

Atomized Metal Powder Plant

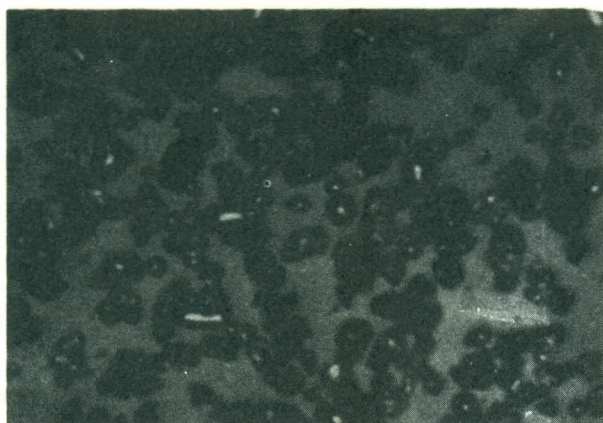
There exist a variety of powder metallurgical products, but this product introduced here is mainly in use as raw materials for the manufacture of copper-related oilless bearings applicable to household electric appliances, general industrial machinery, cars and audio equipment.

Depending upon its way of manufacturing, the metal powder is classified into the electrolytic metal powder, atomized metal powder and stamping milled metal powder. It also breaks down to the bronze powder, brass powder, kelmet powder, copper powder, tin powder, lead powder and aluminum powder depending upon respective raw materials.

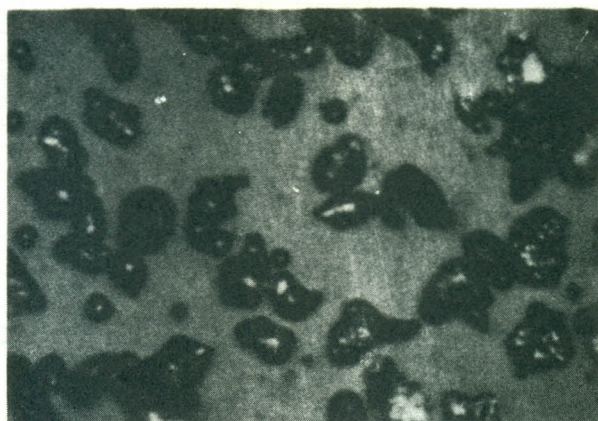
Developed by the Korea Advanced Institute of

Science and Technology (KAIST), the manufacturing technology of this product is related to the production of copper powder and tin powder in accordance with such processes as atomization, oxidation and reduction.

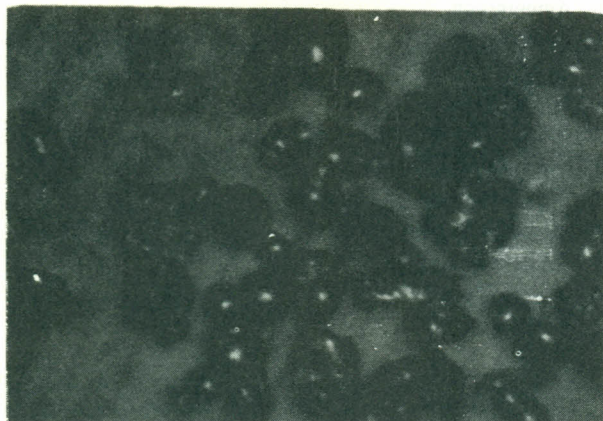
The produced powder is adjusted to have suitable characteristics as a raw material of oilless bearings, while maintaining its apparent density below 3g/cm^2 as a blending source before forming. It is also the technology improving the workability of the oilless bearing itself by providing the necessary property of fluidity, and mass-producing bronze powder on the basis of water atomization process.



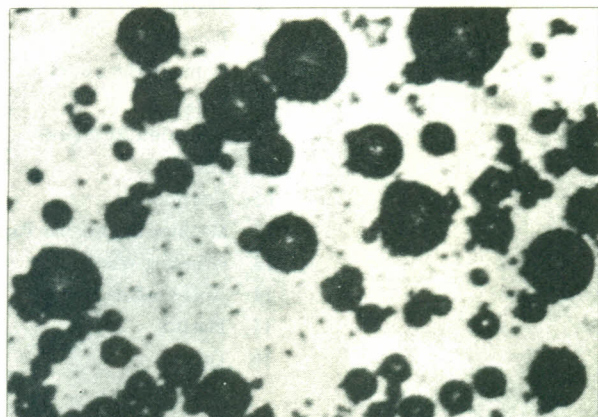
Mixing bronze powder



Brass powder



Lead bronze powder



Kelmet powder

View of Products

Products and Specifications

This plant produces bronze, copper, brass, kelmet, tin, lead, zinc, aluminum and colder powders. Among these, specifications of the brass powder are as shown in Table 1.

Table 1. Specifications of Brass Powder

Model no. Spec.		ABra-20	ABra-30
Apparent density (g/cm ³)		2.7 ~ 3.3	2.7 ~ 3.3
Fluidity (Sec/50g)		max. 35	max. 35
Composition (%)		Cu 80 Zn 20	Cu 70 Zn 30
Size distribution	mesh 100 ±	max. 5	max. 5
	150 ±	5 ~ 15	5 ~ 15
	200 ±	10 ~ 20	10 ~ 20
	325 ±	20 ~ 30	10 ~ 30
	325 -	40 ~ 50	40 ~ 60

Table 2. Uses of Metal Powders

Use Product		Powder metallurgy	Friction disc	Contact-electrode	Metal-likon	Pigment	Catalyst	Application
Bronze powder	Cu-Sn	○	○		○			5, 10, 13, 15, 17, 22, 30
Cu powder	Cu	○	○	○	○	○	○	1, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 19, 20, 21, 25, 27, 28, 30, 31
Brass powder	Cu-Zn	○	○		○	○		6, 9, 11, 12, 15, 17, 30
Kelmet powder	Cu-Pb	○	○		○			5, 9, 11, 12, 15, 17, 30
Sn powder	Sn	○	○		○	○	○	5, 10, 11, 12, 17, 23, 24, 31
Pb powder	Pb	○	○		○	○	○	4, 5, 6, 11, 12, 14, 15, 16, 17, 18, 25, 27, 31
Zinc powder	Zn	○			○		○	9, 15, 17, 31
Al powder	Al	○			○	○	○	1, 2, 3, 4, 5, 15, 17, 20, 21, 30, 31
Solder powder	Sn-Pb	○			○			5, 13, 17, 21, 22, 23, 24, 28

- | | |
|-----------------------------|------------------------------|
| 1 Pyrotechnics | 17 Plating |
| 2 Thermit Reactions | 18 Sound Equipment |
| 3 Cold Solder | 19 Welding Rods |
| 4 Rubber Compounds | 20 Iron & Steel Foundries |
| 5 Bearing | 21 Ammunition |
| 6 Brazing | 22 Radiator |
| 7 Contact-Electrodes | 23 Jewelry |
| 8 Brush | 24 Special Solder |
| 9 Corrosion Resistance | 25 X-Ray & Radiation Control |
| 10 Filter | 26 Printed Circuit |
| 11 Friction Disc | 27 Sound Dampening Compound |
| 12 Machine & Ordnance Parts | 28 Additions to Iron Powder |
| 13 Grinding Wheel | 29 Infiltrating Powder |
| 14 Anti-Fouling Paint | 30 Friction Parts |
| 15 Plastics | 31 Catalyst |
| 16 Grease | |

Contents of Technology

1) Process description

The melting process makes use of an ordinary metal melting process, while the atomizing process breaks down to the air and water spraying methods depending upon the kind of products.

In the spraying process, the metal powder having required form and particle size can be manufactured by appropriately adjusting the spray nozzle, spray pressure and spray medium, while its particle size can be adjusted up to -325 mesh.

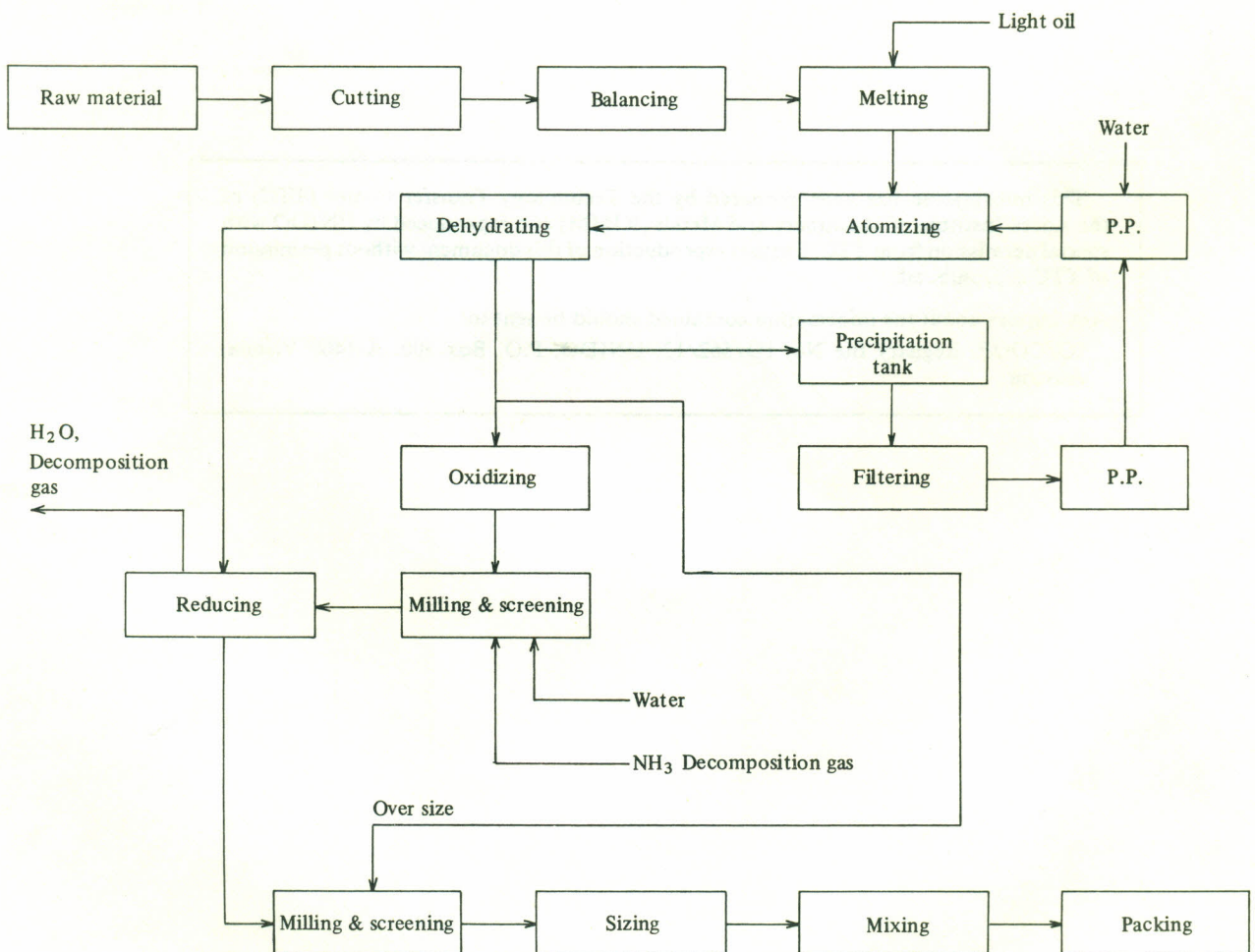
When water-sprayed, a dehydration process is necessary. The powder of irregular and porous form can be produced by oxidation and reduction processes depending upon the use of products.

The particle size adjustment as well as the addition of a lubricant are required for conforming to such conditions as its flow rate and expansion when sintering.

2) Equipment and Machinery

Mechanical press
Melting furnace
Atomizing chamber
Plunger pump
Oxidizing furnace
Crusher
Sieve
Reduction furnace
Duble cone mixer

Atomized Metal Powder Manufacturing Process Flow Diagram



3) Raw Materials and Utilities

- Bronze powder

Raw materials and utilities	Requirement (per ton of product)
Electrolytic copper	934.5 Kg
Tin	118.8 Kg
Electric powder	340 Kwh
Water	20 M/T
Light oil	4 D/M
NH ₃	5 Kg

2) Estimated equipment cost (as of 1981)

- Equipment and machinery : US\$ 285,000
- Utilities : US\$ 100,000

Total : US\$ 385,000

3) Required space

- Site area : 3,240 m²
- Building area : 784 m²

4) Personnel requirement

- Plant manager : 1 person
- Engineer : 2 persons
- Operator : 14 persons
- Others : 3 persons

Total : 20 persons

Example of Plant Capacity and Construction Cost

- 1) Plant capacity : 200 m/t/year

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