



INVOLUTE METAL POWDER TECHNOLOGIES

TECHNOLOGY PROVIDERS FOR FERROUS & NON FERROUS POWDERS SINCE 1987

'SPONGE IRON POWDER PLANT'

for

POWDER METALLURGY & WELDING APPLICATIONS

EXCLUSIVE REPORT

ABOUT US:

Involute Metal Powder Technologies (IMPT) are technology providers for the manufacture of ferrous and non - ferrous metal powders . Since its inception in 1987 , IMPT has facilitated the setting up of various manufacturing facilities at different locations in India .With expertise in Powder Metallurgy our powders have achieved national and international recognition. We changed the scenario of Powder Metallurgy in India in 1997 by inventing Partially alloyed Bronze powders and introducing them to the Indian Market.

Earlier known as S.Mohanty & Co, **Involute Metal Powder Technologies LLP** continues to bring innovative and advanced methods of metal powder production for use in various applications through the team's constant research and development.

SPONGE IRON POWDER:

Sponge iron powder is manufactured by process of chemical reduction of Iron Oxides, known as D.R.I. process, which makes the powder porous and spongy in characteristics. This provides for higher green strengths in the powder compacts, due to the inherent irregular shapes of the powder particles, unlike the atomized iron powders, which are regular in shape.

There are many companies in world that produce Iron powder via the processes of ATOMIZATION, and ELECTROLYSIS, but the only technology in the world that makes SPONGE IRON POWDER through reduction process, remains as a class by itself, and is an intricate ART in powder makings.

HISTORY :

The history of sponge iron goes to 350 A.D. wherein the Iron Pillar of India stands as a proof to the world that the technology of making of sponge iron was developed here in India but was forgotten in the sands of time.

Many centuries later ,in 1911,Hoganas A.B. of Sweden, re-invented the process of making sponge iron by a chemical reduction process, using the Magnetite Iron Ore, to produce sponge iron as a melting feed stock. In 1931, the process gradually evolved towards the manufacture of sponge iron powder by employing a second stage reduction by hydrogen .

Meanwhile, Pyron Corporation of USA too invented a process for making iron powder by single stage Hydrogen reduction of Mill scales (wastes of steel re-rolling) and got a low density iron powder which although, fell short for P/M applications , recently found its

unique use in the manufacture of Friction materials such as Brake pads etc., that arose due to the banning of the use of Asbestos in such Friction materials. Hoganas seized the opportunity and acquired Pyron, to remain a world leader.

SOLID STATE REDUCTION PROCESS- SPONGE IRON

Sponge Iron manufactured for Powder Metallurgy applications, essentially employs tunnel kilns or shuttle furnaces using Coal/Petroleum Coke/Producers gas/Natural gas or L.P.G. as its fuel. Such Sponge Iron is of purity exceeding 96% in iron content.



TUNNEL KILN



SHUTTLE FURNACE (courtesy S.Mohanty & Co)

GASEOUS STATE REDUCTION PROCESS

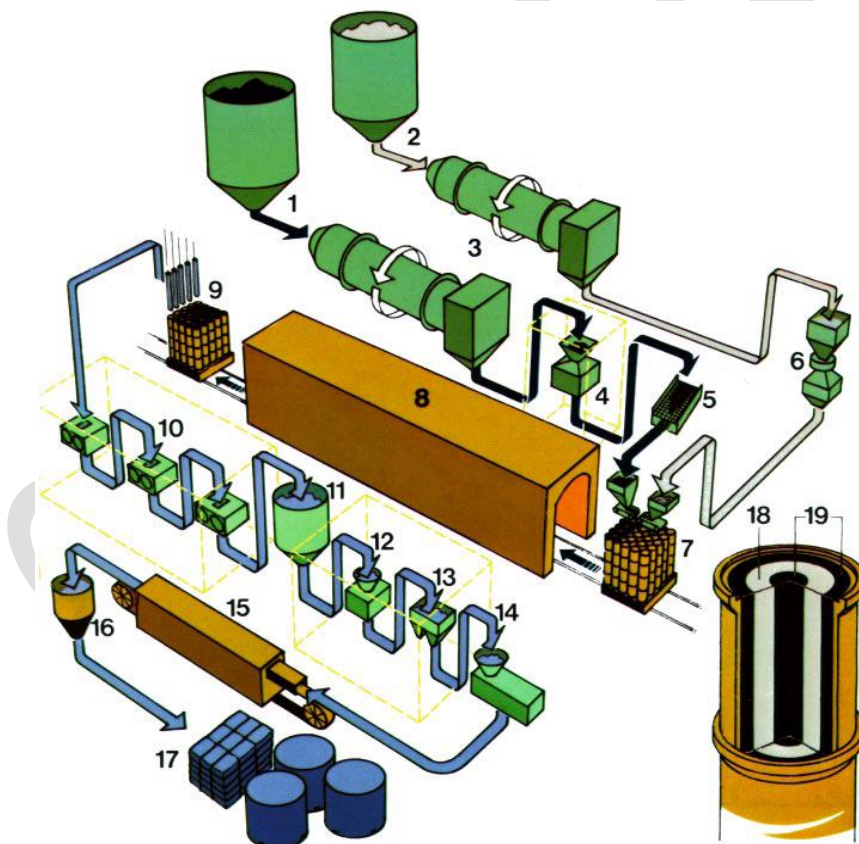
Be it solid state reduced sponge iron, needing secondary Hydrogen Reduction ,or the single gaseous state reduced sponge, manufacture of such products employ Hydrogen reduction in an Annealing furnace, either pusher type or a continuous belt driven one.



HYDROGEN REDUCTION FURNACE.
Co



HYDROGEN FURNACE courtesy S.Mohanty &



Schematic diagram of Sponge Iron Powder Flow chart

No.8 denotes the Tunnel Furnace and No.15 the Hydrogen Reduction Furnace.

- HOGANAS SWEDEN holds largest market share in sponge iron powder, while the rest of the global players like QUEBEC & KOBE make ATOMISED & REDUCED powders.
- Sponge Iron Powders finds a definite edge over Atomised Iron Powders and are most sought as they have six times more green strength and can therefore be used in intricately shaped automobile parts.
- Chinese companies which sell a mix of these land in India @ Rs,65000/ton. However the product quality is inconsistent.
- Few Indian manufacturers who sell IRON POWDER procure melting grade Sponge Iron and try to reduce it by Hydrogen gas, and as such their products are available below Rs.40000/ton due to their low quality.

‘However, no one has been able to use mill scale in a double stage reduction system to produce iron powders, for which we have the exclusive patents’.

UNIQUENESS & EXCLUSIVITY:

OUR PROCESS, therefore is described as one to manufacture various worldwide acceptable grades as well as some unique grades of Sponge Iron powders, with the proprietary and patented process of the two stage reduction of Mill Scales.

- ✓ Our process is the only one in world which using Mill scale gives both varieties and grades of the powder or a combination of both.
- ✓ We have developed Sponge Iron Powder by Reduction process which can be used for structural as well as other friction and non- friction sintering parts, together with uses in Welding Rods.
- ✓ We have also designed a unique coal /gas fired furnace which has multiple uses in chemical reduction processes.
- ✓ We have invented the process for making partially alloyed bronze powders used for sintered bushes. These powders can be used as replacement to Copper and Tin powders used in the same. These are neither premix nor pre-alloyed powders.

- ✓ Several partial alloyed powders including **Fe-Cu-Sn-Pb, Fe – Cu-Sn-Zn, Fe- Cu-Sn- Sb** for various P/M applications also have been produced at various manufacturing facilities depending on customized demands.

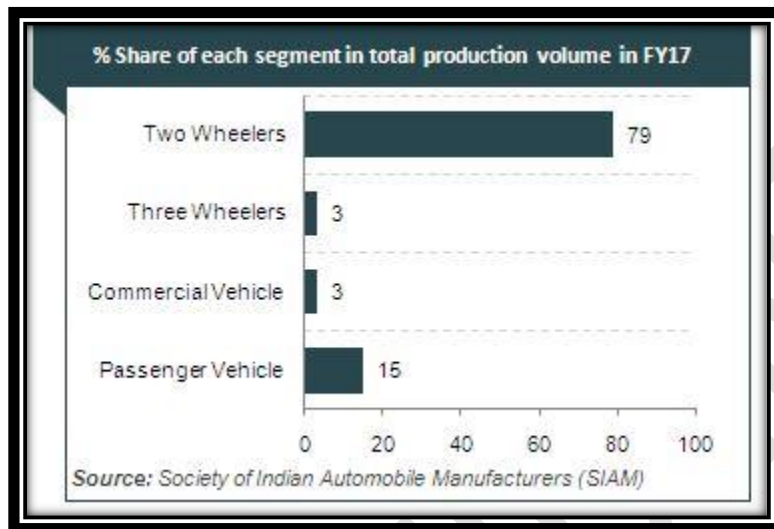
IRON POWDER APPLICATIONS :

- ✓ Self-lubricating bearings
- ✓ Parts with complicated geometry where high green strength is essential
- ✓ Shock absorber parts
- ✓ High density P/M structural parts
- ✓ Clutches and pulleys
- ✓ Brake pads and brake shoes
- ✓ Soft magnet applications
- ✓ Welding electrodes
- ✓ Cutting grade

MARKET SIZE & SHARE

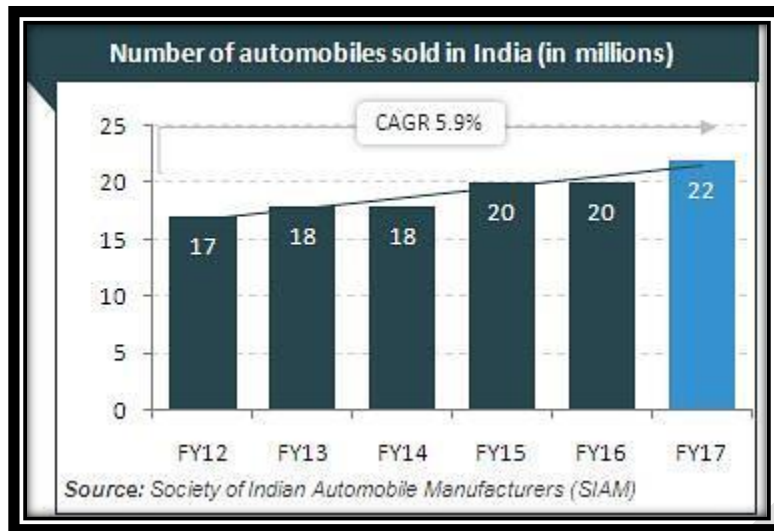
Almost a million tons of iron powder is used worldwide each year. Around 90% of this quantity is used in the production of sintered components and 75% to 80% of the sintered components are used in the automotive industry. The rest can be found in appliances, business machines, bicycles, hand tools and other implements made in large numbers.

The automobile industry in India is world's fourth largest, with the country currently being the world's seventh largest commercial vehicle manufacturer. The Indian automotive industry (including component manufacturing) is expected to reach Rs. 16.16-18.18 trillion (US\$ 251.4-282.8 billion) by 2026.



Two-wheelers dominate the industry and had a **79 per cent share** in the automobile production in **FY17**. Cumulative vehicle sales in India are estimated to have grown 13.5 per cent in FY18. Automobile exports from India increased **15.81 per cent** year-on-year in April-February 2017-18.

Approximately 50 pounds or around 25 kg of metal powder was used in automobile parts in 2010 and estimated 10 pounds i.e.; 5 kgs per two wheeler .



According to a SIAM report, 18 million vehicles are two wheelers and three million are passenger four-wheeler vehicles of India industry:

- Two-wheeler industry approximately consumes **90,000 tons of metal powder per year**
- Four-wheeler automobile industry consumes around **75,000 tons per year**
- 80% of the metal powder industry comprises of Iron powder and rest 20 % of nonferrous powders.

THUS, THE TOTAL CONSUMPTION OF SPONGE IRON POWDER IN INDIA IS APPROX. 1.32 LAKH TONNES/YEAR

-Information as per 2021

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