EXECUTIVE SUMMARY

1 Ferrites are essentially magnetic ceramics made of oxides of iron and other metals. They can be divided into two categories - soft and hard ferrites. Soft ferrites are those materials which do not retain permanent magnetism but provide easy magnetic path with low losses, while hard ferrites are magnetic ceramics which retain permanent magnetism and find application in both electronic and non-electronic sectors.

2 Hard ferrite magnets are made in two different magnetic forms - isotropic and oriented. Isotropic magnets are formed to desired shapes, sintered and then magnetised. These exhibit a modest magnetic field and find application in cycle dynamos, ring magnets and many novelties. Oriented magnets are formed to shape under a strong magnetic field and then sintered. These exhibit a very strong magnetic field and find application in loudspeaker magnets, magnetos of two wheelers and others.

3 The ferrite industry made an entry into India in the early sixties. Dr Morris, who is considered a pioneer in the ferrite industry, established M/s Morris Electronics in 1963. This was followed by M/s Permanent Magnets, the largest manufacturer of hard ferrites, today.

4 During the early eighties, there was a sudden spurt in the demand for hard ferrites due to increased investment in consumer electronics with the result that the total licensed capacity increased to 14000 tonne per annum, licensed to twenty two companies.

5 However, only half of them implemented their licensed projects and eight of them are now in production. They are M/s Permanent Magnets, Morris Electronics, G.P.Electronics, Aag Rola Magnetics, Magnetix India Ltd., Ferro Magnet and Allied Products, Auroville Electronics & Allied Industries, and Ferrite Manufacturing Co. The first five companies

entered into foreign collaborations for technical know-how, while the latter three utilised indigenous technology.

6 The hard ferrite market in India, caters to the requirements of magnets for loudspeakers, magnetos for two wheelers, magnets for D.C. motors, telephone instruments, dynamos of bicycles, etc. The major share is in the loudspeaker market which accounts for more than 60% of the hard ferrites market.

7 The production of hard ferrites during 1989-90 was 4200 tonne of which 600 tonne was exported. The domestic market has grown at around 15% per annum during the last seven years. It is estimated that the demand will exceed 7700 tonne by 1994-95.

8 The current installed capacity of the hard ferrite industry is 6110 tonne. The required capacity for the demand in 1994-95 is 10,300 tonne. Against this the licensed capacity of the running units is 10750 tonne. Addition to installed capacity is expected through normal market mechanism.

9 Manufacture of hard ferrites has the following stages:

Raw materials are thoroughly blended and crushed in a crusher and formed into pellets with a pelletiser. The pellets are then calcined at high temperature in a gas fired rotary furnace. Subsequently,the pellets are pulverised and milled to required micron size in a water cooled ball mill. After wet milling the slurry is fed into a die and pressed to shape at very high pressures. Hard ferrites are wet pressed/dry pressed under the influence of a powerful magnetic field to produce anisotropic properties. They are then sintered in a tunnel furnace at an elevated temperature (1300 degree centigrade) where precise temperature control is maintained. This controls the size and magnetic properties of the ferrite. For closer tolerances, these magnets are precision ground with diamond wheels on surface grinding machines. These magnets are then cleaned in an ultrasonic machine to remove grit and dust.

10 The raw materials needed are iron oxide, barium carbonate, strontium carbonate and additives and binders. One ton of hard ferrite would need approximately 1000 kgs. of iron oxide and 200 kgs. of barium carbonate or 50 kgs. of strontium carbonate.

11 Iron oxide is available in natural form in the Hospet - Bellary belt. It is chemically produced in most of the other countries.

12 The basic plant needed for manaufacture are ball mill, pelletiser, calciner, attritor, hydraulic press, sintering furnace and grinder. A new manaufacturer tends to import the plant in the first instance and indigenise for subsequent expansion.

13 In the world scenario, Japan has a market share of 36% followed by the USA, with 16%, Taiwan with 7% and USSR with 6%. The world production of hard ferrites in 1988 was around 2,50,000 tonne where the entertainment sector and the automotive sector consumed 68%. (This figure is 95% for India). India's production forms 1.5% of the world production while exports are around 0.2% of the world production.

14 The world market on hard ferrites covers more than 60 products. The estimated demand for the year 2000 AD, is 4.50 lakh tonne according to one estimate and 6.0 lakh tonne according to another.

15 The manufacturing process in terms of its stages is similar both in India and overseas. But, there are differences in scale of operations (overseas plants are ten times larger than Indian), automation (more automated), raw materials (synthetic iron oxide against mined product in India), tooling (multicavity and more complex) and product range (wider). This does reflect on the quality of the end product and its price.

16 Among the existing Indian manufacturers one obtained its technology from the plant supplier, four obtained from the product manufacturers and three used their own indigenous know-how.

17 National Physical Laboratory (NPL), New Delhi and National Chemical Laboratory (NCL), Pune have developed technology for hard ferrites and the indigenous technology has been licenced to 13 companies through National Research Development Corporation Limited (NRDC), New Delhi. Only four of them started manufacture but discontinued due to technological and other problems. So, the preference of the Indian companies is for importing a complete commercially proven technology including plant technology, tool design, applications engineering and others from abroad.

18 The major technology gap between India and the world arises largely out of the scale of operations. Against a standard single unit capacity of 10,000 tonne per annum overseas, the present Indian demand of 5,000 tonne is met by eight manufacturers, only four of whom have capacities exceeding 1000 tonne per annum.

19 The major differences between Indian and overseas companies in areas such as automation, process control instrumentation and handling, defects of products, arise out of differences in scale of operations.

20 A capacity of 2,500 tonne per annum can be regarded as economic under the present circumstances. If ferrite powder is sourced from outside, this can be scaled down to 1500 tonne.

21 Most of the manufacturing plant is now indigenised, but, the indigenous machines have lesser sophistication, lesser productivity and cost much less.

22 Gap exists in the area of tool design and manufacture in that the complex tools are not being made in the country and the lead time is very high.

23 A major difficulty faced in respect of raw material relates to inconsistency in the composition of the basic raw material, ferric oxide, which is natural material.

24 The Indian manufactured products suffer from visual defects and shrinkage cracks which do not detract substantially, from functional quality but constitute a big handicap for exports.

25 The process results in air pollution because of the handling of the fine particles of dry powder and this is handled by the manufacturing units through normal air filters. This, however, is regarded as a "dirty" industry due to the adverse environment faced by the workers, and as such, industries in the west would tend to migrate to the east.

26 Even though two of the existing units are in the Small Scale Sector there is little scope for small scale industry in this product in future.

27 The export market is very large and is growing but India is unable to tap this in any significant manner because of several factors. The basic issue is one of price where the Indian product is costly because of its operating on a smaller scale in a capital intensive industry. There are also problems of quality, tool availability, the poor image of the Indian product abroad and lack of any specific comparative advantage for India. In any event, the existing capacity is just adequate to supply the domestic market.

28 Following from this scenario of the industry, it becomes imperative that the Indian industry should upscale its operations closer to international levels. With this increased unit capacity and some degree of automation and instrumentation, it should be possible to compete in the world market.

29 There is also a need to diversify product range, improve upon the available raw material and develop indigenous plant and machinery. This industry needs to work closely with R&D establishments and plant manufacturers in India.

30 Other measures of importance would be standardisation of end products and establishment of a large ferrite powder manufacturing facility.

RECOMMENDATIONS

1 The need of this industry is to achieve economic levels of manufacture as compared to international levels. It is admitted by industry that its costs are higher by 30 - 40% as compared to international prices. A major reason for this is the scale difference between the fragmented operations here and the average operations of an overseas company, which has a significant effect on cost in this capital intensive industry. It, therefore, becomes necessary for the existing units to consciously work towards substantial expansion to achieve economies of scale and thereby address the export market. The industry needs to rise to the occasion in taking this calculated risk.

2 The existing manufacturers may enhance their capacities in preference to new capacities getting generated, to avoid further fragmentation. It may be worthwhile to consider 2,500 tonne per annum as the minimum economic capacity with powder plant and 1500 tonne per annum without powder plant.

3 Banks and financial development institutions also need to come forward to provide the loans required for expansion of capacity by existing units.

4 Automation is another issue which needs to be tackled by the industry. Automation and process control instrumentation as practised overseas is necessary for export oriented

manufacture. However, where the unit addresses largely the domestic market, automation needs to be assessed very carefully having regard to its cost benefit. It could become counter productive to over automate at low capacities.

5 The industry also needs to diversify its product range to areas not presently covered in India, but, which have wide outside market such as anisotorpic plasto ferrites. This involves considerable development work, in which the industry could associate outside research establishments. Certain amount of technical assistance may also be required from overseas.

6 An area of importance for the industry, is standardisation of end products, especially for loudspeakers and two wheelers, so that, the industry's tooling requirements can be brought down and cost of production can also be reduced through larger batch runs. Research establishments and Bureau of Indian Standards have a role to play, in this, along with the industry.

7 A significant way by which costs can be minimised is by organising large scale production of ferrite powder in the required grades so that the overall costs, including investment costs and technology costs can be minimised. This will also enable the smaller manufacturers to improve the quality of their products. Since, India has a substantial availability of this natural raw material, which is not available in most other parts of the world, the country should seek to exploit this advantage by setting up such a large ferrite powder processing facility. Part of the production of this facility can be directly exported, but, the aim should be to add further value and export as hard ferrite. In this context, the pilot plant set up by the National Mineral Development Corporation can be expanded into a full scale facility and the hard ferrite industry needs to take this into account in its further investment decision.

8 The industry should come forward to make use of R&D facilities, set up elsewhere such as with the IITs and CSIR laboratories to carry sponsored Research and Development studies in the areas of product development, materials development, process economies and others. The industry and the concerned research institutions should make bold efforts to meet each other's needs and collaborate closely.

9 The industry also needs to work closely with machinery manufacturers in India and even try to develop new manufacturers of smaller size, since, the existing manufacturers do not consider the business volume to be worth while. This has to be accorded priority since, capital cost is a critical factor in the cost of production of this industry and the cost difference between imported plant and indigenous plant is enormous.

10 The hard ferrite industry in India has developed at a steady pace, initially, as import substitution and then, to cater to the growing domestic demand. It is time for the industry to make a break and take a high growth trail by making a determined attempt in the export market, which is vast.