8.0 CONCLUSION

The existing deoxidation practice in tube-maker grade gives crack edges in 20 to 25% of the hot rolled coils. In the present study, the effect of deoxidation on edge cracks in hot rolled coils has been investigated. It is found that the deoxidation has profound influence on edge cracking. Results obtained in the study are summarised below:

1. The edge cracking as shown by SEM studies is by microvoid formations and their coalescence. The cracked portion exhibits dimples, which indicate that the cracking is of ductile nature.

2. Manganese, in steel is helpful in decreasing edge cracks. Manganese is restricted to 0.50% in tube-maker steel, since increase in manganese makes the coil hard.

3. Decrease in sulphur level causes decrease in edge cracking. At higher levels of sulphur viz., 0.035% and above, higher degrees of deoxidation are required to overcome the problem of edge cracking.

4. With increase in silicon, percentage of crack-edge coils is reduced. Semikilled steels having silicon less than 0.045% exhibit lot of blowholes near the ingot.
FIG. 55. EFFECT OF CARBON ON SOUNDNESS OF INGOTS
surface. Ingots having about 0.080% silicon show concentrated pipe at the top.

5. Aluminium addition in the ladle does not help much in reducing edge cracks. With manganese-silicon aluminium ladle deoxidation, percentage of cracked edge coil is about 12 to 13% and this is also considered high. With manganese-aluminium deoxidation, obtaining correct deoxidation is very difficult and about 54% of the coils made by this deoxidation method have crack edges.

However, addition of aluminium shots at the rate of 0.125 Kg/T during teeming to the steel, already deoxidised with ferromanganese and ferrosilicon can ensure ingot to slab yield around 87 to 88% and also crack free edges in more than 97% of the coil production.

6. Longer heating time of ingots in soaking pits causes an increase in crack edge coil percentage. Heating of low carbon semikilled ingots for time longer than 7 hours should be avoided.

7. Theoretical analysis to predict the optimum composition in low carbon semikilled steels indicates that lower carbon levels can give optimum ingots for wider silicon ranges. It is suggested that Rourkela Steel Plant may find out the suitability of producing tubemaker steel in the carbon range of 0.60 to 0.08%.