

Upon controlling several building projects

Dimitri Golenko-Ginzburg¹ and Zohar Laslo²

¹*Department of Industrial Engineering and Management,
Ariel University Center (AUC) of Samaria, Ariel, 44837, Israel,
E-Mail: dimitri@bgu.ac.il*

²*Department of Industrial Engineering and Management,
Sami Shamoon College of Engineering, Beer-Sheva, P.O.Box 950, 84100, Israel,
E-Mail: zohar@sce.ac.il*

Key words: Production speed; Cost-optimization; Target amount reassignment; Chance constraint; Inspection point

A two-level construction system is considered to be composed of several different building projects U_i , $1 \leq i \leq n$, at the lower level and a control device at the upper one. The upper system's level is required to produce a given target amount by a given due date subject to a chance constraint, i.e. the least permissible probability of meeting the target on time is pre-given. Each building project has several possible $v_{i1}, v_{i2}, \dots, v_{im}$, which are subject to random disturbances. The project's output can be measured only at preset inspection (control) points. The target amount is gauged by a single measure, e.g. in square meters, and may be rescheduled among the projects. For each unit, the average costs per time unit for each project and the average cost of performing a single inspection at a control point to observe the actual output at that point, are given.

We present a two-level on-line control model under random disturbances, which centers on minimizing the system's expenses subject to the chance constraint. The suggested two-level heuristic algorithm is based on rescheduling the overall target among the projects both at $t = 0$, when the system starts functioning, and at each emergency point, when it is anticipated that a certain project is unable to meet its local target on time subject to a chance constraint. At any emergency point the remaining system's target is rescheduled among the projects; thus, new local targets V_{it} , $1 \leq i \leq n$, $\sum_i V_{it} = V_t$, are determined. New local chance constraint values are determined too. Those values enable the system to meet its overall target at the due date subject to the pre-given chance constraint p .

Upon controlling several building projects

Dimitri Golenko-Ginzburg¹ and Zohar Laslo²

¹*Department of Industrial Engineering and Management, Ben-Gurion University of the Negev, Beer-Sheva, 84105, Israel, E-Mail: dimitri@bgu.ac.il, and*

Department of Industrial Engineering and Management, Ariel University Center (AUC) of Samaria, Ariel, 44837, Israel

Summary

A two-level construction system is considered to be composed of several different building projects U_i , $1 \leq i \leq n$, at the lower level and a control device at the upper one. The upper system's level is required to produce a given target amount V by a given due date D subject to a chance constraint, i.e. the least permissible probability p of meeting the target on time is pre-given. Each building project U_i has several possible speeds $v_{i1}, v_{i2}, \dots, v_{im}$, v_{i2}, \dots, v_{im} , which are subject to random disturbances. The project's output can be measured only at preset inspection (control) points. The target amount is gauged by a single measure, e.g. in square meters, and may be rescheduled among the projects. For each unit, the average costs per time unit for each project and the average cost of performing a single inspection at a control point to observe the actual output at that point, are given.

We present a two-level on-line control model under random disturbances, which centers on minimizing the system's expenses subject to the chance constraint. The suggested two-level heuristic algorithm is based on rescheduling the overall target among the projects both at $t=0$, when the system starts functioning, and at each emergency point, when it is anticipated that a certain project is unable to meet its local target on time subject to a chance constraint. At any emergency point t the remaining system's target V_t is rescheduled among the projects; thus, new local targets V_{it} , $1 \leq i \leq n$, $\sum_i V_{it} = V_t$, are determined. New local chance constraint values p_{it} are determined too. Those values enable the system to meet its overall target at the due date subject to the pre-given chance constraint p .

Key words: Production speed; Cost-optimization; Target amount reassignment; Chance constraint; Inspection point.
