a two-day programme of lectures on the PM process, question and answer sessions with industry experts and recent graduates now working in PM.

They also had tours of the exhibition and Lazer Centrum Nord to give them an appreciation of the variety of PM employment areas. The programme also included networking opportunities at the Congress Welcome Reception and a Young Engineers Dinner on the first evening. The success of previous years means that the 2017 programme will increase potential student numbers from 32 to 50.
Research and Development Projects

As far as research and development work is concerned, the projects can be divided in two. Firstly, large scale, mainly publicly financed projects and then those projects where funding has been co-ordinated on a private basis by the Secretariat using members’ direct funding. This method has produced a number of smaller scale, but equally successful projects e.g. Ultrasonic Fatigue Testing of Hard Materials and Toughness of PM HIP Steel stage. During the last seven years some 19 projects valued at over €650,000 have been launched, some of them still on-going or now entering a second or even third phase.

Global PM Property Database

The online database GPMD was launched in 2004 as a joint project between the leading regional PM trade associations, the EPMA and its sister organisations in North America (MPIF) and Japan (JPMA). Over the period, content has been increased to a total of nearly 4000 lines of high quality data, covering both ferrous and non-ferrous PM materials, as well as MIM. The number of registered users continues to grow steadily and has now exceeded 10,000.

A major step forward in expanding the reach of the GPMD has been the agreement originally signed in 2009 with Granta Design based in Cambridge, England, a leading company in materials information technology. As a result the GPMD data is now available to a range of end users as part of an integrated and comprehensive materials information management system called GRANTA MI.

The need for members to be proactive in helping to provide information is essential for the growth and success of this long standing and valuable project. New data was uploaded during the year and further improvements made to the operation of the website.

The next step for this database is to keep it up-to-date, with more data from the members and ensure end users and designers are using the data. Members willing to provide more support for this joint effort are very welcome to contact EPMA.

www.pmdatabase.com

Club Projects

The EPMA continues to coordinate several Club Projects in order to improve the synergy of the PM community. All EPMA Club Projects are open to Corporate EPMA Members. More detailed information on all EPMA Club Projects is available at www.epma.com/projects

The following Club Projects were coordinated in 2016:

**MicroMech: Micro-mechanical testing: a quantitative method for measuring local mechanical properties in hardmetals**

This project is an exploratory study to assess the ability of microsample testing to measure mechanical properties of hardmetals at the local scale. Three research organisations (CEIT, NPL, UPC) have joined their efforts to collaborate with the EPMA in this Club Project, along with seven industrial participants (Ceratizit, Hilti, Sandvik Coromant, Sandvik Hyperion, Kennametal Shared Services, Seco Tools and Element 6). The Consortium met for a final meeting on 27 October at CEIT to review the final results and it was decided to ask the Contractors to propose a follow up project to the HM community.

**RoH2: Resistivity of Hardmetals: Part 2**

This current project, RoH2, proposes to follow on from RoH by addressing further objectives like Contiguity, Resistivity Property Map, Co alloy research for input data to modelling studies, Binderless pure carbides and Modelling – input data sensitivity and model upgrade.

The RoH2 project was launched in February 2016 in partnership with NPL, London and CEIT, San Sebastian and the support of Ceratizit, Kennametal Shared Services and Hilti. A mid-term review meeting took place at CEIT, San Sebastian on 26 October 2016. The project is in good progress and the results are to be expected in summer 2017.

**MicroTest: Correlation study of mechanical properties/microstructure/fracture behaviour of industrial parts and standardized tensile specimens**

This Project started in June 2015 in partnership with the Instituto IMDEA Materiales, Madrid and the support of AMES, PMG, GKN Sinter Metals, MIBA and Höganäs AB. The project aims are to study the mechanical properties and the fracture behaviour (hardness and tensile features) in correlation with the microstructure using real parts. A mid-term meeting...
took place at IMDEA in May 2016 to review the first results obtained on
the standard and micro tensile specimen and agree on the next steps in
the project.

DfS: Design for Sintering – Dealing with the
anisotropy of dimensional changes
A new club project was launched in September 2016 on ‘Design for
Sintering’ – Dealing with the anisotropy of dimensional changes: ‘DfS’ in
partnership with the Department of Industrial Engineering, University
of Trento and the following industrial participants: AMES, GKN Sinter
Metals, Höganäs AB, MIBA Sinter Group and SINTEX. The project aims to
demonstrate the possibility to predict dimensional changes of real parts
using the design methodology developed at UNITN. A kick-off meeting
was organised in Bologna, where the participants agreed on the parts and
materials and also discussed the way forward.

Toughness of PM HIP Steel: stage 2
The project, started in partnership with IWM Aachen and six industrial
partners (Areva, Bodycote, Böhler Edelstahl, Carpenter, Cremer
Thermoprozessanlagen and Kennametal), follows two objectives:

1. Data collection and determination of toughness for PM-HIP material
   and chemical identical, conventionally produced material.
2. Identification of reasons for the differences in toughness by careful
   analysis of the microstructure and damage mechanisms. Identification of
   correlations to each step in the process chain from powder production
to consolidation.

The literature survey in Stage A of the project revealed a considerable
amount of data that connects properties like chemical composition,
HIP and heat treatment parameters and mechanical properties of
PM-HIP materials. Direct comparisons of conventionally and powder
metallurgically produced materials were, however, of very limited range.

In order to obtain reliable, comparable results, three materials (316L
austenitic stainless steel, 2505 duplex steel and alloy 625 Ni-base super
alloy) are to be examined in the ongoing Stage B. Tensile and Charpy
impact tests will be conducted with the material being produced in a PM-
HIP and a conventional route, respectively.

EU Funded Projects

EFFIPRO
EFFIPRO (Energy Efficient Manufacturing Process) was a three-year
Project which was launched in September 2013, and was part funded by
the European Commission in the 7th Framework Programme.

The objectives of this Project were to develop a significantly shorter
PM process, using a new concept of hybrid electrical current assisted
sintering and hard materials with improved properties, thus resulting in
a more energy efficient and cost effective process. The developments of
this project directly impacted on the cutting tools industry, as tools with
enhanced properties and a longer lifetime have been obtained using a
highly efficient process. A prototype was built and two types of parts
were machined, one for the aerospace sector and the other for the
automotive sector.

For this Project, the EPMA joined a Consortium of nine members
including: The University of Seville (USE), Fraunhofer IFAM, AMES Group,
MIRTEC S.A., KYOCERA UMIMERCO, Airbus Group and TECNALIA as
the Project Leader. The EPMA’s main responsibility was the dissemination
and training activities. The EFFIPRO project was closed on 1 February
2017 and received a very high mark from the European Commission.

More information can be found at the project website:
www.EFFIPRO.org

The EFFIPRO consortium meeting at Tecnalia, San Sébastian
AM-Motion Project

AM-Motion (A strategic approach to increasing Europe’s value proposition for Additive Manufacturing technologies and capabilities) is a two-year Coordination and Support Action (CSA) project which was launched in November 2016. It is part funded by the European Commission in the Horizon 2020 Framework Programme under grant agreement no. 723560.

The overall objective of the AM-motion CSA project is to contribute to a rapid market uptake of AM technologies across Europe by connecting and upscaling existing initiatives and efforts, improving the conditions for large-scale, cross-regional demonstration and market deployment and by involving a large number of key stakeholders, particularly from industry.

The AM-motion proposal will achieve a unique combination of expertise and networks in the following important areas:

- Key technological capabilities and infrastructure
- Barriers and market failings to industrialisation and deployment
- Key future applications and markets
- Relevant industrial lead-users
- Links with regional initiatives and policies.

For this Project, the EPMA has joined a Consortium of 13 partners from 7 countries including: TNO, TWI, CEA., ERRIN, IDEA, Brainport, Airbus, D’appolonia, Siemens, Cecimo, Materialise and Prodintec as the Project Leader. The EPMA will, among others, coordinate a Materials & Processes Experts Working Group with main actors from industry and RTDs working on material and process development and organise an AM Summer School in 2018.

More information can be found at the project website:

www.am-motion.eu
Hamburg, well known for being Germany’s second largest city and one of Europe’s largest container ports, played host to the World PM2016 Congress & Exhibition event, 9 - 13 October 2016. The ‘World Series’ World PM2016 event, organised and sponsored by the European Powder Metallurgy Association (EPMA) made for a truly international event with participants attending from over 60 countries, including the Far East, Africa and the Americas. The appeal of the World PM2016 event meant that it attracted over 400 Oral and Poster presentations and a strong attendance in excess of 1900 participants.

The event also included a sell-out exhibition with over 200 booths covering companies from all parts of the PM supply chain. Dr Lionel Aboussouan, EPMA Executive Director said “Hamburg will be well remembered within PM circles for a positive and successful World PM event. We would like to thank all the EPMA supporters who, over the last 5 years, have helped to create a first-rate World PM event in Europe. We would also like to thank our sponsors (BASF, Höganäs AB, Linde AG, Makin Metal Powders UK Ltd, Rio Tinto QMP, SACMI Imola SC, Taylor & Francis Group); our Plenary speakers (Dr Oliver Schauerte, Volkswagen and Roland Käppner, thyssenKrupp); the Technical Programme Committee; and to congress chairman Dr Michael Krehl”.

During the plenary, presentations were made from Europe, the USA and Asia, which are now available on the World PM2016 website (www.worldpm2016.com). The EPMA Distinguished Service Award was presented to Dr Cèsar Molins (AMES) and seven special EPMA Keynote Paper Awards for the papers selected as having the highest merit, were presented to:

- Mr Daniel Schwenck, University of Bremen, Germany
- Mr Dominik Bauer, Airbus Group Innovations, Germany
- Mr Alexander Angré, Swerea KIMAB, Sweden
- Dr Thomas Ebel, Helmholtz-Zentrum Geesthacht, Germany
- Dr Jean-Michel Missiaen, Grenoble INP, France
- Mr Yuu Akiyama, Sumitomo Electric Sintered Alloy Ltd, Japan
- Dipl.-Ing. Nadine Eißmann, Technical University Dresden, Germany

The EPMA Thesis Competition awarded prizes to the winning theses for:

- Masters category - Mr Uriel Tradowski, ‘Selective Laser Melting of AISi10Mg: Influence of Post-Processing on the Microstructure and Mechanical Properties’, Technical University of Berlin and the University of Birmingham.

The EPMA 2016 Powder Metallurgy Component Awards highlighted the excellence of today’s PM industry components and winners ranged from one of the largest 3D printed aerospace elements by Airbus, through to an innovative planetary carrier assembly in the automotive sector courtesy of Stackpole. The winners were all awarded the much sought after and prestigious EPMA 2016 PM Component Award. Photos from the event can be seen on page 20.

For the third successive year, the EPMA’s Young Engineers event enabled students from five Universities to attend the World PM event and experience through an intensive two day programme, what a career in the PM industry can offer to graduates. The traditional Gala Dinner on Tuesday evening saw some 1000 attendees enjoy a cruise along the River Elbe, culminating in a spectacular firework display.

Photographs, videos and presentations from the event are now available online at: www.worldpm2016.com
World PM2016 in Pictures

Opening Plenary

Poster Area

EPMA Booth

Welcome Reception
2016 Exhibition Schedule

EPMA Exhibit at DEVELOP3D LIVE 2016

EPMA exhibited at the DEVELOP3D LIVE 2016 conference, which took place at Warwick University, 31 March 2016.

DEVELOP3D LIVE is the UK’s leading conference and exhibition celebrating design, engineering and manufacturing technology and how it brings world-leading products to market faster. EPMA was on hand to promote the benefits of powder metallurgy, showing the delegates what Additive Manufacturing, Metal Injection Moulding and conventional Press & Sinter processes can do for them when they are designing the products of tomorrow!

Given the increasing size of the event and the designer-orientated demographic the conference attracts, exhibiting at the event was an ideal opportunity to introduce our e-learning platform (www.designforpm.net), as well as the ‘Introduction to...’ process brochure range, in the hope that they will specify one of our processes in the future production of their products.

Farnborough International Airshow: Exhibiting at the Heart of the Aerospace Industry

EPMA exhibited for the first time at the Farnborough International Airshow, 11 – 15 July 2016 to showcase the advantages that powder metallurgy can provide to the aerospace sector. The 5-day trade only exhibition, which alternates each year between the Paris Airshow and Farnborough Airshow, attracted over 1500 exhibitors from 52 countries and 73,000 trade visitors. 2016 saw an increase in the reach of the event with its international trade pavilions increasing to an all-time high of 23.

Exhibiting at one of the biggest aerospace events in the 2016 calendar helped to raise awareness of the PM process to the aerospace and associated sectors. By promoting each PM process, there were positive discussions around how each area of PM can be used in the future, or replacing and enhancing existing aerospace applications. There was a great deal of interest and discussion regarding the metal Additive Manufacturing process and how this can be of use in the aerospace industry.
Industry Promotion Presentations at Advanced Engineering UK 2016, 2-3 November 2016, NEC, Birmingham

The EPMA not only exhibited at the 2-day Advanced Engineering UK 2016 event, but also provided presentations at the event within the presentation programme on powder-based manufacturing processes: Hot Isostatic Pressing and Metal Injection Moulding. The two presentations took place in the Performance Metals Engineering area and allowed visitors to gain a better understanding of the benefits of using these production methods.

Bodycote Hot Isostatic Pressing AB, based in Chesterfield, presented the benefits of using the Hot Isostatic Pressing (HIP) production process, the types of components that can be produced using this process and the advantages over other manufacturing processes.

ITB Precisietechniek, Netherlands, presented the advantages of using the Metal Injection Moulding (MIM) process, the types of parts the process can produce and the cost/design advantages using MIM can create for the customer over other manufacturing avenues.

Exhibiting and having EPMA Members presenting at the 2016 Advanced Engineering Event created an opportunity for follow-up discussions surrounding the different PM processes presented. The 2-day exhibition comprised of 700 exhibitors and attracted 13,500 visitors from a variety of industrial sectors, which made for interesting discussions on a range of applications where PM could be of added value.

Formnext 2016 Places EPMA’s Additive Manufacturing in the Spotlight

EPMA exhibited at the second formnext powered by tct exhibition, 15 – 18 November, Frankfurt. formnext 2016 has become one of the key Additive Manufacturing exhibitions in Europe, and attracted an audience of AM professionals and companies looking into how to realise this technology and innovative process.

Exhibiting at one of Europe’s key AM exhibitions provided EPMA and its members the ability to not only promote the Introduction to Additive Manufacturing Technology brochure to the European mainstream AM sector, but it also helped in promoting the synergies between the AM sector and the PM Industry. During the 4-days of the exhibition over 250 EPMA brochures were handed out to students, designers, engineers and decision makers, which is hoped will not only inform these groups about PM processes, but also turn into business potential for EPMA Members.

The 2016 formnext exhibition area covered over 18,000 sqm, an increase of 33% based on the previous year and the number of exhibiting companies increased to over 300 companies. The increased number of exhibitors translated into an increase in trade visitors, which was over 13,000 during the 4-day event.
### EPMA Financial Statements

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, is registered for UK VAT. 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 below are the accounts for 2016, with those of 2015 for comparison.

#### ACKNOWLEDGEMENTS:
Accounts prepared and audited by Baldwin’s Chartered Accountants, Shrewsbury, UK.

### Income

<table>
<thead>
<tr>
<th></th>
<th>2016 (€)</th>
<th>2015 (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership fees</td>
<td>386,683</td>
<td>389,182</td>
</tr>
<tr>
<td>Publications and promotions</td>
<td>4,734</td>
<td>3,602</td>
</tr>
<tr>
<td>Conferences, seminars and courses</td>
<td>1,701,736</td>
<td>644,986</td>
</tr>
<tr>
<td>Summer School</td>
<td>28,750</td>
<td>31,522</td>
</tr>
<tr>
<td>EU and other projects</td>
<td>107,572</td>
<td>134,797</td>
</tr>
<tr>
<td>Bank Interest Received (gross)</td>
<td>5,042</td>
<td>4,889</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,234,527</strong></td>
<td><strong>1,208,978</strong></td>
</tr>
</tbody>
</table>

### Expenditure

<table>
<thead>
<tr>
<th></th>
<th>2016 (€)</th>
<th>2015 (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries social charges and pensions</td>
<td>483,550</td>
<td>414,143</td>
</tr>
<tr>
<td>Subsistence and travel</td>
<td>40,945</td>
<td>27,002</td>
</tr>
<tr>
<td>Conferences, seminars and courses</td>
<td>1,085,740</td>
<td>463,699</td>
</tr>
<tr>
<td>Professional and membership fees</td>
<td>126,004</td>
<td>66,114</td>
</tr>
<tr>
<td>Council and meetings expenses</td>
<td>22,415</td>
<td>12,707</td>
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<tr>
<td>Publication costs</td>
<td>9,783</td>
<td>9,496</td>
</tr>
<tr>
<td>Promotions</td>
<td>34,684</td>
<td>12,971</td>
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<tr>
<td>Printing, stationery, postage and sundries</td>
<td>20,085</td>
<td>15,684</td>
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<tr>
<td>Office overheads</td>
<td>64,065</td>
<td>58,599</td>
</tr>
<tr>
<td>EU and other projects</td>
<td>72,000</td>
<td>103,500</td>
</tr>
<tr>
<td>Summer School</td>
<td>24,945</td>
<td>38,643</td>
</tr>
<tr>
<td>Bank and credit card charges</td>
<td>7,212</td>
<td>6,728</td>
</tr>
<tr>
<td>Taxation on interest received</td>
<td>4,715</td>
<td>1,077</td>
</tr>
<tr>
<td>Realised exchange rate differences</td>
<td>(12,038)</td>
<td>999</td>
</tr>
<tr>
<td>Depreciation</td>
<td>9,440</td>
<td>10,303</td>
</tr>
<tr>
<td>Profits/losses on disp of tangibles</td>
<td>-</td>
<td>315</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,993,545</strong></td>
<td><strong>1,241,980</strong></td>
</tr>
</tbody>
</table>

**Surplus of income over expenditure**  
240,982  

Expenses relating to 2016/2017/2018  
-  

Unrealised exchange rate differences in respect of opening and closing bank balances denoted in GBP  
77,770  

**Net Surplus of income over expenditure/ (expenditure over income)**  
163,212  

(71,910)
### Balance Sheets

**AS AT 31 DECEMBER 2016**

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOTES</strong></td>
<td>€</td>
<td>€</td>
</tr>
<tr>
<td><strong>FIXED ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>1</td>
<td>28,567</td>
</tr>
<tr>
<td><strong>CURRENT ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade debtors</td>
<td>2</td>
<td>425,708</td>
</tr>
<tr>
<td>Other debtors</td>
<td></td>
<td>141,867</td>
</tr>
<tr>
<td>Bank accounts</td>
<td></td>
<td>1,024,477</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1,592,052</strong></td>
</tr>
<tr>
<td><strong>CURRENT LIABILITIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creditors</td>
<td>3</td>
<td>600,951</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>991,101</strong></td>
</tr>
<tr>
<td><strong>NET CURRENT ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1,019,668</strong></td>
</tr>
<tr>
<td><strong>TOTAL CURRENT ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LESS CURRENT LIABILITIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1,019,668</strong></td>
</tr>
<tr>
<td><strong>REPRESENTED BY:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accumulated fund at 1st January 2016</td>
<td></td>
<td>856,456</td>
</tr>
<tr>
<td>Less: Surplus of expenditure over income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add: Surplus of income over expenditure</td>
<td></td>
<td>163,212</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1,019,668</strong></td>
</tr>
</tbody>
</table>
1. **FIXED ASSETS**

<table>
<thead>
<tr>
<th>Description</th>
<th>2016 (€)</th>
<th>2015 (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment brought forward</td>
<td>31,154</td>
<td>21,440</td>
</tr>
<tr>
<td>Additions during the year</td>
<td>6,853</td>
<td>20,962</td>
</tr>
<tr>
<td>Disposals during the year</td>
<td>-</td>
<td>(945)</td>
</tr>
<tr>
<td><strong>Less: depreciation @ 25%</strong></td>
<td>38,007</td>
<td>41,457</td>
</tr>
<tr>
<td></td>
<td>9,440</td>
<td>10,303</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>28,567</td>
<td>31,154</td>
</tr>
</tbody>
</table>

2. **DEBTORS**

<table>
<thead>
<tr>
<th>Description</th>
<th>2016 (€)</th>
<th>2015 (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade debtors</td>
<td>425,708</td>
<td>309,937</td>
</tr>
<tr>
<td>Other debtors</td>
<td>147,867</td>
<td>86,038</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>573,575</td>
<td>395,975</td>
</tr>
</tbody>
</table>

3. **CREDITORS: amounts falling due within one year**

<table>
<thead>
<tr>
<th>Description</th>
<th>2016 (€)</th>
<th>2015 (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase ledger balances</td>
<td>36,149</td>
<td>97,271</td>
</tr>
<tr>
<td>Trade creditors</td>
<td>406,904</td>
<td>371,737</td>
</tr>
<tr>
<td>PAYE owed to inland revenue</td>
<td>30,912</td>
<td>13,606</td>
</tr>
<tr>
<td>Taxation</td>
<td>834</td>
<td>3,673</td>
</tr>
<tr>
<td>Professional fees</td>
<td>5,274</td>
<td>12,218</td>
</tr>
<tr>
<td>Other sundry creditors</td>
<td>5,058</td>
<td>5,058</td>
</tr>
<tr>
<td>EU and other projects</td>
<td>115,820</td>
<td>108,512</td>
</tr>
<tr>
<td>VAT</td>
<td>-</td>
<td>1,846</td>
</tr>
</tbody>
</table>

4. **EXCHANGE RATES**

The figures in the Income and Expenditure accounts have been converted at the actual rate of exchange for each month. The Balance Sheet figures have been converted at the closing rate of exchange as at 31st December 2016, which was £1 to €1.171969 (2015: £1 to €1.358610) and differences arising are shown in the Income and Expenditure account as ‘exchange rate differences’.

The unrealised exchange rate differences in relation to the conversion of the bank balance denominated in GB pounds is disclosed separately.
Your guide to EPMA Seminars, Events & Training 2017

Additive Manufacturing Seminar
18 - 19 May 2017 | Coventry, UK
Application Deadline: 18 April 2017

Metal Injection Moulding Seminar
1 - 2 June 2017 | Ludwigshafen, Germany
Application Deadline: 4 May 2017

EPMA Powder Metallurgy Summer School
19 - 23 June 2017 | Grenoble, France
Application Deadline: 19 April 2017

PM for Non-PM Specialists Seminar
27 - 29 June 2017 | Radevormwald, Germany
Application Deadline: 24 May 2017

Find out more and apply online today at: www.epma.com/seminars

Euro PM2017 will be an all-topic powder metallurgy event covering:

- Additive Manufacturing
- Core PM
- Hard Materials and Diamond Tools
- Hot Isostatic Pressing
- New Materials and Applications
- Powder Injection Moulding
- PM Structural Parts

www.europm2017.com