CHAPTER-I

EXECUTIVE SUMMARY

1.1 GENERAL

The Material Handling Equipment are classified in four different sectors namely Cranes, Conveying and General Equipment which includes specialist bulk handling equipment such as stackers and reclaimers, pneumatic and ash handling equipment and fork lift trucks. This study which provides the status report on the technology employed in the segment of material handling equipment manufacturing industry was embarked upon under direction of DSIR by MANTEC Consultants. The study highlights the present status of industry as well as focuses attention on areas which require upgradation of technology. It recommends action and remedies with a view to update technology on one hand and preparing it to meet the demand of growing user industry on the other. This report is not a directory listing all the material handling equipment and their manufacturers but a good representative of these for the purpose of technology evaluation. The Chapter provides in a nutshell the synopsis of the study for quick appraisal. Reference to relevant chapter would be necessary where further clarifications/details are needed. This chapter provides the information in four sections as described above.

1.1.1 Industry Overview:

a) *Production Data:* In all 47 foreign collaboration arrangements were signed up to 1980 (refer Annexures 2.1 to 2.4). However, between 1981-85, sixty-one new foreign collaborations agreements have been signed (Annexure 2.5) which provide for enhancing the capacities of the equipment and updating the products. None of these cover any aspect of research and development whereby the industry could keep itself updated and competitive all the time in respect of product development, concept evaluation and the technology involved in producing the equipment. In addition to these units in the organised sector there are 350 units in the medium and small scale industries. Produc-

tion data for various equipment as per DGTD figures for the industry is summarised below :

Year	1977	1978	1979	1980	1981	1982	1983	1984	1985
Cranes (Structural Weight in tonnes)	20143	20321	15744	20500	22500	22500	20000	22000	21300
Material Handling Equipment (Conveyors and other equipment) (Rs. crores)	35	39	45	50	54.5	56	86.92	110.73	–
Ash Handling (Rs. crores)	–	–	–	–	–	–	3.92	4.427	7.30
Fork Lift (Nos.)	–	463	765	800	1000	914	720	842	829

While the production level of material handling equipment have grown perceptibly from year 1977 to those in year 1984 in all sections except cranes, these, however, have been almost stagnant in last 3 years in all sections other than Ash handling.

b) *Status of R&D :* The industry possesses the necessary manufacturing and designing infrastructure but lacks the backing of well organised R&D effort to keep itself updated. This is one reason that fresh foreign collaboration agreements are sought periodically to make up the deficiency that manifests with passage of time. New Foreign collaboration agreements which provide for increasing the capacity of equipment and updating of product list are sought which could be avoided if planned R&D is done in the industry.

c) *Indigenisation :* A thrust also needs to be made to indigenise control instruments including continuous weighing machines and imported contents of fork lift trucks to achieve self reliance.

Salient features of individual sections are highlighted below :

1.2. CRANES

1.2.1. *Technology Overview :* Despite best efforts, the technology obtained from the leading manufacturers through collaborations is not the latest. This is mainly because the collaborators transfer that technology whose commercial potential has already been fully exploited by

them. Latest technology based on R&D is not shared for obvious commercial disadvnatage. The Indian Industry has however, been able to establish a base to make different types of cranes, but lacks the technological dynamism towards growth, development of new techniques, designs and systems.

1.2.2 *Infrastructure for Manufacture:* Fabrication of structural work and manufacture of equipment for cranes needs a versatile base. Most of these facilities are available in Indian Industries. The manufacturing techniques and equipment are mostly labour intenstive and dated. Upgradation has not kept pace with the changes occurring at international level resulting in poor productivity, higher costs and poor finish.

1.2.3. *Designing Capability & Standardisation:* Designing of different types of cranes is being undertaken either as per the guidelines provided by collaborators or from the outright purchased detailed drawings which are adapted to suit the particular conditions specified by the end user. Some of the organisations have developed software for design calculations and have been able to achieve upto 10% reduction in raw materials for the same load capacity. With little or no innovation the technology is static.

The R&D work is limited to the designing effort in adapting the cranes to suit the particular requirements but there has not been any real breakthrough in assimilating basic know-why or R&D to develop new concepts.

Since the technology has been obtained from diverse sources, the individual equipment manufacturers have adopted their own norms and standards. Due to diversity of product design, the quantities produced individually of fitments and hardware are small and hence advantage of economy of scale cannot be taken for product improvement and cost reduction.

In the existing conditions, achieving self-sufficiency, international competitiveness and good quality, will be difficult till substantial efforts are made to carry out R&D to develop basic design and engineering capabilities.

1.2.4. *Indigenisation of Control Instruments:* Electrical Drive Motors, brake mechanism and control system for heavy cranes are being imported from diverse sources. This is also applicable for control panels for

smaller cranes. There is little effort to evolve common standards, on one hand, and involve the relatively developed segment of indigenous industry of control instruments for meeting the demands on material handling equipment industry on the other. Proper assessment of long term requirement for undertaking production are not being considered.

1.2.5 *Assessment, Gaps and Remedial Measures:* The industry generally employs out-dated manufacturing techniques. There is inhibition to make use of automation for achieving precision and economy in costs because of larger capital investments against uncertain demand of finished goods. There is no effort to evolve detailed national standards for different types of cranes, control instruments, sub-assemblies and major assemblies. Some of these problems can be traced to diverse collaborations for similar products.

a) The gap in manufacturing technology includes employment of conventional designing methods, orthodox machine tools, manual layout and cutting techniques in the country as against CAD techniques, CNC machines & Photo-electric flame cutting machine used extensively in developed countries. Absence of descaled model testing and other simulated facilities is a serious disincentive for developing original & new concepts. Inability to test new ideas on ground for their viability leads to lack of confidence and results overdesigning. Resultant lack of competitiveness leads to seeking repetitive import of technology.

b) Standardisation of models, sub-assembly and control instrument needs to be undertaken. R&D efforts need to be organised at National Industry and unit level to provide a proper futuristic direction to the efforts of the industry which otherwise has very viable infrastructure backed by capable trained manpower. Facilities for conducting research for developing new concepts and computer aided designs, structural stress analysis and their testing with the help of descaled models need to be created. There is room to organise interaction between future researchers, manufacturers and users.

1.3. CONVEYING AND GENERAL MATERIAL HANDLING EQUIPMENT

1.3.1. *Technology Overview:* The Industry has done well to absorb the technology acquired through collaboration agreements. Considerable

progress has been made towards indigenisation. The requirements that arise in the user industry are well looked after. It however, still depends upon foreign support for product improvement.

1.3.2. *Manufacturing Infrastructure:* During the course of its development, the industry has built up the necessary infrastructure and generated trained manpower to undertake manufacture of all types of equipment needed for meeting the existing demands. Some of the units like K.C.P. have specialised in meeting the demands of the Sugar and Cement Industry.

Despite alround capabilities being available indigenously, some of the new projects launched with foreign collaborations prefer to acquire material conveying systems from the collaborators as a part of total package although equivalent systems can be supplied by indigenous manufacturers. This not only is resulting in wastage of foreign exchange but also not letting the industry utilise its full potential. Such an approach shows lack of faith in the industry and hampers growth.

1.3.3. *Design & Standardisation:* Although some standards in general form are available, no common standards have been drawn in respect of components, sub-assemblies and major assemblies used in material conveying equipment. Invariably the manufacturers follow their own standards. Consequent manufacturing processes adopted are on the job-lot basis. As mass production techniques cannot be employed, cost reduction/quality improvement, is not easily possible. The industry has not built up sufficient strength in R&D for original designing and product development. The necessities are met by signing fresh foreign collaboration agreements or through outright purchase of designs.

1.3.4. *Control Instruments & Continuous Weighing Machines:* Continuous weighing machines upto capacity of 10000 TPH have been developed with an accuracy of ± 0.5%. However, the technology in this industry is not updated so far it concerns sensing, monitoring, control and recording equipment. There is need for updation, in line with the international trends, to keep pace with fast changing technology which provides auto correction. Since the electronic industry is implementing new projects, sophisticated electronic equipment required in aid of this work demand could be taken up for indigenous manufacture to ensure continuous support.

1.3.5. *Assessment, Gaps and Remedial Measures:* This segment of general

material handling equipment manufacturing industry is well organised, possessing all the ingradients of infrastructure and trained manpower. All the necessary machine tools are available. However, in the field of control instruments and continuous weighing machines, it is still dependent on foreign help for product development. Similarly there is need to assess and club the requirements of control instruments and continuous weighing machines at first to meet the on-going requirements and then to develop better instruments for deployment in future.

1.4. PNEUMATIC AND ASH HANDLING EQUIPMENT

Study of ash handling equipment have assumed special significance in view of manifold increase in Thermal Power Generation. Since 1983, DGTD has separated it from general material handling equipment and brought it under a separate heading.

1.4.1. *Technology Overview:* Initially ash handling systems for thermal power station boilers used to be imported and later on technology based on wet, dry and submerged scraper conveyor was inducted through collaborations. Each system has its own advantages and disadvantages. All these systems are in use in a different generation of boilers. There is a need to standardise on the type of systems to be used and suiting the prevailing conditions in the country. In spite of having reputed collaborators, the ash handling equipment in use have a number of problem areas during their life cycle and maintainability. Some of the problem areas are equipment, construction materials, ash disposal and applications, pollution control, etc.

1.4.2. *Manufacturing Infrastructure:* This equipment manufacturing industry is well -developed in all aspects and geared to meet the demands of thermal power stations.

1.4.3 *Design & Standardisation:* The systems conform to overall specifications but have a great variation in components and sub-assemblies from manufacturer to manufacturer. The ash handling equipment manufacturing technology for the large modern thermal power plant & boilers is in a state of development & growth. Innovation and improvements are being made in the light of experience gained. Keeping in view the quality of coal, its calorific value, the system requirements need to be studied for designing the equipment. The equipment manufacturers have to invest in their own R&D on one hand and keep abreast of international trends on the other. Most of

the manufacturers are having foreign collaboration for such product development work.

1.4.4. *Assessment, Gaps and Remedial Measures :* Overall standards need to be evolved with a view to optimise the design parameters and improve the quality of products so as to reduce maintenance costs and improve the life cycle. For continuous updation participation of entrepreneurs, engineers, designers and those designing thermal plants through the forums of national seminars be encouraged. Such seminars would help in evolving a national approach for developing updated technology. R&D effort need to be formally organised to develop better concepts.

1.5 FORK LIFT TRUCKS, STACKERS AND ORDER PICKERS

1.5.1. *Technology Overview :* The equipment manufacturing units in this sector have built up the necessary infrastructure to build fork lift trucks upto a capacity of 10 tonnes. While the indigenous technology has been developed to produce 4 tonne fork lift trucks without any outside help, and fork lift trucks of 10 tonnes and 6 meter lift height are being produced with foreign collaborations, higher capacity fork lift trucks are being imported. Indian products which had found acceptance abroad earlier are loosing ground because of lack of competitiveness both in cost and design.

1.5.2. *Manufacturing Infrastructure :* The industry has set up a large capacity for producing the equipment. It is well backed by vendors. The capacity utilisation has stood at about 35%. The cost of fork lift trucks are prohibitive. In order to encourage the industry to use this material handling equipment, it is desirable to develop inexpensive models on one hand and improve upon the technique of production so as to reduce its cost. The existing units are not able to undertake manufacture of high capacity fork lift trucks, stackers and order pickers. This situation is however, being improved by entering into fresh foreign collaboration agreement. Some of the units have launched assembly from SKD/CKD Kits. Indigenisation effort would take a little more time.

1.5.3. *Design & Standardisation :* Various models serving the same needs are being produced by the various units. In the absence of any standardisation, large number of units manufacture small number of these equipment resulting in un-economic production cost. No effort is discernible in developing inexpensive models for indigenous users. Similarly practically no headway has been made to develop indigenous

models of higher capacity fork lift trucks for container handling and for operation in rough terrains. Foreign collaborations have recently been finalised to meet this deficiency.

1.5.4. *Assessment, Gaps, & Remedial Measures:* There is need to improve the capacity utilisation of the industry. Such an objective can be achieved through generation of internal and external demand. There is need to standardise on models for use in the country in the first instance and organise research and development effort to bring in improvement in products & concepts. New and more cost effective techniques need to be developed to bring down the cost of production and improve the quality of goods to obtain a reasonable share of the export market. Unless we develop our own capabilities in time, dependence on foreign collaborations for product updation will continue over the coming years. Example of new agreement for higher capacity fork lift trucks for containers and use in rough terrains is relevant.