Editor **DANA SIMIAN**

MODELLING AND DEVELOPMENT OF INTELLIGENT SYSTEMS

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October 10-12, 2013, Sibiu, ROMANIA

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A Second Order-Cone Programming Formulation for Simple Assembly Line Balancing Problem

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Abstract

Decision support in order to assure an optimal business in the framework of an industrial company is based on some mathematical models, including optimization. The paper discusses the numerical solving of a task known as the Simple Assembly Line Balancing Problem (SALBP-I). In this context, a model based on the Second-Order Cone Programming (SOCP) it is proposed.

1 Introduction

The success at the level of an enterprise requires optimal organization of the production processes and related activities. These activities include organizational processes, economic and financial, production, trade, and, not least, information processes. What it is important in the organization of the business process it is the optimization of the enterprise activity, taking into account the market demands and current technology power. The activities listed are made by human agents and/or machines to help achieve business objectives across the enterprise. So, business process optimization is related to activities (or tasks), participants (human agents and/or machines) and targets (performance indicators).

In general, the requirements for optimal organization of the enterprise activity are actual and fit into the idea of reengineering. This idea is centered on all processes in the modern enterprise. Reengineering is a radical redesign of a business process to achieve a considerable improvement in performance indicators (cost, quality, productivity, etc.). The idea of reengineering is actual one as information technology is constantly changing. Hence the ability to adapt quickly to market demands.

Decision support for an optimal business in the framework of an industrial enterprise is not always possible without software products that are based on mathematical models of combinatorial optimization. It is the case of the simple assembly (manufacturing) line balancing problem (SALBP).

The assembly line consists of a finite number of workstations that are running individual operations (tasks) to manufacture a single product. The problem now is to combine operations and workstations in order to obtain an optimal distribution of the workload to a minimum number of stations. At the same time, it is necessary to ensure conditions of precedence for the execution of operations.

Assume the following conditions ([1]):

- the assembly line is designed for a single product and supports only one mode of functioning;
- the stations are serial arranged;