

Application of Simulated Annealing Algorithm in Advanced Planning and Scheduling System for TFT-LCD Color Filter Fab

James C. Chen, Jim Z. Lin, Chih-Cheng Chen, Yu-Yao Wei, Chin-Ping Liu
Industrial Engineering and Engineering Management
National Tsing-Hua University
No. 101, Section 2, Kuang-Fu Road, Hsinchu, Taiwan 30013, R.O.C.

Abstract

Due to global competition and technology development, the market price of Thin-Film Transistor Liquid-Crystal Display (TFT-LCD) fluctuates quickly and violently in the past years. Furthermore, the continuous increase of component cost leads to a significant decrease in profit in TFT-LCD industry. As a result, TFT-LCD manufacturers increase their competitiveness in many ways, such as productivity improvement and cycle time reduction. This research presents an advanced planning and scheduling system (APS) to automatically generate production schedules, assign orders to production lines, plan order release time, and balance the equipment loading for color filter fabs, as color filter is one of TFT-LCD's four major processes: array, color filter, cell, and module. APS is based on a finite capacity planning and Simulated Annealing algorithm (SA) that is an efficient and practical heuristic method to find the near-optimal solution. Experiment results using industrial data show that it can significantly increase system throughput and save more than 80% scheduling time for one color filter fab in north Taiwan.

Keywords

Advanced planning and scheduling, TFT-LCD, Simulated Annealing, Color filter

Biography

James C. Chen is Professor in the Department of Industrial Engineering and Engineering Management at National Tsing-Hua University (NTHU), Taiwan. He received a B.S. in Industrial Engineering from NTHU, Taiwan, an M.S. in Manufacturing Systems Engineering, and a Ph.D. in Industrial Engineering, both from the University of Wisconsin- Madison. His research interests include advanced planning and scheduling, lean production, supply chain management, business process reengineering, and project management. Dr. Chen was awarded Dr. Yi-Chi Mei Scholarship at NTHU in 1983, IBM Manufacturing Research Graduate Fellowship 1991-92, Outstanding Teaching Awards at CYCU, Distinguished University-Industry Collaborative Research Award at Chung Hua Picture Tubes (CPT) in 2009, Distinguished Industrial Engineer Award from Chinese Institute of Industrial Engineers (CIIE) in 2011, Outstanding Research Award at NTUST in 2011, and Feature Person: Enjoying the International University-Industry Collaboration, Engineering Science and Technology Bulletin, NSC in 2011.

Jim Z. Lin is a Master student in the Department of Industrial Engineering and Engineering Management at National Tsing Hua University. He received a B.S. from Department of Industrial Engineering and Systems Management at Feng Chia University in 2012. His research interests are advanced planning and scheduling, lean production, and algorithm.