<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Director Report</td>
<td>1</td>
</tr>
<tr>
<td>Organization of JPMA</td>
<td>2</td>
</tr>
<tr>
<td>Board Members</td>
<td>2</td>
</tr>
<tr>
<td>JPMA Secretariat</td>
<td>3</td>
</tr>
<tr>
<td>Activities of Committees</td>
<td>4</td>
</tr>
<tr>
<td>JPMA Events and International Communications</td>
<td>7</td>
</tr>
<tr>
<td>JPMA Publications</td>
<td>7</td>
</tr>
<tr>
<td>JPMA Membership</td>
<td>8</td>
</tr>
<tr>
<td>Statistics of Japan</td>
<td>8</td>
</tr>
<tr>
<td>Awards</td>
<td>12</td>
</tr>
<tr>
<td>APMA Activities</td>
<td>15</td>
</tr>
<tr>
<td>PM Production in Asia</td>
<td>18</td>
</tr>
</tbody>
</table>
Dear Friends:

Your continuous cooperation with our JPMA is much appreciated.

Last year, the Third APMA Conference Kyoto was held in the October, where many PM related people participated from not only Asian countries, but also other worldwide countries. This conference was the third one following after the First at Busan, Korea in 2011 and the Second at Xiamen, China in 2013.

Under the concept of “Simple & Compact”, the Third APMA Conference was held at Clock Tower Centennial Hall of Kyoto University. Thanks to supports of many related people, it was very successful in result that the number of registered participants and presented papers were 439 and 198 respectively. Also, under the very beautiful autumn at Kyoto, participants could get together to have opportunities of exchanging the information about PM technologies and industries, and promoted friendly relations with each other. Taking this opportunity, we would like to express our sincere thanks to cooperators for the Third APMA Conference.

The JPMA saw the Sixtieth Anniversary of the founding in April, 2016, and the commemoration exercises and the cerebration party were held at Palace Hotel Tokyo on April 27, 2016. The guests including concerned persons of the Ministry of Economy, Trade and Industry, ex-JPMA members, and related people joined then, and enjoyed talking about various passed JPMA events since the foundation.

As to the World PM2016 Hamburg of this coming October, JPMA is planning to send a mission as the previous World Conference. In the exhibition site, the JPMA booth is scheduled to promote conferences of APMA2017 Taiwan and World PM2018 Beijing, China.

Now, in comparison with a decrease of 5.1% over last year of locally produced quantity of automobiles which are main PM product consumer, the decrease for the same period of locally produced weight of PM machine parts and bearings was 5.0%, that is an apparent reflection on the decrease of automobile products.

About the Japanese economy in 2015, the export enterprises including automobile manufacturers and others enjoyed in general good results because of continuous cheaper Yen and stable stock price, however manufacturers could not keep powers on the whole due to the continuous high level inventories of products and materials influenced from the deceleration of economically growing sphere and the instability of the international financial market. In spite of such market circumference, the JPMA has performed positive activities through each committee, such as standard unification, promotion of technologies for managing environmental issues and the like. We confidence such activities would surely provide favorable results for promotion of PM products, and progress of PM industries in the future.

In conclusion, please access to the English version of JPMA web site that provides the newest information about our activities and JPMA awarded products.

Mr. Mamoru Moritani  
Executive Officer General Manager, Powder Metal Products Division  
SUMITOMO ELECTRIC INDUSTRIES, LTD.

Mr. Takashi Saito  
Japan Powder Metallurgy Association

2015 JPMA Annual Report
Permanent Board Members

- Mr. Taichi Haraguchi
  DIAMET CORPORATION
- Mr. Yozo Sato
  Hitachi Chemical Co., Ltd.
- Mr. Yoichi Inoue
  FINE SINTER CO., LTD.
- Mr. Isamu Kikuchi
  PORITE CORPORATION
- Mr. Akihiko Hamano
  JFE Steel Corporation
- Mr. Syuzo Sonoda
  FUKUDA METAL FOIL & POWDER CO., LTD.

Board Members

- Mr. Junichi Takahashi
  IWAKI DIECAST Co., Ltd.
- Mr. Mikio Fujihara
  Tungaloy Corporation
- Mr. Kazuhide Kikuchi
  Tokai Carbon Co., Ltd.
- Mr. Masayoshi Nishimura
  Fukuisinter Co., Ltd.
- Mr. Shinichi Kondo
  KOBE STEEL, LTD.
- Mr. Satoshi Tsujimoto
  Daido Steel Co., Ltd.
- Mr. Atsushi Nagano
  Dowa Electronics Materials Co., Ltd.
- Mr. Masanori Kijima
  Nippon Atomized Metal Powders Corporation
- Mr. Carl-Gustav Eklund
  Höganäs Japan K.K.
- Mr. Tsugio Watanabe
  Mitsubishi Materials Techno Corporation

Auditor

- Mr. Masaaki Matsumoto
  Tungaloy Corporation
- Mr. Tomomi Yamamoto
  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

*Selection Committee for JPMA Award (Development Prize)

New Design
Higher Cost Performance by Reduction of Wear Resistant Material on the Valve Seat
FINE SINTER CO., LTD.

Chairman: Mr. Yozo Sato
(Hitachi Chemical Co., Ltd.)
New Chairman

Committee for Administration
Number of Committee Members: 22 persons
Sub-Committee for General Affairs
Number of Committee Members: 7 persons

*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 2014” in June
* Planning and operating of “33th Case Studies on Improving Production Efficiency Meeting (APMA2015 JPMA Special Seminar)” in November.
*Planning and operating of “PM information Exchange Meeting”

Chairman: Mr. Sanpei Seki
(PORITE CORPORATION)
Commission from 2014

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

*Renewal of the “JPMA Website (Japanese and English site)”
*Planning of operating of “3nd Human resources development seminar”
*Publication of JPMA News “Funmatsu Yakin” (No381-384)

Chairman: Mr. Yoshio Uetsuki
(SUMITOMO ELECTRIC INDUSTRIES, LTD.)
Commission from 2014

2015 JPMA Annual Report
Technical Committee for Sintered Parts
Number of Committee Members: 9 persons

Chairman: Mr. Hiroaki Terai
(SUMITOMO ELECTRIC INDUSTRIES, LTD.)
Commission from 2014

*Discussion of the matter for ISO/TC119/SC3 and SC5
*Planning and operating of “Joint Meeting by three technical committees”
*Planning of the Plant tour for new markets

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

Chairman: Mr. Yoshinari Ishii
(DIAMET CORPORATION)
Commission from 2014

*Deliberation of standardization of the PV value
*Inter laboratory test of the PV value

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

Chairman: Mr. Yoshihisa Ueda
(FINE SINTER CO., LTD.)
Commission from 2010

*Exchange of Information for Friction Material
*Planning of “Opinion Exchange Meeting among Young Workers of Sintered Friction Materials Companies”

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

Chairman: Mr. Katsuo Murakami
(YOSHIZUKA SEIKI CO., LTD.)
Commission from 2010

*Exchange of Information for defect case of Press
*Exchange of Information for newfangled Press machine
*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: 11 persons

*Investigation of the Japanese MIM market
*Publication of “the MIM booklet”
*Deliberation of “MIM Lecture Meeting for Users” and “Opinion Exchange Meeting among Young Workers of MIM Companies”

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 2015 ISO/TC119 Meeting in Los Angeles, USA
*Discussion of related matters for TC119, SC2, SC3 and SC5

Chairman: Mr. Akio Sonobe
(JFE Steel Corporation)
Commission from 2010

Chairman: Mr. jyunichi Takahashi
(IWAKI DIECAST CO., LTD.)
Commission from 2014

Chairman: Mr. Tatsuya Kajino
(PORITE CORPORATION)
Commission from 2014

Chairman: Mr. Tetsuya Sawayama
(KOBE STEEL, LTD.)
Commission from 2012

2015 JPMA Annual Report
# Committee for Environment

**Number of Committee Members:** 5 persons


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

*Deliberation of “Environment Awards”*

## JPMA Events and International Communications

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>14, January</td>
<td>Gathering of 2015 New Year Greeting and Ceremony of Awarding Various Honors in 2014</td>
</tr>
<tr>
<td>20, March</td>
<td>The 10th PM Information Exchange Meeting</td>
</tr>
<tr>
<td>14-15, May</td>
<td>The 6th Opinion Exchange Meeting among Young Workers of MIM Companies</td>
</tr>
<tr>
<td>21, May</td>
<td>2015 JPMA General Assembly</td>
</tr>
<tr>
<td></td>
<td>The 2015 Working Plans and Budget of JPMA</td>
</tr>
<tr>
<td>26, May</td>
<td>JPMA Special Session at the JPMA Spring Meeting</td>
</tr>
<tr>
<td>18, June</td>
<td>Tour of Committee for Administration</td>
</tr>
<tr>
<td></td>
<td>Miyagi Fukkou Park</td>
</tr>
<tr>
<td>22, June</td>
<td>The 1st Opinion Exchange Meeting among Young Workers of Sintered Friction Materials</td>
</tr>
<tr>
<td>3, July</td>
<td>3rd Human resources development seminar</td>
</tr>
<tr>
<td>22, October</td>
<td>2015 JPMA Fall General Assembly</td>
</tr>
<tr>
<td></td>
<td>Announcement of 2014 JPMA Awards</td>
</tr>
<tr>
<td>8-10, November</td>
<td>APMA2015 3rd International Conference on Powder Metallurgy in Asia (Kyoto, Japan)</td>
</tr>
<tr>
<td>8, November</td>
<td>APMA, 7th Board Meeting</td>
</tr>
<tr>
<td>10, November</td>
<td>The 33th Case Studies of Production Efficiency Improvement Meeting in APMA2015</td>
</tr>
</tbody>
</table>

## JPMA Publications

- The 36th Investigation Collection Results of Sintered Parts Demand Structure
- JPMA Report, 2014 (English and Japanese)
- JPMA News “Funmatsu Yakin” (No381-384)
- The MIM Booklet
Production of PM Products in Japan

Fig1 shows the production volume change of Machine Parts and Bearings for the period from 2006 through 2015.

Machine Parts volume was 86,287 ton, 5.0% decrease from the previous year. Bearings volume was 6,284 ton, 6.6% decrease from the previous year. As the other products, Friction Materials volume was 660 ton, 4.6% decrease from the previous year. Electric Contacts volume was 71 ton, 10.9% increase from the previous year.

Fig1. Production of Machine Parts and Bearings (Calendar Year) (Source: METI)
Machine Parts and Bearings

Fig 2 shows the analysis of demand for Machine parts and Bearings for the period from 2006 through 2015.

Machine Parts Production volume for Vehicles was 81,200 ton, 3.8% decrease from the previous year.

This is because the production amount of automobile that is the main user of powder metallurgy in Japan was 5.1% decrease. And also, production transfer to foreign countries by automobile producers because of the spot supply, is another reason.

In 2016, it is expected to recover the demand a little. One of the reason is the urgent demand increase before the expected consumption tax increase in April, 2017 and the other reason is the production amount recovery in Japan from other countries by some automobile producers.

Production volume of Bearings for Vehicles was 4,018 ton, 4.2% decrease from the previous year.
Fig3 shows the use breakdown of Machine parts and Bearings in vehicle in 2014 based on the demand structure survey by JPMA.

52.2% of Machine parts were for engine use, the main trend of machine parts is not the change of the parts itself, but it is investigated to change the low cost material by keeping the same material properties and to fulfil the cost saving by the new compaction and heat treatment technology, by that we aim the distinction from other manufacturing method.

The main trend of Bearings is for electrical use, the bearing with high tolerance and high durability is required. And the bearing as turbo-parts by down-sizing is expected to increase.

Fig3. Breakdown of Machine Parts and Bearings for Automobile (2013)  (Source: JPMA)

Fig4 shows the weight of sintered parts used for one car and the car production in Japan for the period from 2005 through 2014.

The weight of sintered parts used for one car in 2014 was 8.9kg in Japan, 20.3kg in U.S. and 9.5kg in Europe.

Fig4. Weight for sintered parts used for one car (Source JPMA and JAMA)
Fig 5 shows Shipment of Metal Powders.

**Fig.5 Shipment of Metal Powders (Source JPMA)**

**Shipment of Iron Powders (Calendar Year)**

- **For PM:**
  - 2011: 33,495
  - 2012: 69,768
  - 2013: 105,986
  - 2014: 48,119
  - 2015: 44,725

- **For Others:**
  - 2011: 32,001
  - 2012: 65,186
  - 2013: 109,972
  - 2014: 53,868
  - 2015: 54,104

- **Export:**
  - 2011: 4,295
  - 2012: 5,568
  - 2013: 10,883
  - 2014: 10,764
  - 2015: 10,710

**Stainless steel powder**

- **For PM:**
  - 2011: 5,173
  - 2012: 4,848
  - 2013: 4,768
  - 2014: 5,081
  - 2015: 4,662

- **For Others:**
  - 2011: 1,115
  - 2012: 1,002
  - 2013: 1,101
  - 2014: 1,177
  - 2015: 1,017

- **Export:**
  - 2011: 1,137
  - 2012: 1,102
  - 2013: 1,126
  - 2014: 1,181
  - 2015: 1,109

**MIM powder**

- **For PM:**
  - 2011: 2,463
  - 2010: 2,838
  - 2011: 2,841
  - 2012: 3,014
  - 2013: 2,893
  - 2014: 2,933

- **For Others:**
  - 2009: 301
  - 2010: 414
  - 2011: 389
  - 2012: 313
  - 2013: 281
  - 2014: 359

**For Others:**

- 2009: 2463
- 2010: 2838
- 2011: 2841
- 2012: 3014
- 2013: 2893
- 2014: 2933
Awards

Development Prize

A New Design

A-1
Higher Cost Performance by Reduction of Wear Resistant Material on the Valve Seat

FINE SINTER CO., LTD.

A-2
Development of the soft magnetic composite core for high-power output and rectangular-shaped ignition coil

SUMITOMO ELECTRIC INDUSTRIES, LTD.

A-3
Development of bearing for linear vibration actuator to be used in wearable device

Porite Corporation

A-4
A set of sintered joints for the motor used in valve lift actuator

DIAMET CORPORATION

B New Materials

B-1
Austenitic high heat and wear resistance sintered material for turbocharger

Hitachi Chemical Co., Ltd.

B-2
Ferrous sintered bearing material with high permeability and oil content

Hitachi Chemical Co., Ltd.
C Process Development

C-1
Development of high-density sprocket for automobile engines made by die wall lubrication compacting at room temperature

Hitachi Chemical Co., Ltd.

F Effort Prize

F-1
Development of planetary carrier for E-4WD applied with sinter brazing technology

SUMITOMO ELECTRIC INDUSTRIES, LTD.

F-2
Partially Alloyed Bronze Powder with High Compactibility Suitable for High Sintered Density

Fukuda Metal Foil & Powder Co., LTD.
Prize for Distinguish Service of the Committee Activities

Dr. Yoshimi Sugaya
Former Hitachi Chemical Co., Ltd.
2009-2015
Chairman and Member of Technical Committee
for Sintered Parts
Member of Technical Committee for Press Machines
Member of Technical Committee for Metal Powders
Member of Committee for International Standardizations
Member of Selection Committee for Award Prize
Member of Committee for Japan Industrial Standards

Mr. Ryoichi Harada
Höganäs Japan K.K.
2001-2015
Member of Technical Committee for Metal Powders
Member of Committee for Japan Industrial Standards

Recognition of Superior Employees
2015 prizewinner numbered 20 persons
(15 member companies)
## 2015 APMA Activities

### The 7th Board Meeting

**Date:** Sunday 8th November 2015   16:00 - 17:00  
**Venue:** Hotel Granvia Kyoto, Konjaku, 3rd Floor  

### Participants

#### APMA Board Member

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>President</td>
<td>Mr. Isamu Kikuchi (JPMA, Japan)</td>
</tr>
<tr>
<td>Director</td>
<td>Mr. Chang Whan Bae (KPMA, Korea)</td>
</tr>
<tr>
<td>Director</td>
<td>Mr. Chiu-Lung Chu (TPMA, Taiwan)</td>
</tr>
<tr>
<td>Director</td>
<td>Mr. Cai Rang (CPMA, China)</td>
</tr>
<tr>
<td>Auditor</td>
<td>Mr. Jun Sakai (JSPM, Japan)</td>
</tr>
<tr>
<td>Secretariat</td>
<td>Mr. Takashi Saito (JPMA, Japan)</td>
</tr>
</tbody>
</table>

#### Attendant of APMA Members Association

<table>
<thead>
<tr>
<th>Association</th>
<th>Name</th>
</tr>
</thead>
</table>
| CPMA(China) | Dr. Han Wei  
|             | Dr. Yu Yang  
|             | Prof. Xiong Xiang  
|             | Mr. Bin Liu  |
| CPMS(China) | Mr. Sea Fue Wang  
|             | Mr. Shin Chieh Liao  |
| TPMA(Taiwan)| Mr. In Bun Jeong  
|             | Mr. Suc Choi  
| KPMA(Korea)| Prof. Tae Suk Jang  
|             | Prof. Young Do Kim  
|             | Prof. Jai Sunng Lee  |
| KPMI(Korea)| Prof. Tae Suk Jang  
|             | Prof. Young Do Kim  
|             | Prof. Jai Sunng Lee  |
| JSPM(Japan)| Ms. Yoko Inoue  
|           | Mr. Mamoru Moritani  
|           | Mr. Yoichi Inoue  
|           | Mr. Taichi Haraguchi  
|           | Mr. Shuzo Sonoda  
|           | Mr. Sanpei Seki  
|           | Mr. Hideo Kato  
|           | Mr. Yoshio Uetsuki  
|           | Mr. Yusuke Watanuki  |

### Conclusion

*2014 Finance and 2015 Budget was approved  
*2016 Member Fee was approved  
*World PM2018 date was decided.  
**Date:** September, 16-18, 2018  
**Venue:** Beijing National Convention Center  
*Introduction of the APMA2017 Taiwan preparations situation  
*Next APMA Board Meeting is decided to be held at World PM2016 Hamburg, Germany
APMA (Asian Powder Metallurgy Association) has held "Asian Powder Metallurgy Congress (APMA Congress) at the year that World Congress is not held to strengthen the connection and co-operation in Asian area.

The first congress was held in Korea in 2011, the second congress was held in China in 2013. At APMA board meeting in 2013, it was decided to hold the third Congress will be held in Japan in 2015 (APMA2015).

APMA2015 was held at Kyoto University under the sponsorship of JSPM (Japan Society of Powder & Powder Metallurgy) and JPMA (Japan Powder Metallurgy Association) before JSPM autumn congress since November 8th through 10th. Total attendees were 439 from 19 countries mainly from Asian area.

Main participating countries were as follows.

<table>
<thead>
<tr>
<th>Aria</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>278</td>
</tr>
<tr>
<td>China</td>
<td>50</td>
</tr>
<tr>
<td>Korea</td>
<td>36</td>
</tr>
<tr>
<td>Taiwan</td>
<td>28</td>
</tr>
<tr>
<td>Sweden</td>
<td>8</td>
</tr>
<tr>
<td>Malaysia</td>
<td>7</td>
</tr>
<tr>
<td>Others</td>
<td>32</td>
</tr>
</tbody>
</table>

The Congress was held at Kyoto University Clock Tower Centennial Hall. The registration was started at November, 8th. And at the same day, we had APMA board meeting and Friendship Night at Hotel Granvia Kyoto. At 9th, the Opening Ceremony, PM Forum, Presentation of Research Report Exhibition were held. At 10th, Presentation of Research Report, Exhibition and Case Studies of Production Efficiency Improvement Meeting were held. And also, Conference Party was held at Hotel Granvia Kyoto.

Opening address (Sakai Chairman)

Presentation of Research report (November 9-10)

At Presentation of Research Report, total 195 reports were presented. In that, Oral presentation were 143 and Poster presentation were 52.

Oral presentation were made from 6 categories at 5 meeting rooms from November 9th through 10th. The animated discussion were made.
Poster presentation were made from November 9th until the noon of 10th. And from 11:30 through 13:30, Core Time was settled, also the animated discussion were made.

Exhibition (November 9-10)
The exhibition was settled at the same meeting space of Poster presentation. 13 companies were participated.

Conference Party (November 10)
The conference party was held as the last event of APMA2015 at Hotel Granvia Kyoto. Under the chairmanship by Prof. Yoshimura (Kyoto University) and Prof. Matsubara (Tohoku University), Mr. Sakai, Chairman of Organization Committee, made an opening address and Mr. Moritani, Vice Chairman of Organization Committee, made a toast. At this party, 8 Poster Award were commended. And Japanese harp attraction were made. And also, PR of APMA2017 Taiwan and World PM2018 China were made.

Finally, Ms. Inoue, Ms. Doi and Ms. Yoshida of JSPM were introduced as the members who has worked for the success of APMA2015. Mr. Sonoda, a member of Organization Committee, were made the closing address. Total attendees were 258.
### PM Production in Asia

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

<table>
<thead>
<tr>
<th>AREA</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>15/14(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>93,251</td>
<td>93,594</td>
<td>89,123</td>
<td>95.2</td>
</tr>
<tr>
<td>Copper-base</td>
<td>3,948</td>
<td>3,984</td>
<td>3,449</td>
<td>86.6</td>
</tr>
<tr>
<td>Total</td>
<td>97,199</td>
<td>97,578</td>
<td>92,572</td>
<td>94.9</td>
</tr>
<tr>
<td>China</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>145,291</td>
<td>166,865</td>
<td>146,153</td>
<td>87.6</td>
</tr>
<tr>
<td>Copper-base</td>
<td>11,293</td>
<td>12,173</td>
<td>12,457</td>
<td>102.3</td>
</tr>
<tr>
<td>Total</td>
<td>156,584</td>
<td>179,038</td>
<td>158,610</td>
<td>88.6</td>
</tr>
<tr>
<td>Korea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper-base</td>
<td>585</td>
<td>632</td>
<td>640</td>
<td>101.3</td>
</tr>
<tr>
<td>Total</td>
<td>65,877</td>
<td>68,513</td>
<td>68,257</td>
<td>99.6</td>
</tr>
<tr>
<td>Taiwan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>29,000</td>
<td>30,000</td>
<td>30,680</td>
<td>102.3</td>
</tr>
<tr>
<td>Copper-base</td>
<td>1,500</td>
<td>2,000</td>
<td>2,100</td>
<td>105.0</td>
</tr>
<tr>
<td>Total</td>
<td>30,500</td>
<td>32,000</td>
<td>32,780</td>
<td>102.4</td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>36,000</td>
<td>37,000</td>
<td>30,500</td>
<td>82.4</td>
</tr>
<tr>
<td>Copper-base</td>
<td>12,100</td>
<td>12,100</td>
<td>10,000</td>
<td>82.6</td>
</tr>
<tr>
<td>Total</td>
<td>48,100</td>
<td>49,100</td>
<td>40,500</td>
<td>82.3</td>
</tr>
<tr>
<td>Malaysia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>5,419</td>
<td>4,963</td>
<td>4,186</td>
<td>84.3</td>
</tr>
<tr>
<td>Copper-base</td>
<td>239</td>
<td>213</td>
<td>136</td>
<td>63.8</td>
</tr>
<tr>
<td>Total</td>
<td>5,658</td>
<td>5,176</td>
<td>4,322</td>
<td>83.5</td>
</tr>
<tr>
<td>Singapore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>1,443</td>
<td>1,420</td>
<td>1,452</td>
<td>102.2</td>
</tr>
<tr>
<td>Copper-base</td>
<td>626</td>
<td>600</td>
<td>498</td>
<td>83.0</td>
</tr>
<tr>
<td>Total</td>
<td>2,069</td>
<td>2,020</td>
<td>1,950</td>
<td>96.5</td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>15,156</td>
<td>14,748</td>
<td>16,074</td>
<td>109.0</td>
</tr>
<tr>
<td>Copper-base</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>15,163</td>
<td>14,755</td>
<td>16,081</td>
<td>109.0</td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>1,619</td>
<td>2,959</td>
<td>3,992</td>
<td>134.9</td>
</tr>
<tr>
<td>Copper-base</td>
<td>0</td>
<td>45</td>
<td>83</td>
<td>184.4</td>
</tr>
<tr>
<td>Total</td>
<td>1,619</td>
<td>3,004</td>
<td>4,075</td>
<td>135.6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron-base</td>
<td>392,471</td>
<td>419,430</td>
<td>389,777</td>
<td>92.9</td>
</tr>
<tr>
<td>Copper-base</td>
<td>30,298</td>
<td>31,754</td>
<td>29,370</td>
<td>92.5</td>
</tr>
<tr>
<td>Total</td>
<td>422,769</td>
<td>451,184</td>
<td>419,147</td>
<td>92.9</td>
</tr>
</tbody>
</table>

*Included “Others”*
### Application Field Ratio of PM Production (2015) (%)

<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>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>92</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>63</td>
<td>2</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>Korea</td>
<td>93</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Taiwan</td>
<td>45</td>
<td>25</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>India</td>
<td>80</td>
<td>5</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Malaysia</td>
<td>58</td>
<td>3</td>
<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Singapore</td>
<td>53</td>
<td>5</td>
<td>41</td>
<td>1</td>
</tr>
<tr>
<td>Thailand</td>
<td>92</td>
<td>1</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Indonesia</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>