CHAPTER 9

CONCLUSION

9.1 INTRODUCTION

Foundry practices had been in existence in the world for a very long time (Anderson et al 2008). Being the source of wealth generation, foundries had been started in many countries in the olden days. After the middle part of the twentieth century, the requirement of cast components increased to a large volume in the world (Fore and Mbohwa 2010). As a result, foundries amazingly increased in number in several countries. Within few years of this development, the governments of several countries began to realize that, although foundries were aiding to generate enormous wealth, they were also causing high level of pollution which affected the health of the people (Sekhar and Mahanti 2006).

As a result of this realization, governments of various countries began to stipulate the pollution emission levels for foundries. This affected the growth of the foundries in these countries (Neto et al 2008). On the other hand, foundries began to improve the melting technology and install PCDs. Amidst these developments, researchers realized that, foundries need to be protected by evolving solutions for controlling the emission of pollutants. As a result of this realization, few papers on improving the melting technologies and installing PCDs have appeared in literature arena. The reason for the appearance of only few papers dealing with this sensitive research area is attributed to the reason that, foundries are not promoted in developed
countries and hence, researches have not been carried out in these countries in the direction of improving the performance of foundries and preventing the pollution problems caused by them.

Despite the low volume of reporting of the researches on applying PCDs in foundries, it is concerning to note that, researches leading to the important findings in this direction have been appearing in the recent research papers. The most important finding is that, the stipulations of pollution control agencies set by the governments are varied among the countries (Rabah 1999). The second finding is that, the foundries have been developed as clusters due to many factors like emergence of original equipment manufacturers around the foundries and availability of raw materials (Mukherjee 2010).

Third finding is that, the conditions preventing the foundries from implementing energy efficient melting technologies and PCDs differ from cluster to cluster. These findings collectively indicate that, researches covering the foundries of different clusters located in different countries will lead to the findings of solutions for achieving sustainability of foundries through the application of energy efficient melting technologies and PCDs. Presumably on realizing this research imperative, some researchers have conducted this kind of research activities in certain foundry clusters. For example Pal et al (2008) and Murkarjee (2010) have reported the application of energy efficient melting technologies and PCDs in foundry clusters of Howrah district situated in India. Likewise Polizzi et al (2007) have reported such kind of researches in Turin district in Italy. A projection of views in this direction indicates that in future, many more such researches in several clusters of foundries need to be carried out. The knowledge that would be generated from these researches would be useful to bring out solutions for sustaining the foundries located in several clusters. The accomplishment of
this goal will result in future the abundant wealth generation through the foundries located in several clusters. In the context of realizing the need to achieve this goal, the doctoral work reported in this thesis was carried out.

In the beginning of this doctoral work, the literature survey was conducted to gather information about the researches that are carried out throughout the world to provide solutions to control pollution in foundries situated in different parts of the world. Then, the real time survey were carried out to gather the actual tasks exerted in foundries for controlling the information. These surveys were conducted in two stages. The data gathered from these survey were analyzed. The results of this analysis revealed that cassette filter is the most efficient PCD that can control pollution that arise from the iron foundries. Despite the several benefiting utilizing cassette filter, foundries continue to use wetscrubber. Hence, in order to cope up with this trend, an improved design of wet scrubber with incorporation of sand filtration techniques has been proposed. This proposed design was analysed by using CFD. Thus the pursuance of this doctoral work resulted in the identification of two solutions to control pollution in iron foundries.

9.2 CONTRIBUTIONS

The main contributions of the doctoral work reported in this thesis are highlighted below:

- The identification of the issues involved in utilizing PCDs in different parts of world
- Identification of cassette filters as the most economical and efficient PCD that can be used for controlling pollution in foundries.
• Drawing of information about the construction and working of cassette filter. This is an important contribution as the details of the construction working of cassette filter are yet to be reported in literature arena.

• Secondary pollution in foundries can be reduced using sand filtration techniques in wet scrubber. Hence, an improved design of wet scrubber in corporate with sand filtration techniques has been proposed. The effectiveness of this improved design investigated using CFD modeling.

All these contributions suggest the foundry engineers to choosing induction furnace melting the metals and cassette filter as the PCD to control pollution in the foundries. These contributions facilitate the hassle free running of iron foundries that will enhance the prosperities of societies in which these iron foundries are located.

9.3 LIMITATION OF THE WORK

The comparative investigations on utilizing wet scrubber and cassette filter were conducted only among the iron foundries located in Coimbatore city of India. This limitation leads to an impression that, the findings and contributions of this doctoral work may not be compatible with respect to the iron foundries situated in other parts of the world. However, this limitation is not very sensitive as the trend of controlling pollution that is emitted by the iron foundries located in different parts of the world is similar to that of prevailing in iron foundry cluster of Coimbatore.
9.4 SUGGESTIONS FOR FUTURE WORK

The results of the doctoral work reported in this thesis have pointed out the direction along which researches shall be conducted in future to bring about prosperity to the societies by running iron foundries that cause no pollution. To begin with, in future, doctoral work may be carried out by developing prototype of cassette filter and determine the optimum parameters of this design that will facilitate the efficient pollution control in iron foundries. In another direction, the doctoral work may be carried out for involving induction furnace that would consume least energy. Particularly the induction furnace that will cause least pollution in iron foundries may be designed and developed. In order to carry out this kind of doctoral work the involvement of engineers working in iron foundries is to be solicited for evolving practically compactable solutions.

9.5 CONCLUDING REMARKS

The doctoral work reported in this thesis, was begun by conducting literature survey on controlling pollution. The results of this literature survey favored the concentration of research activities in controlling pollution in iron foundries. Although relatively less number of researches on controlling pollution is reported in literature arena, the knowledge generated through these researches are highly useful to the engineers and managers who are working in iron foundries. One of the findings of these researches is that, the usage of induction furnace for melting the metals in iron foundries leads to the efficient controlling of the pollution. Further work conducted in this direction revealed that, the cassette filter is the most efficient and economical device that can be used for controlling pollution in iron foundries. As the construction and working of cassette filter is not made available in literature arena, the same has been presented in the sixth chapter of the thesis. Further,
investigation were conducted using computational fluid dynamic software to examine the adoption of sand filtration techniques to reduce secondary pollution in iron foundries in which wet scrubber is used. This thesis is hereby concluded with the suggestion to carry out numerous doctoral works by the future researchers to evolve improved and economical versions of cassette filter that would enable the iron foundries to perform at zero pollution level.