

## Executive summary

### S & L programme for motors

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#### Objective:

To appraise the spread of efficiency of fast moving electric motors (2.2 & 3.7 kW) motors as a preparatory activity to arrive at standards for the BEE programme.

#### Approach:

30 motors each of the above rating were procured and tested for performance as per IS 325 in NABL accredited laboratories. These motors were stripped for evaluation of quality and quantity of active materials (steel and copper). These test results were analysed for arriving at the minimum energy performance standards.

#### Strategic partners:

Thyssen Krupp Electrical Steel India Private Limited (TKES), Bureau of Energy Efficiency , International Copper Promotion Council of India and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH. GTZ had provided funding for equipment purchase, energy efficiency and material testing of equipment samples and other studies to arrive at minimum energy performance standards. TKES had employed the Task Manager, ICPCI have provided the office, BEE & IGEN and the other partners have been providing technical inputs. Testing was carried out at SiTarc, Coimbatore.

#### Major findings:

- The test results for efficiency indicated that only 35% of the **2.2 kW** samples conform to EFF – 2 not taking into account the generous tolerance benefit. If tolerance benefits are taken into account 71% will qualify for EFF – 2. However, still 29% of the samples failed to meet EFF – 2 standards.
- The test results for efficiency indicated that only 47 % of the **3.7 kW** samples conform to EFF – 2 not taking into account the generous tolerance benefit. If tolerance benefits are taken into account 68 % will qualify for EFF – 2. However, still 32 % of the samples failed to meet EFF – 2 standards.
- The tests showed (see chart 1 through 4), a rather surprising result that **“Those manufacturers which used the least efficient active material in fact paid the highest active material costs for manufacturing the motor”**.
- The reason is that the lower efficiency motor manufacturers used more copper as well as more quantity of lower quality steel. The active material (electrical steel and copper) account for 50% of the cost of motors. The thinking of manufacturers that use of substandard steel (high watt loss steel) would help them to reduce the manufacturing cost is not correct, since, they tend to use more copper, which is 6 times costlier than steel.
- Manufacturers of motors with EFF - 2 and above efficiency spend 23% of the sales price of motor on active material. Manufacturers not conforming to EFF - 2 spend almost double (43%) the cost in active material and also do not realize good price for their products, while they spend more on active materials. All the above analysis points to the fact that **“EFF - 2 motors could be manufactured by all the manufacturers without increasing the cost of manufacture”**.
- More over, some of the manufacturers have conformed to EFF – 2, taking advantages of the tolerance provided in IS specifications by using lesser quantities of active materials. The average active material cost of such manufacturers is low. The tolerance levels in terms of **absolute efficiency percentages** for 2.2 kW and 3.7 kW is 2.85 % and 2.4 %, respectively.

Chart1

### Relation between active material cost and efficiency

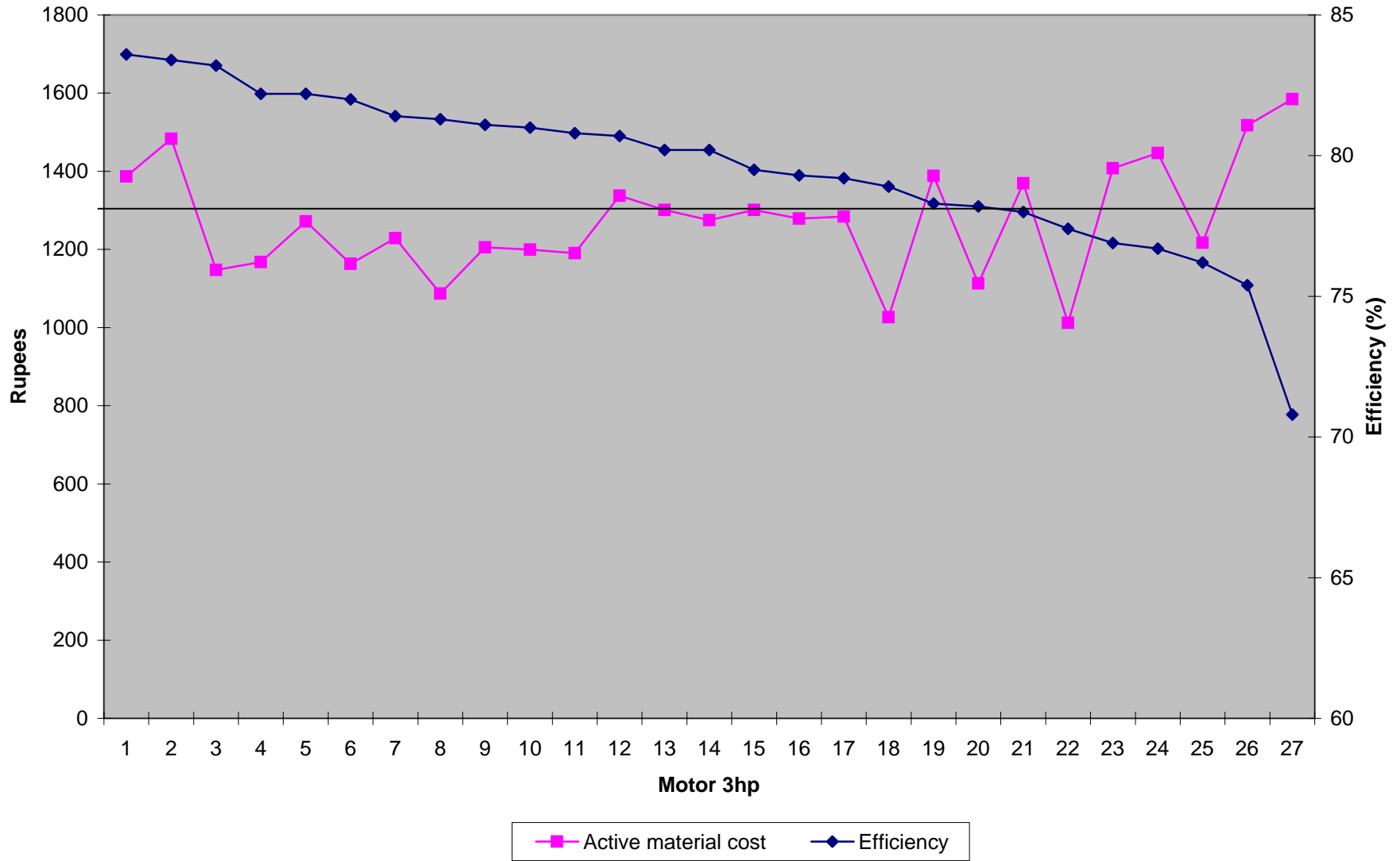


Chart 2

### Relation between purchase price and active material cost

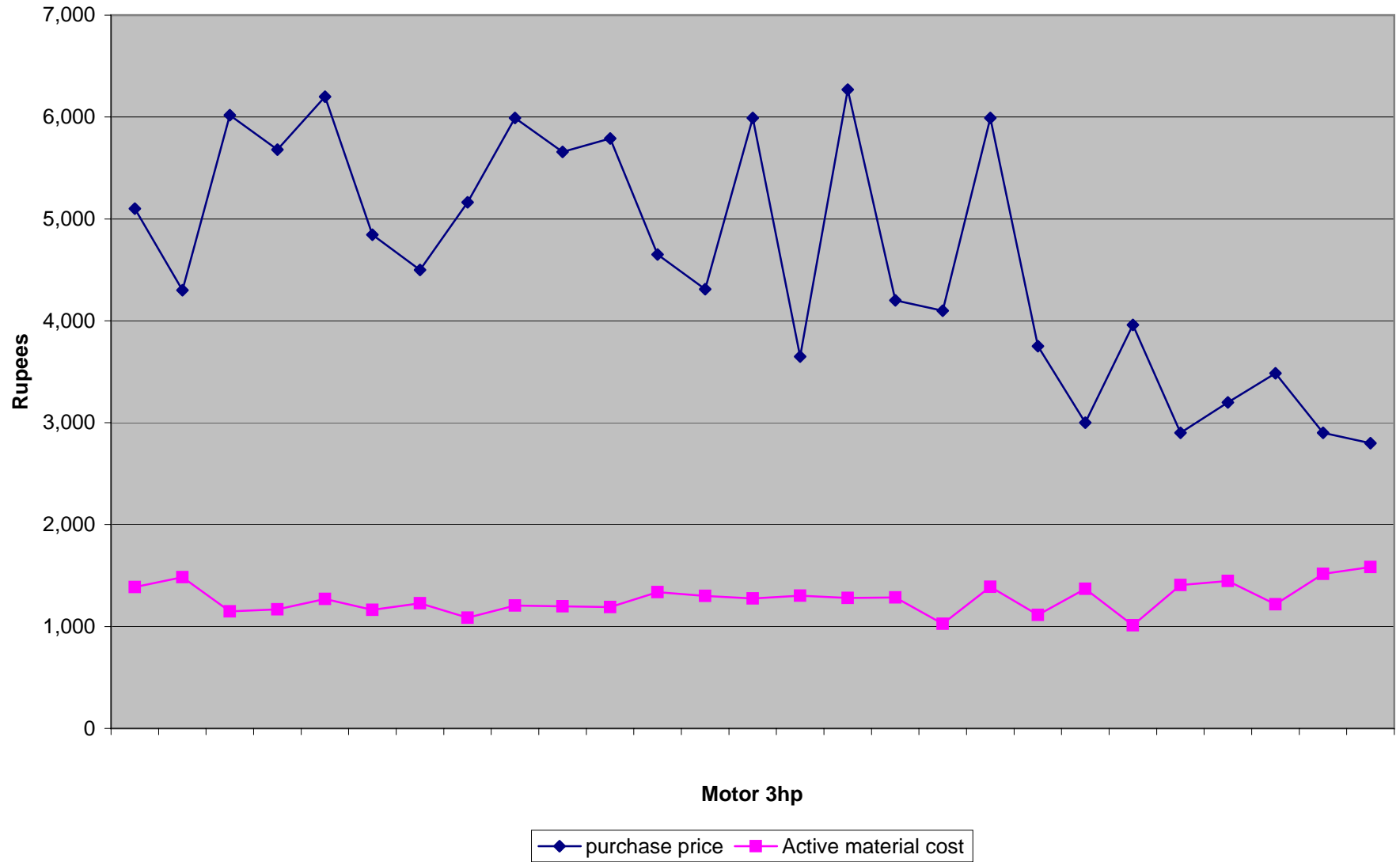
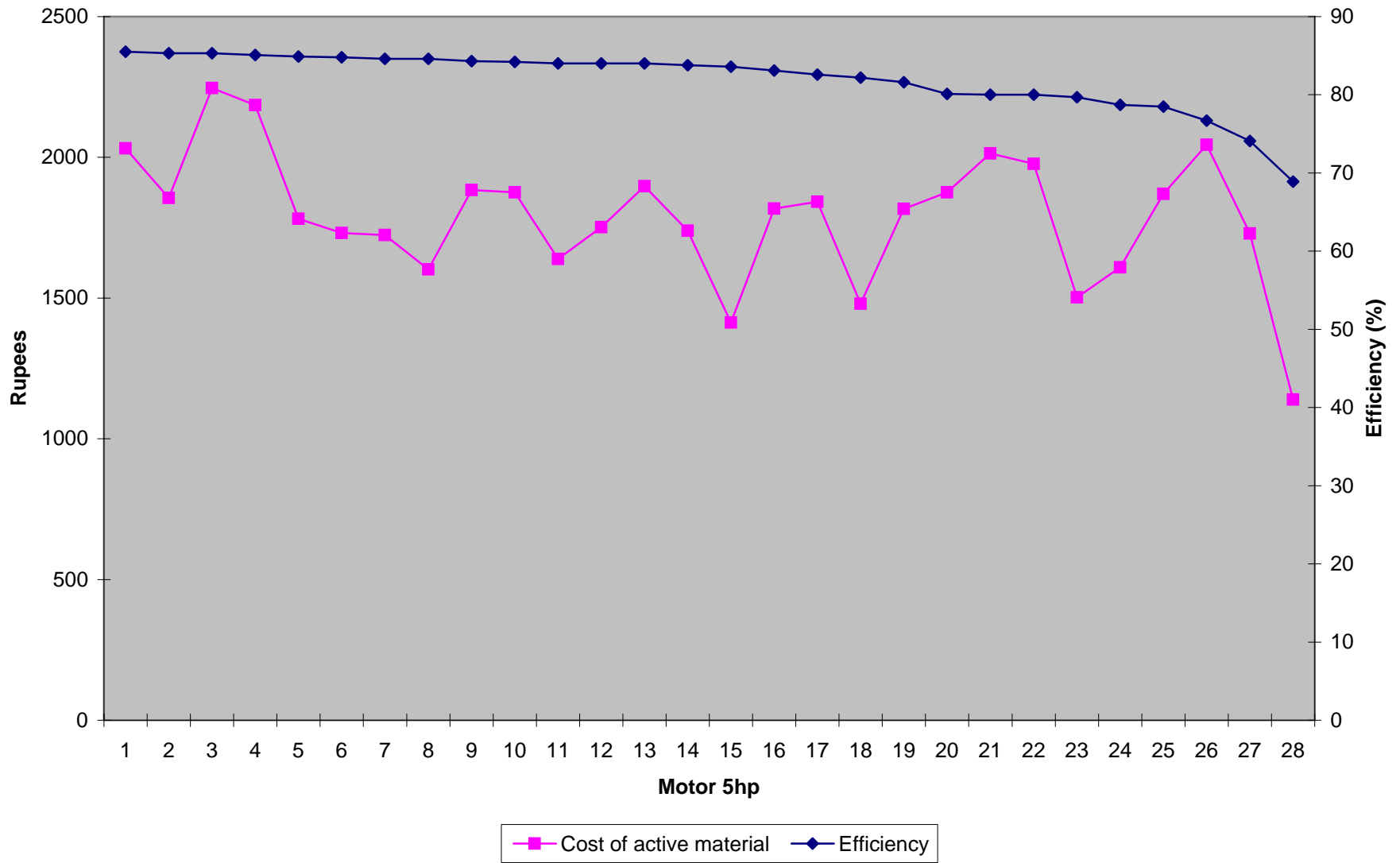


Chart3

### Relation between active material cost and efficiency



Relation between purchase price and active material cost - 5 hp

