CHAPTER 9

CONCLUSION

9.1 SUMMARY

A methodology for the implementation of IAS has been developed and implemented in a manufacturing enterprise to effectively manage and control the various application systems of the enterprise.

The identified CSFs for the implementation of IAS predict that significant benefits will be achieved only when technology and processes are integrated and key success factors are considered. These factors also reveal the fact that system integration should be achieved in a cohesive manner to provide a complete and intelligent solution to the manufacturing industries. The research framework empirically evaluating the successful integration, and shows the CPIs, and CPMs. The tackling of CSFs result in effective planning and scheduling, effective communication and coordination, effective use of managerial skills, technology, effective control and monitoring, and availability of resources.

A modelling approach for the design and implementation of integrated automation system using CIMOSA has been presented, which follows the enterprise system life cycle starting with requirement definition, followed by design specification and ending with the description of the implemented operational system, which offers a modular approach, structuring and modelling.
the business into manageable units (processes) and models the operations as a set of cooperating processes exchanging results and request (events) between themselves.

IIS for CIM implementation in manufacturing enterprise is to build an Integrated Automation System and fills the gap between the different kinds of hardware platforms, operating systems, and data storage mechanisms. It also provides a unified integration interface, which enables quick and efficient integration of different applications in various computing environments. IIS establishes a Knowledge base to control information flow and data consistencies and functional relationships among enterprise modules and Integrated Information System. A method to reuse the existing Internet infrastructure and transforming the plant information to wireless / mobile devices is also established.

To combine robustness against disturbances and unforeseen changes with performance optimization and predictability, a holonic control architecture has been presented, that integrates the entire range of manufacturing activities from order booking through design, production, and marketing to realise an agile manufacturing enterprise. The system combines knowledge and material processing, and is evolutionary in nature to accommodate changing requirements. The decentralized information structure, the distributed decision-making authority, the integration of physical and informational aspects, and the cooperative relationship among holons, make a new paradigm, with great potential for meeting today's agile manufacturing challenges. Control architectures for Integrated Automation Systems satisfies requirements such as autonomy, reliability, fault-tolerance, interoperability, re-configurability, and other real-time functionalities.
The methodology for the implementation of IAS presented above has been implemented in an enterprise and the results show that the production has indeed optimized to predicted standards. The comparative statistics very broadly and particularly certifies the supreme addition brought in by CIM based IAS. The CIM model developed for this industry made possible effective implementation of IAS with reference to the industry.

9.2 CONTRIBUTIONS

- The research could successfully identify all Critical Success Factors for IAS.
- The system has been modeled using CIMOSA and the performance has been analysed using Petrinet.
- The identified CSFs and the CIMOSA modelling accomplished were logical for developing an Integrating Infrastructure. Integrating Infrastructure filled the gaps between the different kinds of hardware platforms, operating systems, and data storage mechanisms and provided a unified integration interface, which enabled quick and efficient integration of different applications in various computing environments.
- A holonic control architecture has been developed for the IAS. The Control architecture for Integrated Automation Systems thus developed provides autonomy, reliability, fault-tolerance, interoperability, re-configurability, and other real-time functionalities.
• A CIM model has been developed for the implementation of IAS.
• The CIM based IAS detailed above has been implanted successfully in a manufacturing enterprise and the performance also has been tested and validated.

9.3 FUTURE RESEARCH

The new research directions emerged particularly in the area of IAS include the following:

• For improving the efficiency and analytical capabilities of the proposed system, new algorithms for the knowledge base verification, which would check higher levels of conflicts and consistency, has to be developed. The implementation of this knowledge base with complicated communication protocols and database accessibility issues in a manufacturing process has also to be tried in a real manufacturing environment.

• IAS in different enterprises can be integrated through web technology, as networked manufacturing enterprises to share their resources and complex manufacturing processes can be studied on simulated models using web technology.

• Multimedia can also improve the effectiveness of manufacturing and support new manufacturing environments such as virtual enterprises and agile manufacturing. The lead-time for transferring information, material and services can be reduced by an interactive multimedia application. Future applications should
include Group Ware video servers into the mainstream of the manufacturing operations. The Internet, incorporating computers and multimedia, has provided tremendous potential for remote integration and collaboration in business and manufacturing applications. Hence all possible inter phasing should be tried for effective information sharing.

- Incorporating the above research aspects case studies can be made in various manufacturing enterprises to study the implementation issues of IAS.