INSIDE THIS ISSUE:

Page 2 — Tony Francis FIMMM Chair of the MP&EM Board provides feedback on the activities of the division

Page 3 — What has happened to IMMa? and news of Professor Vasant Kumar

Page 4 — Frances Perry Reports on the Library and Information Services

Page 5 — Details of papers included in the latest editions of the Mineral Processing and Extractive Metallurgy, IMM Transactions C

Page 6 — One day conference: The Iron Cycle—150 years of extracting, processing & recycling the material that built the modern world

Page 7 — More about the conference including MPEM participation

Page 8 — SGA Conference in Glasgow 27-30 August:
“The changing face of metal extraction - geology, biology and geometallurgy”

Page 9 — Extract from the MP&EM, Board annual report for 2018

Page 10—News of Members and Fellows

Page 11— The Editor would like to hear from you; where in the world are you?

*MP&EM is a technical division of the Institute of Materials, Minerals and Mining, Registered Charity No 269275, 297 Euston Road, London NW1 3AD  www.iom3.org*
MP&EM Board Activities Summary, February 2019

- The Camborne School of Mines, Exeter University MSc course in Minerals Engineering serving our Industry is underway with the first students, refer to - http://www.uec.ac.uk/csm/postgraduate-study/minerals-engineering/index.htm

- 2019 is the 150 year anniversary of the founding of IOM3 through the Iron & Steel Institute. The MP&EM Division is contributing, with the other Extractive Divisions, to a one day event at 297ER on March 20 next year, “The Iron Cycle - 150 years of extracting, processing & recycling the material that built the modern world”. The programme has been drawn up and provides a very impressive list of distinguished speakers. The Conference website is The Iron Cycle - registration is open for this exciting event, refer to page 6.

- Your Board is also contributing to the SGA Conference to be held in Glasgow on 27 – 30 August 2019 refer to - https://www.sga2019glasgow.com

- The Board is in the early stages of organising “Future Prospects in Minerals & Metals” at Trinity Hall, Cambridge in 2020.

- The International Extractive Industry database “OneMine” is live and available as part of your membership benefits, this complements IMMAGE.

- Please check your member profile at www.iom3.org/user to make sure that you have the correct preference selected for your technical division. IMMa is no longer available as a preferred technical division, being an umbrella body for the four resources divisions. All members selecting one of the four resources divisions as their preferred technical community automatically become members of IMMa.

- The first Board meeting of 2019 was convened at 297 ER on 31 January.

- The technical journal representing our discipline is IMM, Transactions C published by Taylor & Francis Group is free to download for members. The journal publishes high quality refereed papers at the leading edge of MP&EM, MP&EM Trans C

- The MP&EM annual report for 2018 is available to all IOM3 members from the website.

- The CPD facility on the IOM3 web site is available for members.
What is happening at IMMa?
The International Mining & Minerals association, IMMa, is an association that embraces the four IOM3 resource technical divisions: **Applied Earth Science**, **Mineral Processing & Extractive Metallurgy**, **Mining Technology** and **Oil & Gas**. It encompasses all the interests that resided in the former Institution of Mining and Metallurgy (IMM), which merged with the Institute of Materials in 2002 to form IOM3.

IMMa has not convened for the past year since the last meeting in January 2018 because none of the resource division boards met on the same day as had occurred previously.

This period coincided with the recently concluded review of the structure of the technical divisions within the Institute, previously represented by the Industry & Technology Policy Board, ITPB, which has morphed into the Technology Communities Board, TCB.

The TCB will be representing the technical divisions through 6 cross-cutting Strategic Advisers, SAs as well as a Chair and Vice-Chair. At this stage it is not known whom will be the Resource Divisions SA(s).

In the meantime Professor Patrick Foster, Chair of IMMa, who is also a member of the Mining Technology Division, MTD, will be preparing a strategic paper outlining the way forward for IMMa. This will then be discussed between the 4 Resource Division Chairs.

News on Board member Professor R Vasant Kumar

A Personal Chair in Materials Chemistry has recently been created for Professor R Vasant Kumar in the Department of Materials Science & Metallurgy at the University of Cambridge. Vasant is the Head of the Materials Chemistry Group and a Fellow of Trinity Hall, University of Cambridge, and a Fellow of the IOM3. He has published over 300 papers, 17 patents, 4 Chapters in Handbooks and edited the book, High energy density Li batteries, Wiley-VCH 2010, also translated into Chinese. He has supervised over 40 PhD students, 35 post-doctoral researchers, 20 visiting students and hosted 15 visiting professors. He is Honorary/Guest Professor at three Universities in China. Vasant has received an Honorary Engineering Degree from the University of Malaysia (2011), the Kroll Medal from IOM3 for translating research into industrial applications (2014). He is the Editor-in-Chief of IOM3 journal, “Mineral Processing & Extractive Metallurgy” from 2004 and a Board Member of the IOM3 Technical Division. Many of his research projects have led to licenses and industrial practices and he has founded four start-up companies in order to commercialise some of his inventions. I think you will agree this is pretty impressive and he also finds time to attend and contribute to Board activities. **Tony Francis MP&EM Chair.**
Frances Perry Reports on the Library and Information Services of the Institute

We are continuing to provide IMMAGE, IMM Abstracts, photocopies and library searches with two or three interesting incursions recently into the old card catalogues and pre-war microfiche subject index. The oldest journals have also been providing data for the Mining Technology Division’s contribution to the IOM3 150\textsuperscript{th} anniversary year, publishing a booklet on a century and a half of mining inventions and inventors. We were lacking technical detail about the techniques actually introduced by Coulson, the master shaft-sinker but happily one of the earliest North of England Institute of Mining and Mechanical Engineers’ volumes from 1861-62 contained a paper co-authored by him that gave good insight into his methods and innovations, together with an 1850s paper by Nicholas Wood on shaft sinking through the Magnesian Limestone.

We continued to digitise our publications for OneMine and the IOM3 virtual library and have been slowly continuing with the preparation side and finalising the software so that the site will be ready to go live by the 150\textsuperscript{th} anniversary date of 25 February. The new CEO, Colin Church, has asked us to monitor usage so that the level of resources for continuing the project can be re-assessed so please get in the routine as soon as the site is live, of checking regularly for relevant and interesting material and spread the word to others. We’ve been identifying scanned documents relevant to particular activities scheduled for 2019 so that publicity can be suitably targeted, but it needs members to follow them up by going online and becoming familiar with this powerful new resource and all it has to offer.

The procedure for transferring scanned papers to OneMine is now established, the first few hundred (some 150-year-old ones from \textit{Journal of the Iron & Steel Institute} and the first of the 1990s ones from \textit{Trans. IMM}) have now been added to OneMine. It is a laborious process so it will be worth checking the IOM3 site as well as OneMine. We plan to have 1,500 documents on the site when it first goes live and a good third will be the IMM papers and another third the old iron and steel literature.

**Contents:**

This is a themed issue focusing on ‘converters in metals processing’ guest edited by Seshadri Seetharaman,

- Historical overview on the development of converter steelmaking from Bessemer to modern practices and future outlook. Lauri Holappa
- BOF process dynamics. Ghosh Snigdha, Ballal N. Bharath and Nurni N Viswanathan
- History and latest trends in converter practice for steelmaking in Japan. Shin-ya Kitamura, Ken-ichiro Naito and Goro Okuyama
- Converter practice in China with respect to steelmaking and ferroalloys. Xinhua Wang and Haijuan Wang
- Matte converting in copper smelting. Pekka Taskinen, Guven Akdogan, Ilkka Kojo, Markku Lahtinen and Ari Jokilaakso
- Modelling of liquid phases and metal distributions in copper converters: transferring process fundamentals to plant practice. E. Jak, T. Hidayat, D. Shishin, P. J. Mackay and P. C. Hayes
- Copper smelting and converting: past and present Chilean developments. Manuel Devia, Roberto Parra, Claudio Queirolo, Mario Sánchez and Igor Wilkomirski
- The practice of copper matte converting in China. Zhihong Liu and Longgong Xia
- The Ni-converter – an historic perspective. Peter Rozelle, Seetharaman Sridar, Paul B. Queneau and Shane Thompson
- Converter processing of platinum group metals. Lloyd R. Nelson, Gregoray A. Georgalli, Keith L. Hines and Rodney J. Hundermark

This journal is available free to IOM3 members through the website and the contents are particularly relevant in this the 150th year of the founding of the Iron & Steel Society and hence the IOM3. Visit www.iom3.org/journal-access
150 years of extracting, processing & recycling the material that built the modern world

The Institute of Materials, Minerals and Mining is celebrating the 150 year anniversary of its foundation through the Iron and Steel Institute in 1869. These events and activities are being described and updated through the Institute's web site and in Materials World.

The Iron & Steel Society (I&SS) is leading the celebrations and a very full and fascinating series of events are planned which are being co-ordinated by the Institute.

The Extractive divisions are contributing to the anniversary which includes arranging this one-day Conference – “The Iron Cycle – Fe 150” which will be held at the Institute’s London HQ, 297 Euston Road on 20 March. The theme is “150 years of extracting, processing & recycling the material that built the modern world.” The programme and how to register are included in the Conference web site for this exciting event The Iron Cycle - Fe 150.

Iron and steel were the foundation of the Industrial Revolution with one of the major pathfinders being Sir Henry Bessemer and the process he invented for the mass production of steel in 1856 which remained the dominant technology for the next century. This enabled the development of steam power for industrialisation. From the nineteenth century to the present day, the mechanical properties of iron and steel have been continuously studied and the importance of alloying elements and heat treatments have been appreciated by metallurgists and materials scientists. The tools to aid this understanding developed congruently from visual examination with the naked eye to the nano-scale investigating equipment used today. Steel and its alloys remain a major component in modern life embracing, transportation, machine tools for industry, buildings, the military, agriculture and on and off-shore oil rigs providing petrochemicals.

The industrial revolution resulted in a colossal demand for iron ore. Initially the iron ore mines of the UK, such as those in Northamptonshire, met demand but domestic production was never going to be enough and this need was, and is, met by exploration geologists travelling the world to discover deposits some of which would become producing mines. This aspect of the iron cycle will be covered in the Conference by the Applied Earth Science division of the Institute. The board is chaired by Julian Aldridge.

The extractive disciplines work together throughout the development of a mining project and not in isolation, indeed this collaboration is essential for a successful outcome of any project. Many techniques are utilised in mine project evaluation including resource and mine modelling software, geometallurgy, engineering design, financial appraisal and project control methods.

Deposits then have to be mined which require developing the mine plan, deciding on the mine type, underground or open pit, the mining method, the scale of operation, specifying the equipment and the operating practice. It is becoming common in today’s world that economics are not the main deciding factor but that restrictions on obtaining permits and the right to mine can be over-riding considerations which include the social engagement of affected communities, protection of the environment and maximising the use of local resources. The presentations from the Mining Technology Division, the board of which is chaired by Christine Blackmore will be expounding on these matters.
Once the deposit has been discovered and mined the ore then has to be processed. Iron ore mines are usually very high tonnage operations treating millions of tonnes of material per day. This requires moving thousands of tonnes of material per hour from the mine and through the process plant. The minerals processing unit operations in iron ore plants are based on 2 main properties of iron ore, its relatively high specific gravity compared to the waste material and magnetism. This has led to the development of separation methods such as hydro-cyclones, Dense Media Separators, high and low intensity magnetic devices. The massive rock from the mine has first to be reduced in size by comminution, basically crushing and grinding. The upgraded product from the minerals processing plant may then have to be dried and pelletised before being shipped to the blast furnace and steel production works for thermal and mechanical treatment to the finished products such as rebar, billets and strip. Clearly the method of alloying and heat treatment are defined by the required properties of the various products in terms of mechanical strength, corrosion resistance and specific application frequently specified by the metallurgists and materials engineers. The three talks in the Conference in the Minerals Processing and Extractive Metallurgy of iron ore will be expanding on this theme and the divisional board is chaired by Tony Francis.

The Oil and Gas Division of IOM3 chaired by Andrew Sturgeon, is the fourth division of the extractive group. This division represents those engineers who are dedicated to providing the world with oil and gas. This division has provided three speakers who have focussed on the use of steel in the onshore and off-shore structures required to extract the oil and gas from the planet and the environmentally responsible reclamation and recycling following the depletion of the respective field reserves.

The finished production and use of the steel products on which all of us rely will be described by the I&SS, chaired by Martin Brunnock who are providing four talks including introducing and closing the Conference as the event is a celebration of 150 years of IOM3. The sustainability and efficient use of steel will be detailed in the talk by Louise Brimacombe, Chair of the Sustainable Development Group of the Institute.

Dr Graham Couchman, CEO of the Steel Construction Institute will be presenting and describing the present status of steel in construction in today’s society.

Dr Jeremy Ramsden, Research & Technology Director Henge Precision Materials, will be giving a presentation focussed on the tremendous role of iron in the living world.

By the very nature and versatility of steel there will be much overlap in the presentations and the conference will provide a great forum for increasing attendees’ knowledge of the discovery, extraction, application and recycling of iron and steel in the modern era and on life itself, in fact the entire iron cycle.

The Conference is intended to be a tribute to the material that built the modern world.

Full details of the programme and registration are available from the IOM3 website:

https://www.iom3online.org/fe150
15th Biennial Meeting of the Society for Geology Applied to Mineral Deposits
27 - 30 August, 2019
One of the biggest international mineral deposit conferences with +/- 500 attendees

The Session of direct interest to Minerals Processors and Extractive Metallurgists is: **The changing face of metal extraction - geology, biology and geometallurgy**

Convened by MP&EM Board members: Gawen Jenkin, Chris Broadbent and Chris Bryan & Shaun Graham

**Abstract Deadline: 11 March**

There is a growing trend that smaller deposits, lower grades, more complex ore mineralogies and a wider range of elements are being targeted at the same time that environmental concerns as to water and energy usage and environmental contamination are coming to the fore.

This session seeks to bring ore geochemists, mineralogists and geologists together with ore metallurgists to explore new developments in metal extraction and ore metallurgy that will impact on the economics and environmental footprint of a deposit.

We welcome contributions that address new approaches including solvometallurgy (the extraction of metals using non-aqueous solutions), bio-processing and geometallurgical characterisation of ore deposits, as well as developments in ore mineralogy and metallurgy.

**Other sessions:**
- Co-evolution of life and ore deposits
- Mineral resources for green growth
- Advances in understanding hydrothermal processes
- New techniques for ore discovery
- New discoveries – new views - Advances in the science of mineral exploration.
- Magmatic-hydrothermal systems: from Porphyry to Epithermal
- Magmatic sulfide and oxide systems
- Gold - from orogenesis to alluvial
- Economics of ore deposits
- Sustainable development of ore deposits
- Supergenes, gems and non-metallic ores
MINERALS PROCESSING & EXTRACTIVE METALLURGY, MP&EM, BOARD ANNUAL REPORT FOR 2018


1. Board membership
In 2018 the Board welcomed Dr Chris Broadbent of Wardell-Armstrong, Dr Arun Vathavooran of Tetra Tech Mining & Minerals, Dan Goodman of Jacobs and Frances Perry from IOM3 Library & Information Services. Dr Michael Butler left the Board during the year and the Division thanks him for his long service and valued contributions.

There are 12 directors serving on the MP&EM Board, all members of IOM3. They are:

- Tony Francis (TF), Chairman – Independent Consultant, FMC Ltd
- Professor Hylke Glass (HG), Vice Chairman – CSM, Exeter University
- Mike Cave (MC) – Independent Consultant, Mike Cave Pyro Ltd
- Professor Gawen Jenkins – Leicester University
- Professor R Vasant Kumar (VK) – University of Cambridge
- David Meadows (DM) - Global Manager of Metallurgy, Mining & Metals, Bechtel
- Professor John Monhemius (JM) – Director, Anglo Asian Mining Plc
- Professor Stephen Neethling (SN) – RSM, Imperial College
- Dr Chris Broadbent, Director of R & D, Mining & Metallurgy, Wardell-Armstrong.
- Dr Arun Vathavooran, Consulting Metallurgist, Tetra Tech,
- Dan Goodman, Process Engineer, Jacobs
- Frances Perry, Library & Information Services, IOM3.

2. Board meetings
Four Board meetings were held during 2017 all at the London offices of IOM3, 297 Euston Road. The meeting of 19 April was attended by 8 members of the Board. The third meeting on 31 May was attended by 6 Board members. The final Board meeting of the year was convened on September 27 and had 9 Board members in attendance.

3.1 Technical programme in 2018
The MP&EM Division in combination with the Conference section of IOM3 organised the Geometallurgy2018 Conference which was successfully convened at the London base of the Institute over 19 - 20 April.

The Conference was attended by 60 delegates from 10 countries. 23 presentations of great quality were given by distinguished experts in Geometallurgy and the related disciplines. Details of the event including the programme can be found on the Conference website. Selected presentations are available to registered delegates via a dedicated portal on the IOM3 website.

The MP&EM division supported the EU funded FAME, Flexible & Mobile Processing in the 21st Century closure Conference held at 297 Euston Road from 5 – 6 December 2018. This was a very successful and well attended event, chaired by Board member Dr Chris Broadbent.

The Board is planning 2 events in 2019. The Iron Cycle – Fe150, one day Conference scheduled for 20 March at 297ER. This is part of the Resource Divisions contribution to the IOM3 150 year anniversary celebrations in 2019. The event website is - The Iron Cycle - Fe150

The Board will also be contributing to the SGA, Society for Geology Applied to Mineral Deposits, biennial conference from 27-30 August 2019 in Glasgow. Professor Gawen Jenkin is coordinating the Board’s input to this event, web site - https://www.sga2019glasgow.com/.
News of MPEM Members and Fellows

**David Meadows, FIMMM, becomes a Bechtel Fellow.**

David Meadows has had a global career in the Mining Industry that covers six continents. In the past twenty years a large part of his focus has been on copper and gold processing in the Americas. He has participated from the early stages of geometallurgical planning all the way through to final plant commissioning and optimization. In the past three years David has continued his technical contributions to the Las Bambas 140 kt/d copper-molybdenum concentrator optimization in Peru. He is currently working on a joint paper with MMG on the Las Bambas Concentrator startup that will be presented at the SAG 2019 Conference in Vancouver. He also participated as one of the Chapter authors in the new edition of the SME Mineral Processing Handbook released in February 2019. He was selected to become a Bechtel Fellow in late 2018. There are only twenty Bechtel Fellows in the organization employing approximately fifty thousand located across the globe. The Fellows are carefully chosen for their substantial technical achievement to their respective industries over the years. The Bechtel Fellows advise senior management on questions related to their areas of expertise, participate in strategic planning, and help disseminate new technical ideas and findings throughout the company.

David gave a Keynote talk at Geometallurgy 2018. He is an MP&EM Board member and continues to contribute to our activities and present at our conferences.

Even Bechtel Fellows let their hair down occasionally: David with a member of Iron Maiden - specialising in Heavy Metals?

The Editor on the Grumpy Stool in Auckland’s Botanic Gardens, thinking up an excuse for missing the MPEM Board!

Please send in your news for the next edition (after the MPEM Board on 30 May 2019).

Doesn’t have to be work related, news of your travels would be great whether Morocco, Peru, England or Madagascar.
We would like to hear from you!

We’re always interested in hearing from our members! If you would like to share a story, publish an article or just provide some feedback on the newsletter, please get in touch! All enquiries can be sent to our editor:

Mike Cave
Email: mikecavepyro@gmail.com

How do I join?

Individual membership of the MP&EM Division is achieved by joining the Institute of Materials, Minerals and Mining. You can join IOM3 online at www.iom3.org/join to get immediate access to member benefits, or you can complete our printed membership application form. For details of membership grades and professional qualifications visit: www.iom3.org/membership

Company membership: More information about Industry Affiliate membership and an application form are available at: www.iom3.org/ias