CHAPTER 6

CONCLUSION

In the present research work, the major conclusions drawn from the two phases of work carried out on the cast SASS are detailed in this chapter.

1. All the six cast alloys do not reveal any gas defects on the castings indicating the fact that no nitrogen is in free form to produce gas defects even at 0.44% N.

2. Dendritic segregation is higher with lower nitrogen content in the presence of Chromium, Nickel and Molybdenum. Dendritic segregation up to 40% was observed for an alloy with 0.16 wt% nitrogen whereas dendritic segregation decreases to 12% in an alloy with 0.44% N.

3. To increase the recovery of nitrogen, higher amounts of Mn and Mo contents in the molten SASS are required. On the other hand, the yield of nitrogen is reduced with increasing Cr and Ni contents in the molten metal.

4. Higher dendritic segregation results in higher hardness up to 375 VHN in the as-cast condition while hardness is only 267 VHN for lower dendritic segregation in the alloy with 0.44% N.

5. SASS with low N content shows austenite with more amounts of secondary phases up to 18 vol% in the solution-
annealed condition. Whereas, SASS with higher nitrogen content of 0.44 wt % shows fully austenitic structure without any secondary phases in the same solution-annealed condition.

6. After solution–annealing the alloys containing secondary phase show higher hardness compared to alloy with fully austenitic structure.

7. Strength and toughness of SASS in the solution-annealed condition increases with increasing nitrogen content. Alloy with higher nitrogen content (0.44 wt % N) has the highest strength (780 MPa UTS) without loss of toughness (210J impact energy at room temperature).

8. The resistance to pitting corrosion of SASS increases with increasing simultaneously Mo and N contents. Alloy with 7.8 wt % Mo and 0.44 wt % N content in the solution-annealed condition shows the best pitting resistance and higher PREN number.

9. In critical pitting temperature test of SASS with low Mo and N content exhibited higher corrosion rate at lower critical pitting temperature, whereas higher amounts of Mo and N content SASS showed a low corrosion rate even at higher critical pitting temperature.

10. Welding of SASS with the filler ENiCrMo-3/ ERNiCrMo-3 was found to be better than welding of SASS with stainless steel fillers by both SMAW and GTAW process in terms of both pitting corrosion resistance and susceptibility to hot cracking.