

## SIMULATION MODELING METHOD OF BATCH ANNEALING PRODUCTION SCHEDULING PROBLEM BASED ON SYSTEMC

ZHIGANG WANG, QUANLI LIU AND WEI WANG

Research Center of Information and Control  
Dalian University of Technology  
Dalian, Liaoning 116024, P. R. China  
galloping@163.com; {liuql; wangwei}@dlut.edu.cn

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**ABSTRACT.** *The basic characteristics of concurrency, sequence and hierarchy of large-scale integrated circuit also exist in complex industrial process scheduling. This commonness makes convenient modeling of production scheduling problem possible with mature hardware modeling method in the field of electronics design. Considering the typical bell-type batch annealing production-scheduling problem, the traveling flow of lots in annealing shop is mapped into hardware design modeling analogously. A simulation model of annealing shop scheduling is developed with hardware description method based on SystemC simulation engine. Accurate and efficient simulation of batch annealing workflow can be achieved by this model. Simulation comparison and application test in a steel enterprise show the feasibility and validity of this modeling method.*

**Keywords:** SystemC, Batch annealing, Production scheduling, Discrete event simulation

1. **Introduction.** In the past decades, rapid growth of semi-conductor and computer technology has led to profound change in design concept and method of integrated circuit. Following the development process of integrated circuit from large scale, very large scale to SOC (System On Chip) nowadays, electronics design technology also developed from CAD (Computer Aided Design), CAE (Computer Aided Engineering) to EDA (Electronics Design Automation) [1]. The improvement in electronics design automation mainly rests with hardware design, simulation and verification in a higher abstraction level adopting software engineering method. Thus, more attention has been paid to system level algorithm without caring about hardware working mechanism in lower level, which increases efficiency dramatically. Abstraction and modeling the hardware characters of concurrency, sequence and hierarchy with hardware description language simulator is basis of this advancement.

Similar characters also exist in complex industry production scheduling process. For example, concurrency between same kind of independent workbenches, sequence in production process with ordered working stages and hierarchy in complicated working procedure with some basic simple procedures etc. The forenamed complexity in production scheduling is main obstacle in its modeling problem, which is not effectively solved yet. In research of production scheduling problem, production process is usually abstracted as MILP (Mixed-integer Linear Programming) [2,3] or other classic scheduling model, such as flow shop or job shop, for the sake of analysis and evaluation of different scheduling plans. There are several problems when implementing these models in the field. 1) Necessary model abstraction usually ignores factors that subjectively minor or make special rules, which induces possible mismatch between model and production reality. 2) Expert