# LiSA Version 3.0 and its Application to Open-shop Problems with Duedates

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LiSA is a software package for solving deterministic scheduling problems in terms of the well-known $\alpha \mid \beta \mid \gamma$ - notation, where $\alpha$ describes the machine environment, $\beta$ contains additionally constraints and $\gamma$ gives the objective function. Because of the internal data-structure, LiSA is particularly suitable for shop problems. In the talk we give an overview on the modular structure of LiSA Version 3.0, especially on the news in comparison to former versions. Now we are able to use most of the algorithms outside of LiSA. This can be done by using a so-called auto-alg file. This file contains the problem description and the parameters to generate the input data and finally, step by step the calls of the algorithms which have to be applied to the problem. Moreover, it is possible, to start a new algorithm, for instance simulated annealing, from the best schedule calculated earlier by different constructive heuristics. Hybrid algorithms can also be composed, for instance by means of a list of different metaheuristics.

To demonstrate the new powerful tools, we investigate open-shop problems with release dates and the objective function $\sum w_i T_i$, i.e. the sum of the weighted tardiness has to be minimized. Each considered problem can be described by a tuple $w, p, r, d$ for the weights $w_i$, the processing times $p_{ij}$, the release dates $r_i$ and the due-dates $d_i$. We construct 24 different problems by fixing the parameters. For each problem we consider 16 different formats $n \times m$, $n, m \in \{10, 15, 20, 30\}$, where in all cases 20 instances are generated. For every instance we first apply some constructive heuristics and then we continue with different simulated annealing algorithms. Here we use our experience on the properties of the open-shop problem with minimizing mean flow time (see [1] [2]). Finally we compare the results with the quality of genetic algorithms. In total, we

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apply more than 100 algorithms to each instance. The data interpretation seems to be difficult. Nevertheless we will give an overview on the main results of our computational experiments, contained in Andresen et al. [3].

LiSA-Version 3.0 is available under http://lisa.math.uni-magdeburg.de, the handbook will be finished in summer 2008.

# References


[1] Bräsel, H.; Herms, A.; Mörig, M.; Tautenhahn, T.; Tusch, J.; Werner, F., *Heuristic Constructive Algorithms for Open Shop Scheduling to Minimize Mean Flow Time*, to appear in European Journal of Operational Research; published online.

[2] Andresen, M.; Bräsel, H.; Mörig, M.; Tusch, J.; Werner, F., Willenius, P., *Simulated Annealing and Genetic Algorithms for Minimizing Mean Fow Time in an Open Shop*, to appear in Mathematical and Computer Modelling, published online.

[3] Andresen, M.; Bräsel, H.; Plauschin, M.; Werner, F., *Using Simulated Annealing for Open Shop Scheduling with Sum Criteria*, to appear as book chapter in Global Optimization: Focus on Simulated Annealing, ISBN 978-3-902613-33-2.