I thank you very much for your supports with JPMA activities.

I, Takashi Saito would like to introduce myself who succeeded Mr. Kazunori Arai as Executive Director of JPMA. I do hope you to cooperate with JPMA as before.

In April 2016, JPMA will meet the 60th Anniversary. Since the establishment, the Japanese PM Industries have experienced and overcome various difficulties to extend its scale and technologies.

During late several years, Rehman Shock and East Japan Great Earthquake attacked our PM Industries as well, however they could be getting away from such crises through their steady endeavor, I believe. Also, Japanese government economic promotion policies since the year before last and Yen depreciation have revived tremendously Japanese economy. We think such economic conditions make Japanese PM industries keep steady for the time being.

The PM product volume in Japan 2013 dropped 3.6% than 2012, and this tendency is similar to 2013 automobile production units result in Japan (dropped 3.1%) but the drop down was saved by the government policy and Yen depreciation. Therefore the PM product amount showed only slight drop, but a steady transition. The PM weight per a vehicle turned to decrease due to market tendency for smaller and lighter cars.

As for 2014, the PM products are expected steady, but it could not be optimistic because the consumption tax increase (8% from 5%), the possible economic slowdown of new development countries.

I would like to introduce JPMA main activities in 2013.

- The committee for public relations held human resources development seminar to educate young engineers. At the seminar, a couple of group discussed about value engineering by using actual case study and value engineering method.
- JPMA Development Prize 2013, 11 products were elected by selection committee. The trend of products are in relation to the environment and energy saving.
- JPMA supported APMA congress in Xiamen China held in November 2013. Mr. Isamu Kikuchi, president of APMA made the opening address. Mr. Tetsuo Ito, president of JPMA spoke about PM industries in Japan at PM Forum. At the 5th APMA board of directors meeting, APMA2015 Congress venue was decided held in Kyoto Japan in autumn 2015.

JPMA will cooperate closely with the Japan Society of Powder and Powder Metallurgy, and promote the system to create synergy effects by academic institutes and enterprises to widen PM applications.

Also, We will continue promoting PM industries through strengthen the relationship with PM societies of Asia, Europe and America.

Your further support for JPMA would be much appreciated.
Mr. Tetsuo Ito
General Manager, Powder Metal Products Business Sector, Automotive Products Business Headquarters,
Hitachi Chemical Co., Ltd.

Mr. Kazunori Arai
Japan Powder Metallurgy Association
Permanent Board Members

- Mr. Mamoru Moritani
  Sumitomo Electric Industries, Ltd.
- Mr. Yoshiyasu Iino
  DIAMET CORPORATION
- Mr. Yoichi Inoue
  FINE SINTER CO., LTD.
- Mr. Isamu Kikuchi
  PORITE CORPORATION
- Mr. Isao Takagi
  KOBE STEEL, LTD.
- Mr. Carl-Gustav Eklund
  Höganäs Japan K.K.

Board Members

- Mr. Junichi Takahashi
  IWAKI DIECAST Co., Ltd.
- Mr. Masaaki Matsumoto
  Tungaloy Corporation
- Mr. Kiyonari Nakai
  Tokai Carbon Co., Ltd.
- Mr. Yoshimasa Nishimura
  Fukuisinter Co., Ltd.
- Mr. Akihiko Hamano
  JFE Steel Corporation.
- Mr. Atsumi Hatano
  Daido Steel Co., Ltd.
- Mr. Atsushi Nagano
  Dowa Electronics Materials Co., Ltd.
- Mr. Masakatsu Sato
  Nippon Atomized Metal Powders Corporation
- Mr. Shuzo Sonoda
  Fukuda Metal Foil & Powder Co., Ltd.
- Mr. Kazuaki Kusakari
  Mitsubishi Materials Techno Corporation

Auditor

- Mr. Akihiko Tajima
  Daido Steel Co., Ltd.

JPMA Secretariat

- Mr. Yusuke Watanuki (Deputy Manager)
  General Assembly, Committees, Events, Web, Publication
- Ms. Aoi Yamanaka (Staff)
  Statistics, Events and General affairs
- Ms. Tokie Sakamoto (Staff)
  Accountant and General affairs
Activities of Committees

Selection Committee for Award Prize
Number of Committee Members: 14 persons

Chairman: Mr. Yoshiyasu Iino (DIAMET Corporation)

*Selection Committee for JPMA Award (Development Prize)

New Design
Development of Oil-impregnated Sintered Bearing for Motor of Idle Speed Control System of Small Motorcycle
DIAMET Corporation

Committee for Administration
Number of Committee Members: 24 persons
Sub-Committee for General Affairs
Number of Committee Members: 7 persons

Chairman: Mr. Atsushi Tamaki (Sumitomo Electric Industries, Ltd.)

*Planning and operating of the PR meeting “JPMA Awards Special Session” at JSPM Spring Meeting in May
*Planning and operating of “the tour of Committee for Administration”
*Publication of the report “Analysis of investigation results of sintered parts demand structure 2012” in June
*Planning and operating of “PM information Exchange Meeting” and “the Technical Information Meeting”
*Support of the APMA2013

Sub-Committee for Public Relations
Number of Committee Members: 8 persons

Chairman: Mr. Takashi Saito (Hitachi Chemical Co., Ltd.)

*Planning of “JPMA Website”
*Planning of operating of “Human resources development seminar”
*Publication of JPMA News “Funmatsu Yakin” (No373-376)
**Technical Committee for Sintered Parts**
Number of Committee Members: 9 persons

Chairman: Dr. Yoshimi Sugaya  
(Hitachi Powdered Metals Co., Ltd.)

*Discussion of the matter for ISO/TC119/SC3 and SC5*  
*Support of the APMA2013 Keynote Lectures*  
*Planning and operating of “Joint Meeting by three technical committees”*

---

**Sub-Committee for Sintered Bearings**
Number of Committee Members: 4 persons

Chairman: Mr. Sanpei Seki  
(PORITE CORPORATION)

*Discussion of the matter for ISO/TC119/SC3 and SC5 (Bearings)*  
*Deliberation of Standardization for Sintered Bearings*  
*Deliberation of update of JPMA website for Sintered Bearings*

---

**Technical Committee for Sintered Friction Materials**
Number of Committee Members: 3 persons

Chairman: Mr. Yoshihisa Ueda  
(FINE SINTER CO., LTD.)

*Deliberation of revision for Collection of Excerpt of the Standard of Friction Material*  
*Exchange of Information for Friction Material*

---

**Technical Committee for Press Machines**
Number of Committee Members: 7 persons

Chairman: Mr. Katsuo Murakami  
(YOSHIZUKA SEIKI CO., LTD.)

*Deliberation of requests of Press Machines and Compacting*  
*Deliberation of update of JPMA website for Press Machines*  
*Planning and operating of “Joint Meeting by three technical committees”*
Technical Committee for Metal Powders
Number of Committee Members: 16 persons

*Discussion of Matter for ISO/TC119/SC2
*Introduction of topics about “Metal Powder” by Committee members and exchange of views
*Planning and operating of “Joint Meeting by three technical committees”

Committee for Metal Injection Molding
Number of Committee Members: 12 persons

*Investigation of the Japanese MIM market
*Operating on the Standardization of the *Materials Property (fatigue, impact and tensile) with Sub-Committee for Material Characteristics
*Planning of “the MIM booklet”

Marketing Committee
Number of Committee Members: 14 persons

*Introduction of topics by Committee Members and exchange of views
*Introduction of Information Gathering of User Market and Other Market

Committee for International Standardizations
Number of Committee Members: 7 persons

*Attendance of 2013 ISO/TC119 Meeting in Stockholm, Sweden
*Discussion of related matters for TC119, SC2, SC3 and SC5
Committee for Environment
Number of Committee Members: 5 persons

Chairman: Mr. Masahiro Oki
(Hitachi Powdered Metals Co., Ltd.)

*Introduction of Case Study of “CO2 Emissions Reduction”, “Waste Product Reduction” and “KANKYO HIYARI”

## JPMA Events and International Communications

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16, January</td>
<td>Gathering of 2013 New Year Greeting and Ceremony of Awarding Various Honors in 2012</td>
</tr>
<tr>
<td>15, March</td>
<td>The 19th Technological Information Meeting 4 research reports were presented by each winners of 10th Research Promotion Program. The 8th PM Information Exchange Meeting</td>
</tr>
<tr>
<td>23, May</td>
<td>2013 JPMA General Assembly Mr. Tetsuo Ito was elected as a new President. The 2013 Working Plans and Budget of JPMA</td>
</tr>
<tr>
<td>27, May</td>
<td>JPMA Special Session at the JPMA Spring Meeting</td>
</tr>
<tr>
<td>21, June</td>
<td>Tour of Committee for Administration Honda Motor Co., Ltd. Hamamatsu Factory</td>
</tr>
<tr>
<td>7, July</td>
<td>Human resources development seminar</td>
</tr>
<tr>
<td>11-13, September</td>
<td>ISO/TC119/2013 Meeting at Stockholm, Sweden 4 representatives of JPMA took part in this meeting for ISO/TC119, SC2, SC3, SC5 and Workshop</td>
</tr>
<tr>
<td>25, October</td>
<td>2012 JPMA Fall General Assembly (Cancellation) Announcement of 2012 JPMA Awards</td>
</tr>
<tr>
<td>3-6, November</td>
<td>APMA2014 2nd International Conference on Powder Metallurgy in Asia (Xiamen, China)</td>
</tr>
<tr>
<td>4, November</td>
<td>APMA, 5th Board Meeting</td>
</tr>
<tr>
<td>15, November</td>
<td>The 31st Case Studies of Production Efficiency Improvement Meeting and the 17th Metal Powder and Equipment PR Meeting</td>
</tr>
<tr>
<td>6, December</td>
<td>Joint Meeting by three technical committees Theme of discussion “filling” MPIF / EPMA / JPMA Meeting</td>
</tr>
</tbody>
</table>

## JPMA Publications

The 34th Investigation Collection Results of Sintered Parts Demand Structure
JPMA Report, 2012 (English and Japanese)
JPMA News “Funmatsu Yakin” (No 373-376)
2013 New Members

**Regular Member / PM Products Manufacturer**

NTN powder metal corporation

**Associate Member**

Chuo Hatsumei Institute Co., Ltd.
Production of PM Products in Japan

Fig 1 shows the production volume change of Machine Parts and Bearings for the period from 2004 through 2013.

Machine Parts volume was 90,911 ton, 4.3% decrease from the previous year. Bearings volume was 6,288 ton, 1.5% decrease from the previous year. As the other products, Friction Materials volume was 605 ton, 1.7% decrease from the previous year. Electric Contacts volume was 59 ton, 7.8% decrease from the previous year.

![Fig 1. Production of Machine Parts and Bearings (Calendar Year) (Source: METI)](image)

Machine Parts and Bearings

Fig 2 shows the analysis of demand for Machine parts and Bearings for the period from 2004 through 2013.

Machine Parts Production volume for Vehicles was 84,526 ton, 4.0% decrease from the previous year.

This is because of the reactionary decrease of discontinuance of sales tax reduction of vehicles. Because of sales tax increase at April, 2014, we expect the temporary decrease, but overall we expect the slow recovery of market.

As well as Machine Parts, Production volume of Bearings for Vehicles was 3,939 ton, 1.4% decrease from the previous year.

![Fig 2. Analysis of Demand for Machine Parts and Bearings (Calendar Year) (Source: METI)](image)
Fig3 shows the use breakdown of Machine parts and Bearings in vehicle in 2012 based on the demand structure survey by JPMA.

52.3% of Machine parts were for engine use. The main trends of machine parts are to use the parts contributed to the cost saving of fuel by HEV/EV, CO₂ reduction and the low noise countermeasure at the time of engine stop. For the adoption to new technology, we need to make the parts which has high function and high tolerance. So the research & development is always needed.

The main demand of Bearings is for electrical use. For Bearings, long life and high silence performance are required, the requirement for silence performance is very high. The bearing to use for the fun motor for cooling battery for HEV/EV is changed from ball bearing to the oil impregnated bearing with high tolerance. And the same kind of change will be occurred in future.

Fig4 shows the weight of sintered parts used for one car and the car production in Japan for the period from 2003 through 2012.

The weight of sintered parts used for one car in 2012 was 9.0kg in Japan, 19.8kg in U.S. and 8.8kg in Europe.
Fig5 shows Shipment of Metal Powders.

Fig.5 Shipment of Metal Powders (Source JPMA)

Shipments of Iron Powders (Calendar Year)

<table>
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<th>Year</th>
<th>For PM</th>
<th>For Others</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>19788</td>
<td>64960</td>
<td>69768</td>
</tr>
<tr>
<td>2010</td>
<td>30034</td>
<td>65186</td>
<td>55683</td>
</tr>
<tr>
<td>2011</td>
<td>33495</td>
<td>109972</td>
<td>108883</td>
</tr>
<tr>
<td>2012</td>
<td>32001</td>
<td>105889</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>42954</td>
<td>79699</td>
<td>60225</td>
</tr>
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</table>

Shipments of Copper Powders (Calendar Year)

<table>
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<tr>
<th>Year</th>
<th>For PM</th>
<th>For Others</th>
<th>Export</th>
</tr>
</thead>
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<tr>
<td>2009</td>
<td>670</td>
<td>5791</td>
<td>1219</td>
</tr>
<tr>
<td>2010</td>
<td>64960</td>
<td>1137</td>
<td>1102</td>
</tr>
<tr>
<td>2011</td>
<td>1115</td>
<td>5173</td>
<td>1002</td>
</tr>
<tr>
<td>2012</td>
<td>1101</td>
<td>4848</td>
<td>4768</td>
</tr>
<tr>
<td>2013</td>
<td>1126</td>
<td>4218</td>
<td>33495</td>
</tr>
</tbody>
</table>

Shipments of Other Powders (Fiscal Year)

<table>
<thead>
<tr>
<th>Year</th>
<th>Stainless steel powder</th>
<th>MIM powder</th>
<th>Aluminum powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>3212</td>
<td>4050</td>
<td>245</td>
</tr>
<tr>
<td>2009</td>
<td>2463</td>
<td>3014</td>
<td>313</td>
</tr>
<tr>
<td>2010</td>
<td>2838</td>
<td>379</td>
<td>245</td>
</tr>
<tr>
<td>2011</td>
<td>2841</td>
<td>414</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>3014</td>
<td>4094</td>
<td></td>
</tr>
</tbody>
</table>
Awards

Personal Prize
Mr. Yutaka Mizuno
Adviser of FINE SINTER CO., LTD.

2006-2013
Chairman
Board Member
Chairman of Selection Committee for Award Prize

Mr. Yasuhiko Hayashi
Vice Chairman of
FUKUDA METAL FOIL & POWDER Co., Ltd.

2004-2013
Board Member

The late Mr. Junichi Asami
Former Organization for
Small & Medium Enterprises
and Regional Innovation, JAPAN

1988-2012
Councilor
Member of Selection Committee for Award Prize
Special Member of Technical Committee
for Metal Powders
Chairman of Committee for JIS Draft
Development Prize
A New Design

A-1
Development of Oil-impregnated Sintered Bearing for Motor of Idle Speed Control System of Small Motorcycle

DIAMET CORPORATION

A-2
Development of Joint Part for Motor of Electric Power Steering

DIAMET CORPORATION

A-3
Mass-production of light weight piston with thinner thickness for motor cycle

FINE SINTER CO., LTD.

A-4
Development of the sintered bearing for battery cooling fan motor, used for a HEV and EV

Porite Corporation

A-5
Electric Oil Pump Rotors for Use under Silent Environment

DIAMET CORPORATION

A-6
Development of the parking component used in the transmission for PHEV

SUMITOMO ELECTRIC INDUSTRIES, LTD.
B New Materials

B-1
Development of the oil seal made of sintered metal for variable valve timing device

C Process Development

C-1
Development of low cost pure iron based Soft Magnetic Composite Core for automotive reactor

C-2
Development of high-precision gear used in the vehicle attitude control

F Effort Prize

F-1
The sintered hydrodynamic bearing for super thin fan motor

F-2
Development of the high strength and the high dimensional accuracy starter planetary gear for idling stop systems
Prize for Distinguish Service of the Committee Activities

Mr. Masakazu Watarai
Former DIAMET CORPORATION
1995-2012
Chairman and Member of Committee for Administration
Chairman and Member of Sub-Committee for General Affairs
Chairman and Member of Sub-Committee for Public Relations
Chairman of PM2012 Fourth Committee
Member of Selection Committee for Award Prize
Member of Technical Committee for Sintered Parts
Member of Marketing Committee

Mr. Takashi Fukuwaza
Former Porite Corporation
1993-2013
Chairman and Member of Committee for Administration
Chairman and Member of Sub-Committee for General Affairs
Chairman and Member of Sub-Committee for Public Relations
Vice Chairman of PM2012 Steering Committee
Member of Selection Committee for Award Prize
Member of Sub-Committee for Edit
Member of PM2000 Steering Committee
Member of Committee for 40th Anniversary Edit
Member of Committee for 50th Anniversary Edit

Mr. Yoshikazu Seki
KOBE STEEL, LTD.
1997-2013
Chairman of Technical Committee for Metal Powders
Acting Chairman of Selection Committee for Award Prize
Member of Committee for Metal Injection Molding
Member of Committee for International Standardizations
Member of Committee for JIS Draft

Recognition of Superior Employees

2013 prizewinner numbered 21 persons
(15 member companies)
APMA Activities

The 5th Board Meeting
Date: Monday 4th November 2013  10:00 - 12:00
Venue: Xiamen International Conference Center
Participants:

APMA Board Member
President  Mr. Isamu Kikuchi (JPMA, Japan)
Director  Prof. Jai Sung Lee (KPMA, Korea)
Director  Mr. Chiu-Lung Chu (TPMA, Taiwan)
Director  Mr. N. Gopinath (PMAI, India)
Director  Dr. Han Wei (SATI-PM, China)
Auditor  Prof. Hideshi Miura (JSPM, Japan)
Secretariat  Mr. Kazunori Arai (JPMA, Japan)
Interpreter  Mr. Takashi Saito (JPMA, Japan)

Conclusion
*2013 Finance was approved
*Next APMA Conference decided at Japan
*The check of the problems of PM2018 venue
*Next APMA Board Meeting decided at PM2014 Florida

APMA2013 Xiamen, China review

APMA made a start at Asian PM related association Conference that was held at the time of PM 2008 in Washington, U.S.A. by the appeal of JPMA.

After the start, we had the board members meeting every year. The first Asian Powder Metallurgy Congress (APMA2011) was held in 2011 to promote the exchange and to strengthen the connection. So this is the 2nd Congress.

APMA2013 was held at Xiamen International Conference Center Hotel in Xiamen, China by 4 days schedule from November 3rd through 6th under the organizers of SATI-PM · TPM (APMA approval).

“Asian PM Congress” will be held in the year that “PM World Congress” will not be held, by the decision of APMA Board Meeting at the same time of the regular meeting of APMA member association.

In APMA2013, 516 persons from 11 area, mainly from Asian area, attended.

The conference was started by the registration on November 3rd, APMA Board Meeting, Opening Ceremony and Invitation Lecture were scheduled on November 4th, Invitation Lecture, Forum and Presentation of research report were scheduled on November 5th and Presentation of Research report was scheduled on November 6th again. Exhibition was scheduled all days in the period.
○ APMA Board Meeting (November 4th)
The 5th Board Meeting was held. 7 areas, 9 associations and 30 members were participated. It was decided and exchanged opinions as follows under the chairmanship of Mr. Kikuchi.
• Situation Report of APMA2013
• Business condition of each country
• Report of revenue & expenditure
• It was decided to hold 2015 3rd Asia PM Conference in Japan.
• Opinion exchange about the site of PM2018

○ Opening Ceremony of Exhibition (November 4th)
The opening ceremony of exhibition was held in front of the entrance of exhibition with the chairmanship of Prof. Wen-Cheng Chang, Vice chairman of organization, after the greeting by Dr. Chai Rang, Chairman of organization.

○ Invited Keynote Lecture (November 4th ~5th)
At the Invited Keynote Lecture, 8 lecturers that the organization committee had requested before-head made the research report or the new situation report.

○ Opening Ceremony (November 5th)
In the opening ceremony, after the exhibition by Chinese harp, Dr. Chai Rang, Chairman of organization did welcome greeting and introduction of VIP. After that, Mr. Kikuchi, President of APMA, A person from Chinese government, Mr. Chu, President of TPMA, Mr. Serge Sella, EPMA President representative, ERASTEEL, and Dr. R..M. German, MPIF President representative, did greeting.

○ PM Forum (November 5th)
At the PM forum which was planned for the exchange and co-operation between Asian area associations that was the purpose of APMA, 7 associations made the report about the current situation and their activities.
Welcome Dinner Meeting (November 5th)

After PM forum, welcome dinner meeting was held and 7 attractions and the toast was done by VIP member under the chairmanship of Dr. Yu Yang who was a committee member of technical committee.

Presentation of Research report
(November 4th~6th)

Total 170 presentations of research report were done (by congress guide). In that, there were 60 oral presentations and 110 poster presentations. The oral presentations were done at 3 meeting places and by 6 categories. The poster session was done from November 4th through 6th.

Exhibition (November 4th~6th)

The exhibition was held at the lobby and meeting rooms of meeting place. 60 companies (24 companies were out of Asia) exhibited. Total visitors were about 700.
## PM Production in Asia

PM Production (Source JPMA, PMAI, KPMI, TPMA and CMPMA)

<table>
<thead>
<tr>
<th>AREA</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>13/12(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Iron-base</td>
<td>93,538</td>
<td>96,979</td>
<td>96,820</td>
</tr>
<tr>
<td>Japan</td>
<td>Copper-base</td>
<td>3,567</td>
<td>4,427</td>
<td>4,488</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>97,105</td>
<td>101,406</td>
<td>101,308</td>
</tr>
<tr>
<td></td>
<td>Iron-base</td>
<td>134,544</td>
<td>129,485</td>
<td>145,291</td>
</tr>
<tr>
<td>China</td>
<td>Copper-base</td>
<td>8,884</td>
<td>10,011</td>
<td>11,293</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>143,428</td>
<td>139,496</td>
<td>156,584</td>
</tr>
<tr>
<td>Korea</td>
<td>*Iron-base</td>
<td>62,543</td>
<td>64,026</td>
<td>65,877</td>
</tr>
<tr>
<td></td>
<td>Copper-base</td>
<td>1,318</td>
<td>1,209</td>
<td>585</td>
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<tr>
<td></td>
<td>Total</td>
<td>63,861</td>
<td>65,235</td>
<td>65,877</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Iron-base</td>
<td>27,000</td>
<td>26,000</td>
<td>29,000</td>
</tr>
<tr>
<td></td>
<td>Copper-base</td>
<td>1,800</td>
<td>1,200</td>
<td>1,500</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>28,800</td>
<td>27,200</td>
<td>30,500</td>
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<tr>
<td>India</td>
<td>Iron-base</td>
<td>35,400</td>
<td>37,000</td>
<td>**38,300</td>
</tr>
<tr>
<td></td>
<td>Copper-base</td>
<td>14,500</td>
<td>14,500</td>
<td>**15,000</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>49,900</td>
<td>51,500</td>
<td>**53,300</td>
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<tr>
<td>Malaysia</td>
<td>Iron-base</td>
<td>6,009</td>
<td>5,335</td>
<td>5,419</td>
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<td></td>
<td>Copper-base</td>
<td>162</td>
<td>244</td>
<td>239</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6,171</td>
<td>5,579</td>
<td>5,658</td>
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<tr>
<td>Singapore</td>
<td>Iron-base</td>
<td>1,744</td>
<td>1,413</td>
<td>1,442</td>
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<td></td>
<td>Copper-base</td>
<td>674</td>
<td>654</td>
<td>626</td>
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<tr>
<td></td>
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<td>2,069</td>
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<td>Iron-base</td>
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<td>16,029</td>
<td>15,156</td>
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<td>Copper-base</td>
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<td>6</td>
<td>7</td>
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<td></td>
<td>Total</td>
<td>15,546</td>
<td>16,035</td>
<td>15,163</td>
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<td>Indonesia</td>
<td>Iron-base</td>
<td>—</td>
<td>—</td>
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<td></td>
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<td>—</td>
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<td>376,179</td>
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<td>32,251</td>
<td>33,738</td>
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<tr>
<td></td>
<td>Total</td>
<td>407,229</td>
<td>408,518</td>
<td>433,191</td>
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</tbody>
</table>

*Included “Others”, **Provisional value
Application Field Ratio of PM Production (2013) (%)

<table>
<thead>
<tr>
<th>AREA</th>
<th>For Transportation Machines</th>
<th>For Industrial Machines</th>
<th>For Electrical Machines</th>
<th>For Others</th>
</tr>
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<tr>
<td>Japan</td>
<td>92</td>
<td>4</td>
<td>3</td>
<td>1</td>
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<td>China</td>
<td>61</td>
<td>2</td>
<td>28</td>
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<td>Korea</td>
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</tbody>
</table>

PM Production of Asia in the World (Source MPIF, EPMA and JPMA)

*North America & Europe, based on Shipment of Fe & Cu Powder for PM Use

Metric Tons

Europe  N. America  Asia

(Metric tons)