



# Powder Metallurgy Association Of India

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*Editorial*

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## In this Issue

- PM-15- Announcement
- PM Industry News from Abroad
- PM Industry News from India
- PMAI Workshop on Tooling
- PMSC - 14
- PMAI Library & Book Store

PM-15, International Conference & Exhibition, will be held at I.I.T., Bombay is an opportunity to experience the International trends and developments in Powder Metallurgy & Particulate Materials. Tool design and tooling is a critical operation in the PM parts production and hence PMAI is organizing a two day workshop on Tooling for PM, in November 2014 at Bangalore. PMSC-14, will be held at Gandhinagar concurrently with the Intl. Conference on Engineering Materials & Processes organized by ASM International India chapter in December 2014.

During PM 2014 World Congress in Orlando, the MPIF award winning products of PM design excellence have shown that PM fabricators are not only expanding into new applications but also extending the existing applications. The Indian MIM Company has earned 3 prizes, the Grand award as well as the award of distinction in automotive and the award of distinction in the hardware/appliances category.

Transactions PMAI, Vol.39, 2013 is being published and is available for distribution.

P. Ramakrishnan



# PM 15

## ANNOUNCEMENT & CALL FOR PAPERS

INTERNATIONAL CONFERENCE ON POWDER METALLURGY & PARTICULATE MATERIALS + EXHIBITION and 41st ANNUAL TECHNICAL MEETING OF PMAI

Venue

Victor Menezes Convention Centre (VMCC)  
Inside Indian Institute of Technology (Bombay)  
Mumbai - 400 076, India

**Mon. 19th to Wed. 21st January 2015**

### Technical Sessions

Modeling of PM parts & processes	Materials for aerospace and defence applications
Materials & alloy development	Testing & evaluation of PM parts
Powder production & characterisation	Health, safety & environment
Compaction & other forming processes	Materials for alternative energy generation
Compaction equipment	Advanced processing equipment
Sintering & sintering equipment	Medical applications
Hard metals	PIM (MIM & CIM) technology
Diamond tools	Laser sintering, cladding and coating
Refractory metals	Magnetic materials, SMC & hard magnets
Ceramics & composites	Additive manufacturing

### Awards For Students & Young Professionals

Several amazing awards are being offered during PM15 including fully paid attendance at a PM Conference outside India and several generous grants. Details at [www.in/pm15](http://www.in/pm15)

### Call for papers

Extended abstracts of papers for oral presentation as well as posters (1000 words, max. 2 figures) may be submitted electronically at [www.pmai.in/pm15](http://www.pmai.in/pm15) before the deadline. All accepted abstracts from registered delegates will be published in the conference guide and distributed to all delegates.

### Deadlines

Submission of abstracts for oral & poster presentations	30 Oct, 2014
Acceptance of abstracts	15 Nov, 2014
Application for best PM product award	31 Dec, 2014
Submission of the complete paper*	31 Dec, 2014

### PMAI Best Product Awards

These awards are given for the best PM product (raw materials, equipments, processes & PM parts) developed in India which is in commercial production.

Exhibition (open to public)

Sponsorship and Advertisement Opportunities

Advertising in the Conference Guide

For question on abstract, papers, posters & awards please contact:  
[conadmin@pmai.in](mailto:conadmin@pmai.in)

HELP LINE: (10.00 to 20.00 Hours-Indian Standard Time)  
+ 91 98209 51180, + 91 99401 18524  
Email: [conadmin@pmai.in](mailto:conadmin@pmai.in)

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## PM Industry News from Abroad

### World Congress in Orlando.

### Winners in MPIF's 2014 Powder Metallurgy Design Excellence Awards.

### Grand Prize Awards



**Indo-US MIM Tec Pvt. Ltd.**, Bangalore, India, earned the Grand Prize in the Automotive—Engine Category for four MIM parts—blank discharge check, stop discharge check valve, valve discharge check, and CRV spring seat—that go into a device that controls fuel flow in Gasoline Direct Injection (GDI) pumps, made for **Stanadyne Corporation**.

**Keystone Powdered Metal Co.**, St. Marys, Pennsylvania, was awarded a Grand Prize in the Automotive—Transmission Category for a planetary carrier assembly made for its customer **Ford Motor Company**.

**Capstan**, Wrentham, Massachusetts, received the Grand Prize in the Lawn & Garden/Off-Highway Category for copper-steel parts, used in a disengagement mechanism in an intuitive differential snow blower system, made for **General Transmission**.

**FloMet LLC, an ARCMIM Company**, DeLand, Florida, earned the Grand Prize in the Medical/Dental Category for two 5 mm tines—one fixed, one moving—that go into a thermal tissue fusion and dissection system made by its customer **ConMed**.

The final Grand Prize, in the Electronic/Electrical Components Category, was for a three-piece assembly for high-end sound-isolating earphones made by **FloMet LLC, an ARCMIM Company**, DeLand, Florida, for **Shure Incorporated**.

### Awards of Distinction



**Cloyes Gear & Products, Inc.**, Paris, Arkansas, won the Award of Distinction in the Automotive—Transmission Category for a ball ramp actuator comprising a sector gear and fixed ring that goes into BMW X-drive transfer cases, made for **Magna Powertrain**.

**Indo-US MIM Tec Pvt. Ltd.**, Bangalore, India, won the Award of Distinction in the Automotive—Chassis Category for a spur gear used in a rear-door assembly for SUVs made for **Magna Closures**, Canada.

**Lovejoy Powder Metal Group**, Downers Grove, Illinois, earned the Award of Distinction in the Lawn & Garden/Off-Highway Category for a parking/emergency brake piston for hydraulic transmissions used in zero-turn-radius lawn-maintenance equipment.

**Indo-US MIM Tec Pvt. Ltd.**, Bangalore, India, received the Award of Distinction in the Hardware/Appliances Category for three parts—output shaft, lever, and cover—that are assembled into the quick-change mechanism of a Dremel multitool.

A sinter-hardened steel retainer weight used in a motorcycle transmission and made by **Hitachi Chemical Co., Ltd.**, Chiba, Japan, won an Award of Distinction in the Hand Tools/Recreation Category.

Advanced Forming Technology, an ARCMIM Company, Longmont, Colorado, earned an Award of Distinction in the Hand Tools/ Recreation Category for a lock hood for a muzzleloading rifle made for its customer **Smith and Wesson**.

Another Award of Distinction in the Hand Tools/ Recreation Category was given to **MPP Ridgway**, Ridgway, Pennsylvania, for a bathtub drain tool made for **ezXtractor**.

**Smith Metal Products**, Center City, Minnesota, won an Award of Distinction in the Medical/Dental Category for a MIM 17-4 PH stainless steel shaft assembly used in a novel surgical instrument for passing suture through difficult-to-reach tissue.

The final Award of Distinction, also in the Medical/Dental Category, was given to **Indo-US MIM Tec Pvt. Ltd.**, Bangalore, India for a sound tube used in a hearing aid made by its customer **Phonak**, Germany.

## PM Industry News from India

**Meeturaj Group** Established in 1976, is in business in field of Sewing Machinery, Plating Chemicals for last decade. Meeturaj Industries wishes to move forward by diversifying in manufacturing metal, components using MIM technology. A best process widely accepted by engineering world as green technology.

**Meeturaj Industries** has set up the MIM plant in Rajkot, Gujarat manufacturing wide range of products.

### Range of Products by Meeturaj Industries

Medical and orthodontic applications

Automotive components

IT, electronics and telecommunication

Domestic appliances

Aerospace industry

Power tools

Military applications

Watch cases (steel, tungsten)

Mobile parts

Electrical connectors

Textile parts





## PMAI Workshop on Tooling

### TOOLING FOR POWDER METALLURGY

A 2 DAY WORKSHOP ON THE DESIGN & MANUFACTURE OF TOOLING USED FOR POWDER METAL (SINTERED) AUTOMOBILE (& OTHER) PARTS.

Jointly Organised by



### COURSE CONTENT

- Product and Tool design / Tool manufacturing fundamentals for PM axial compaction
- Product material study for Behavioral pattern during compaction, sintering, sizing, HT
- Process sequence for Tool Design calculation
- Press section process for Compaction and Sizing if required
- Press layout design Process
- Detailing of tool drawing
- Tool material selection and section of HT process
- Process sequence for Tool manufacturing
- Tool Process drawing design process
- Equipment Selection For tool manufacturing
- Different type of Process for tool manufacturing e.g - turning, milling, surface grinding, wire cut, spark etc
- Assembly techniques for PM tools
- Polishing techniques for PM Tools
- Inspection Process for PM tools
- Tool life Improvement techniques
- Tool preventive maintenance and storage system

**DATE:** FRIDAY 14<sup>TH</sup> & SATURDAY 15<sup>TH</sup> NOVEMBER 2014

### VENUE

**NETTUR TECHNICAL TRAINING FOUNDATION**  
NTTF ELECTRONICS AND IT TRAINING CENTRE,  
NO. 40, ELECTRONICS CITY, PHASE -1,  
HOSUR ROAD, BANGALORE - 560 100

### Registration fees

DELEGATE TYPE	AMOUNT PAYABLE PER HEAD	
	BEFORE 1 <sup>ST</sup> NOV. 2014 Rs.	AT THE GATE Rs.
PMAI Patron Corporate Member	9,000.00	10,000.00
Non Member	11,000.00	12,000.00
Student	6,000.00	7,000.00

Add 12.36% service tax on Total (\*\*)

## PMSC 14

### SHORT TERM COURSE ON PARTICULATE MATERIALS

PMAI is organizing a short term course on Particulate Materials in Helepad Exhibition Centre, Near Mahatma Mandir, Gandhinagar, Gujarat from 4th to 6th December 2014, concurrently with the International Conference on Emerging Materials & Processes / International Conference on Advanced Heat Processing MET-14 + Heat Treat Show 2014 organized by ASM International India Chapter. The course will cover various aspects of powder metallurgy. Eminent speakers from industries, academic institutions and R&D organizations will deliver lectures and will take part in questions / answers sessions

- Overview of Powder Metallurgy (PM) and Particulate Materials Technology
- Introduction to Technical Ceramics
- Powder Production Methods for PM
- Ceramic Powder Manufacture
- Powder Characterization: manufacturing process, methods of evaluation, interpretation and their significance.
- Consolidation of Powders - 1: Cold Compaction
- Consolidation of Powders - 2: Sintering Fundamentals
- Consolidation of Powders - 3: Sintering Equipment
- Powder Injection Molding (PIM)
- Cold, Hot and Hot Isostatic Pressing
- High Density, High Performance PM Materials Processing
- Shape Forming Technologies for Ceramics and Composites
- PM Secondary Operations
- Maintaining Quality in PM Manufacture
- Applications - 1: PM Porous Materials
- Applications - 2: Powder Metallurgy Tools
- Applications - 3: PM in Nuclear Engineering
- Applications - 4: PM in non-conventional Energy Generation
- Applications - 5: Friction Materials and Composites
- Applications - 6: PM Bio-Materials
- Applications - 7: PM in Defense & Aerospace Applications

The registration fees does not cover the accommodation and transport cost, but participants will be rendered the necessary help in obtaining their suitable choice of accommodation at discounted rates. Similarly, free transport arrangements (pickup and drop) will also be made available from selected locations.

Details will be available on website : [www.pmai.in](http://www.pmai.in)

### Registration fees

Participant Type	Amount Payable per individual (INR)*	
	Before 15.11.2014	After 15.11.2014
PMAI Patron Corporate Member	9,000.00	10,000.00
PMAI Life Member	11,500.00	13,000.00
Non Member	12,500.00	14,000.00
Student	4,000.00	5,000.00

Add 12.36% service tax on Total (\*\*)

## Library & Book Store of PMAI

Powder Metallurgy Association has set up a Library and Book store for the use of members and enterpreuners at it's office at Hirandani Complex Powai Mumbai. Readers may refer the books and periodical s at a nominal charge of Rs.100 per visit. Xeroxing facilities are also available.

### Books

Who'S Who in Particulate Materials in India (PMAI Directory)	Dr T.R Rama Mohan
Powder Metallurgy for Automotive and High Performance Materials in Engineering Industries	P Ramakrishnan
Powder Metallurgy in Automotive Applications -II	T.R. Rama Mohan , P Ramakrishnan
Powder Metallurgy processing for Automotive , Electrical, Electronic and Engineering Industry	P Ramakrishnan
Powder Metallurgy for Automotive and Engineering Industries	Ramakrishnan
Powder Metallurgy for Automotive , Aluminium Alloys Hard and Super Hard Materials	P Ramakrishnan
Powder Metallurgy and Related High Temperature Materials	George L kehil
The Principles of Metallographic Laboratory Practice	I V Savin
General Principles of Powder Metallurgy	MEL M Schwartz
Engineering Application of Ceramic Materials	Enrico Mosca
Powder Metallurgy Criteria for Design and Inspection	Metal Powder Industries Federation
P/M Materials Standard and Specifications	Naval Reserch Board
Naval Materials : Present and Futuristic Trends	P Ramakrishnan
Powder Metallurgy Alloys	P Ramakrishnan
Powder Metallurgy and Related High Temperature Materials	P Ramakrishnan
Metal Ceramic and Composite Powders	V.Vladimirov
Dies Moulds and jigs	E Vleeschdrager
Hardness 10: Diamond History - Diamond Cutting - Trade Powder Metallurgy	John Wulff
Process and Materials of Manufacture	Roy A Lindberg
Modern Developments in Powder Metallurgy Volume 14	Henry H Hausner , Harry W antes ,
Special Materials	Gaylord D Simth
Rapid Solidification Technology Source Book	R.L.Ashbrook
Practical Course in Powder Metallurgy	D Yarrton , M Argyle
Metal Powder	P Ramakrishnan
Progress in Thermal Treatment of Materials	P Ramakrishnan
Handbook for Sintered Components	HOGANAS
Separation of Particles from Air and Gases Volume 1	Akira O gawa
Separation of Particles from Air and Gases Volume 2	Akira Ogawa
The Production of Metal Powder by Atomization	John Keith Beddow
Soft Magnetic Materials	Vacuumschmelze GMBH Hanau
Tin Plate Handbook	W.E.Hoare DSC , FIM
Proceeding of the International Symposium on Energy Related Materials	A.K. Suri
Progress in Thermal Treatment of Materials	P Ramakrishnan
Fundamental Principles of Powder Metallurgy	W.D Jones
Fine Particles Processing Volume 1	P.Somasundaran
Fine Particles Processing Volume 2	P.Somasundaran
Ceramic Engineering & Science Proceedings	John B Watchtman
Advances in Composite Materials	P Ramakrishnan
Materials Science and Engineering Laboratory Ceramics	S.W Freiman , NAS-NRC , NISTIR 4964
Cemented Carbides	DR Paul Schwarzkopf , Dr Richard Kieffer ,
	Dr Werner Leszynski and Dr FritzBenesovsky
Applications of phase Diagrams in Metallurgy and Ceramics	G.C.Carter
Diamond Grinding of Metals	Frank Hughes
Advances in Materials and Processes	P Ramakrishnan
Industrial Chemical Calculation	O.A Hougen , K.M .Watson
Fine Ceramics Synthesis , Properties and Applications	T.R Rama Mohan , DD Sood , V.M Vaidya,
	Ram Prasad
Composites Science and Technology	R.C.Prasad , P Ramakrishnan
Dust Collection and Gas Cleaning	G.Gordon , I Peisakhov
The Commemorative Memorial Volume of Acta Aterologica	Roger E Miles , Ervin E Underwood
Advanced Ceramics	P Ramakrishnan
Recent Advances in Composite Materials	V.K Sricastava , M Singh
Powder Metallurgy in Automotive Applications	P Ramakrishnan
Diamond 1992	P.K.Bachmann, A.T.Collins , M Seal
High Performance Ceramics	B.V.S Subba Rao
Powder Metallurgy for High Performance Application	John J Burke and Volker Wesis
Metals: A History a lesson from Metallurgy for the Non Metallurgist	McIntyre R Louthan
Hot Tinning	C.J Thwaites
Image Analysis Source Book	Professor John Keith Beddow
Tin plate Testing Chemicals and Physical Methods	W.E Hoare , S.C Britton
Powder metallurgy opportunities for engineering industries	P.Ramakrishnan
Metallographic Atlas of Powder Metallurgy	W.J.Huppmann and K Dalal
Tin plate Testing Chemicals and Physical Methods	W.E Hoare , S.C Britton
Lead Free Soldering	B.P Richards , CL Levoguer
Fusible Alloys Containing Tin	Tin Reasearch Institue
Melting Casting and Working of Tin and Tin Rich alloys	Tin Reasearch Institue
TIN-Zinc Alloy Plating	Tin Reasearch Institue
The Properties of Tin Alloys	L.T.Greenfield and PG Forrester
Instruction for Electro-depositing Tin	Tin Reasearch Institue
The Attainment of Reliability in Modern Soldering	C.J Thwaites
Techniques for Electronic Assemblies	
Progress in Composite Materials	P Ramakrishnan,
Assuring reliability in soldered joints with particular reference to mass soldering of printed circuit assemblies	C.J.Thwaites
Zirconia and Zirconia Ceramics	R Stevens
International Survey on the Classification of Advanced Ceramics	Samuel Schneider Jr
Rare Earth Permanent Magnets	I.R. Harris

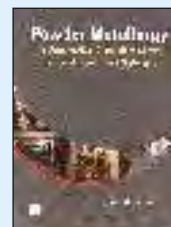
### Periodicals

- 1 Advanced Material & Process
- 2 Advanced Powder Technology
- 3 Bulletins of Materials Science
- 4 Diamond Tooling Journal
- 5 Gear Technology
- 6 Industrial Diamond Review
- 7 International Journal of Powder Metallurgy
- 8 International Journal of Powder Metallurgy & Powder Technology
- 9 Journal of Korean Powder Metallurgy Inst.
- 11 Kona Powder Science and Technology in Japan
- 12 Materials Today
- 13 Metal Powder Report
- 14 Nippon Tungsten Review
- 15 PM International
- 16 Powder Injection Moulding International
- 17 Powder Metallurgy International
- 18 Powder Transmission Engineering
- 19 Powder Metallurgy International
- 20 The International Journal of Powder Metallurgy & Powder Technology
- 21 Transactions of Powder Metallurgy Association of India

### Reports

AVCO continous SIC Fiber Metal Matrix Composite and Ceramic Composite Materials the next Generation of Structural Materials	
Caustic Soda Fusion of Zirconium ores	H.L Gilbert , C.Q Maorrison, A Jones and A.W.Henderson
Electrolytic Polishing	
Encyclopedia of Chemical Technology Fourth Edition	Volume 16
Hoganas Iron and Steel Powders for Powder Metallurgy	
Industrial Heating the Journal of Thermal Technology	
Japan Powder Metallurgy Association 2009 Annual Report	
Japan Powder Metallurgy Association 2011 Annual Report	
Powdered Soft Magnetic Materials for Medium Frequency Application	P Jansson , M Persson , Hoganas
Report Solderability Measurements and Lead Free Alloys	AB , A.G Jack , B .C Mecrow
Zirconium and Hafnium 1989	James B Hedrick and David A Templeton
Zirconium and Hafnium 1991	David A Templeton
Zirconium and Hafnium April 1992	David A Templeton
Notes on Soldering	W.R.Lewis
A Preliminary Report on Growth of Compound layers on Various Metal Bases Plated with Tin and Alloys	D. A Unsworth and CA Mackay

**PMAI has also book store where the books published by PMAI and MPIF in 2013 are available for sale**



### MPIF Books – List available in office

1. MPIF Standards 35
2. Advances in PM Conference Proceedings
3. MPIF General Titles
4. Video and films