Master Thesis:
“Operational production planning at a German food company: implementing a mathematical model”

Topic:
Seasonality plays an important role in the consumption of many food products, among others in the sale of cheese products. During autumn and winter, the demand for these products is particularly high, leading to a high capacity utilization in this period. Therefore, an operational production planning that optimally uses the given capacity while meeting delivery deadlines becomes essential.

The present project is conducted in cooperation with Bergader Privatkäserei GmbH, being famous for their soft and blue cheese portfolio. The cheese dairy is currently at its capacity limits during the wintertime and therefore searches for ways to improve its present production scheduling.

This study is a follow-up project to a recently finished thesis which laid the foundation for a scheduling approach being based on mathematical modeling instead of manual production planning. For this purpose, the bottleneck machines at the dairy plant were analyzed and important production constraints depicted. The start-up project, moreover, introduced an initial mathematical scheduling model.

The objective of the present thesis is to develop the scheduling approach further. Hereby additional practical constraints need to be included in the current mixed integer linear program (MILP). Moreover, the student should analyze possibilities to improve computational times by alternative model formulations or heuristics. The model will subsequently be tested with real demand data from the company and compared with the results of current production planning to show the optimization potential in scheduling.

The results of this thesis will be presented at Bergader Privatkäserei GmbH.
Tasks:
Your tasks will be to

(1) Conduct a literature search on the general and industry-specific scheduling literature to obtain an understanding of possible modeling approaches and formulations;

(2) Enhance the current mixed integer linear program (MILP) with important practical constraints and revise the model formulation/develop heuristics to improve computational times;

(3) Compare the results of the optimization model with the results of the current manual scheduling practice at the company to show improvement potentials.

This thesis allows you to apply your knowledge in mathematical modeling on a practical case and to gain in depth knowledge of operational production planning in a fast moving consumer goods industry.

Prerequisites:
You should have taken the course “Modeling, Optimization and Simulation in Operations Management” or an equivalent course and therefore have an understanding of mathematical modeling and IBM ILOG CPLEX Optimization Studio.

Contact:
Please send a letter of motivation, your CV, and transcript of records until Mai 19th to Verena Stein (http://www.scm.wi.tum.de/index.php?id=82). The project can start immediately, but starting dates can also be arranged individually. In case you have any questions, please feel free to ask.