CHAPTER 11

CONCLUSION

Based on the study of “Energy Optimizing Furnace” carried out during research period, following conclusions are drawn:

1) Energy Optimizing Furnace, under Indian conditions, is a very efficient steel melting unit for achieving high productivity, quality specifications, and low cost of production.

2) Energy Optimizing Furnace is a developing process route with enormous scope for improvements possible in steel manufacturing. However, LD converters and EAF are matured technologies with very little scope for further improvements. Even at this nascent stage, EOF is better than EAF with regard to capital investment, productivity and operational cost. The operational cost in EOF is Rs.1,500/- per MT less than that of EAF. The investment cost for EOF is only 50%, when compared with LD converters. The productivity and operational cost of EOF and LD converter are comparable.

3) Following modifications in the EOF were carried out to improve its performance under Indian conditions:
   - Through modification of the refractory lining of the EOF hearth and strengthening of certain mechanical parts, the capacity of the EOF was successfully increased from 35 to 45MT, which helped to increase the productivity by 20%.
• Removal of the scrap preheater, for 80% hot metal – 20% scrap, maintained the productivity while it reduced power consumption by 10 KWh/MT, simplified the operations, and reduced the down time.

• Double shell practice facilitated proper maintenance of the water cooled elements in the EOF and helped to reduce the bottom changing time by eight hours.

• By reducing the tuyere diameter from 18mm to 14mm, and relocating tuyere no. 1 and 3 to 90 and 270 degree positions respectively, EOF refractory life increased, blow time reduced, and liquid metal loss through slag door was minimized.

4) Catch carbon process was very successfully implemented in the EOF. Very close relationship was established between carbon drop and total oxygen consumed during final stages of oxygen blowing period.

5) Through implementation of the catch carbon technique, with a consistency level of 85%, and certain other practices, following benefits were derived:

• Charge to liquid metal yield increased by 2%.

• Blow time reduced by 6 min per heat

• Refractory consumption reduced by 2.3 Kg/MT.

• The recovery of de-oxidation, carburizing materials and yield improvement resulted in cost reduction up to Rs. 306/MT depending on steel grade.
6) World’s largest EOF (65 MT) was commissioned and the results of the very first campaign were quite satisfactory with much room for improvement. SISCO is the only steel plant in the world with one million tones per annum where 100% steel is manufactured through one 45 MT and one 65 MT capacity EOF operating successfully.