

COMPLEVO

COMPLEVO uses Gurobi in its personnel planning and as a result increases personnel satisfaction and productivity.

Optimal personnel planning with Gurobi increases staff motivation

Stress, hectic pace, sudden change of plans and overtime used to be the norm in the Discher Bakery, a medium-sized company in Baden-Württemberg, Germany. The personnel planning was done manually and could, for example, be compromised by a sudden notification of illness. This scenario can be found in many small and medium-sized companies. This issue is now something of the past.

The Business Sector

COMPLEVO, a Berlin-based consultancy firm, has designed an automatic personnel planning tool called FREI ZEIT, which significantly increases the transparency and flexibility of planning. Stress, hectic situations and unpleasant surprises do not occur and even special requests can be effortlessly taken into consideration.

FREI ZEIT has been designed for medium-sized businesses and allows automation of optimal personnel planning by using mathematical optimization. The results are even more surprising, seeing as prior to this, in the Discher Bakery optimization models were unheard of.

In Germany, small businesses employees can easily influence how they use their flex-time accounts. However, these accounts have to be managed in order to avoid having an excess of unworked hours and expensive overtime. In this scenario FREI ZEIT steps in and can, for example, try to manage flexi-time. It is also efficient at dealing with issues arising due to sick leave.



The Model

The FREI ZEIT software takes into account all eventualities. The circumstances of the bakery are modeled in a mixed-integer linear programming model. The differing opening times of the branches, the number of sales staff needed together with their desired working hours are incorporated into this model. In this way, individual staff wishes regarding holiday leave can be taken into account, as well as personal scenarios like "On Wednesday afternoon I want to take my grandson to football" or "I would like to have every other Saturday off". All these scenarios can be formulated as linear constraints with partially integer and binary variables. Gurobi then solves the model, taking them into account



Using Personnel planning made things a lot easier. However, it is a very extensive field and many cogs must work together in order to achieve a good result. Looking back we can say that we achieved a lot.

Andreas Discher,
Managing Director of Discher Bakery

Why we work with Gurobi

Gurobi doesn't just offer an extremely fast solver, but also great flexibility. We can adapt the Gurobi Optimizer to meet our needs. We have just revised and reformulated the linear optimization model which our software FREI ZEIT is based on. It is extremely straightforward to implement new customer demands and requirements thanks to the Python interface. Moreover, the intuitive and clear way that the Python interface has been written, makes getting used to it very quick.

The scalability of the solver is impressive as any scale of personnel planning problem can be resolved efficiently and within a time limit. It is not unusual for a duty roster to become infeasible, for example when several staff are ill or on vacation and the usual framework cannot be adhered to. Gurobi allows us to simply analyze these unforeseeable occurrences and detect the bottlenecks. This enables us to find a solution which all staff are happy with and that violates as few constraints as possible.

Gurobi's pricing structure enables us to implement mathematical optimization for middle-sized companies, something which up until now has not been possible due to cost and know-how reasons.

COMPLEVO

COMPLEVO uses Gurobi in its personnel planning and as a result increases personnel satisfaction and productivity.

The bakery staff does not have to understand any of the math going on in the background. Employees can enter individual staff restrictions into a calendar, the program constructs the model and transfers it to the Gurobi optimizer so that a solution can be found. After a few seconds it comes up with the optimal duty-roster. In this way, it not only ensures that individual requests are met, but it also makes sure that the weekly working hours are as evenly distributed amongst employees as possible. If any staff availability changes, the updates can be easily entered and the schedule resolved.

In addition, the employer can choose between various optimization objective functions, like for example a reduction in flexi-time. If several objective functions with a variety of priorities are chosen, then the optimization is carried out hierarchically, one after the other. The use of Gurobi can also help identify and address any infeasibilities. In an infeasible model there are constraints that contradict each other. For instance, if nobody wants to work on the first Saturday of the month when the branch should be open, then that contradicts itself. Problems like this are resolved in individual discussions. In this case the program could set up a model where, if there are four members of staff, each one must work on the first Saturday in every fourth month.

The Results

In the Discher bakery, staff costs were cut by four percent and the number of temporary staff taken on has been reduced by six percent. At the same times, a reduction in the amount of overtime has reduced costs sufficiently that even more staff can cost effectively be hired. Staff are now happier due to better schedules while the company is paying less overtime.

The aspect that staff are most pleased with is the fact that their individual needs are being catered for on a more regular basis and the extra workload that arises when someone is off sick, is distributed more evenly. Furthermore, the time spent planning for the bakery has seen a significant reduction. Individual requests are all digitally recorded and are automatically taken into account. The three hours per week which was needed for every branch previously, has now become three hours monthly in which all seven branches are organized. Digitalization of staff planning has also made invoicing simpler, instead of each branch spending two hour per week on this, it is now done at the push of a button.



We are very satisfied with the customer care, documentation and the support offered by Gurobi and I feel that this level of customer service gives the Gurobi Team a clear advantage over their competitors.

Rico Gujjula,
Managing Director COMPLEVO Ltd



The screenshot shows a software interface for 'FREI ZEIT' titled 'Gesamtplan Mitarbeiter'. It displays a grid of employee schedules for various staff members, including names like 'Bach, Martina', 'Dreher, Martina', 'Kriger, Marly', 'Müller, Paul', 'Müller, Sarah', 'Hübner, Wolfgang', 'Sattl, Anke', 'Schrick, Barbara', 'Unger, Tim', 'Baumann, Mathias', 'Grunwald, Lars', and 'Huch, Angelika'. The grid shows dates from 04.01.2014 to 04.01.2015, with columns for different days of the week. Each cell in the grid contains a color-coded indicator (green, yellow, orange, red) representing the employee's status or shift for that day.



COMPLEVO BUSINESS OPTIMIZATION

- Consultancy firm with the emphasis on the development and implementation of software for decision making support.
- Focus on staff and resources implementation planning
- Caters for customers from the automobile and railroad sectors as well as variety of medium-sized businesses
- Distributor of FREI ZEIT software since 2013

Discher
...täglich!

- Medium-sized bakery based in Baden- Württemberg, Germany
- Seven branches
- Planning of 40 sales staff via Gurobi and FREI ZEIT



- Optimal roster planning at the push of a button
- Suggests a variety of alternatives for roster plans
- Integrated time tracking means highly accurate monitoring of hours worked