ABSTRACT

Management of the internal supply chain aims to optimise and control the material flow via the information flow so that material can be moved at a desired pace, in proper fashion and at the right volume. The production processes in the electronics industries are highly automated and dynamic. As production life cycles become shorter, the management system may become the bottleneck.

This research develops an integrated system with simulation for scheduling and planning of a production system. First of all a genetic algorithm based product mix and material match system has been developed to optimise the de-commit demand for customers. This optimisation technique for production scheduling in the internal supply chains of hard disk drive assembly and printed circuit board assembly show how a conventional genetic algorithm (GA) can effectively solve the product mix and material match problem (PMMP). Some unique ideas in chromosome representation, evaluation and survival for product mix and material match problem are addressed. This GA approach which has produced reasonably good results with fast convergent speed at shop floor level is verified via real world applications.

The work also develops an intelligent modelling environment in simulation, which can improve the simulation accuracy and efficiency of internal supply chains in electronics manufacturing. The proposed assembly models for HDD and PCBA industries analyse the performance designed to enhance system performance and line behaviour. The assembly models are constructed in such a way that each model investigates dynamic performance of the overall system or a predefined section within the internal supply
chain. The proposed modelling environment can improve simulation accuracy for internal supply chains in electronics manufacturing.

Finally, this report will propose a novel environment for intelligent operational production planning. The software system for integrating manufacturing planning systems and computer based decision systems is developed and can directly communicate with the company database to support the management of the internal supply chain. The operational planning system is then integrated with product mix and material match and also with simulation.