

IMPLEMENTATION AND OPERATION

Planners can rest easy at night after implementation of GENIOS



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During his career at MENTZ, Andreas Marthaler can reflect on many instances of successful implementation of MENTZ's optimization solution GENIOS.

Marthaler sat down with several of our customers to gauge their level of satisfaction with GENIOS. What resulted was a lively exchange with Tony Zedel (Head of Planning, Lucerne Transport Authority, vbl), Daniel Botta (Head of Duty Scheduling, Zurich Transport Authority, VBZ), Daniel Ledergerber (Duty Scheduling VBZ) and Matjaz Hess (Head of Transport / Duty Scheduling Stadtbus Winterthur, SBW).

MENTZ, Andreas Marthaler: Where did the desire to implement duty schedule optimization originate in your respective company?

Tony Zedel:

Based off of feedback we had received from operations and personnel representatives, it became apparent that we needed to optimize and shorten working hours and break times. We started looking around for tools and then approached MENTZ for a solution.

Daniel Botta:

We looked around the sector, but initially, no one thought that trip planning or duty scheduling could be automated. Here in Zurich, for example, we have one large depot with over 200 duties. The previous MENTZ optimizer was only used for major changes to the timetable and that was due to the parameterization being less appealing than that of the newer GENIOS optimizer. Now we are using GENIOS more frequently because it lightens our workload.

Matjaz Hess:

In the past, all scheduling was done by hand. In a situation similar to our colleagues in Lucerne, long duties and duties with long breaks were not a welcome occurrence for our bus drivers. Scheduling was also rather time-consuming. Now we cannot imagine life without GENIOS. Our drivers are happy with the distribution of duties.

MENTZ, Andreas Marthaler: Did you consult with one another and exchange information?

Daniel Botta:

A few years ago, we heard from Stadtbus Winterthur (SBW) that during the pandemic they would have been unable to manage changes to their duty schedules without the optimizer. That seemed a valid enough argument to take a closer look at optimization.

Tony Zedel:

When GENIOS was being introduced, I visited a number of optimization customers in Switzerland and got to know the product more intimately.

Topic
Duty Schedule Optimization with GENIOS – Implementation and Operation

Customers
VBZ, SBW, vbl

Contact
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»The world is a village. Public transport is the same everywhere, but still so different.«



Tony Zedel
Head of Planning,
Lucerne Transport Authority, vbl

MENTZ, Andreas Marthaler: How do you think the implementation phase went?

Tony Zedel:

“The world is a village. Public transport is the same everywhere, but still so different.”

Initially, the changeover to GENIOS got delayed by procedural requirements. It was important for us to get everyone involved in the changeover internally at different departments. All of this naturally took a bit more time, but we were able to open some doors in the process. Our duty scheduling department was frequently advised by others to ‘just make the shifts shorter,’ but putting this strategy into practice is not as easy as it sounds. The operational requirements of the labor agreement, the issue of having different duty locations, and their corresponding trip times resulted in a very complex set of planning conditions. For this reason, we first started optimizing schedules with GENIOS only on Saturdays and Sundays.

Our driving personnel work 42 hours a week, which works out to an average of 504 minutes a day. One can plan super duties with an average of 480 minutes. However, with an average of 504 minutes, adhering to a maximum duty duration while scheduling duties is a major hurdle for planners - but one that can be done with relative ease using GENIOS.

Another highlight: since the last timetable change, we recorded 20 percent higher performance. GENIOS also produced great results from Monday to Friday when compared to when scheduling was done

by hand. With GENIOS, we could compute additional variants using different parameters. We could never do this in the past because it simply took too much time.

MENTZ, Andreas Marthaler: My recollection is that the changeover from Major to GENIOS ran smoothly at the VBZ. Does my memory serve me right?

Daniel Botta:

Yes, it does. You showed us GENIOS and thanks to the preparatory work that was done in Winterthur, system implementation went off without any hitches, which was a mild surprise. We actually went into the project with relatively low expectations, but were quickly impressed by the quality of the duties that resulted from our computations!

It is hard to determine the extent to which revising our internal operating rules influenced the process. Many internal conventions were optimized, like the number of break locations was reduced. But the effects of new requirements can be clearly demonstrated, as in what might happen if breaks were limited to 90 minutes. That ability to probe effects helps us immensely in planning our operations.

Matjaz Hess:

At first, we had to convince everyone to get on board. The employee responsible for duty scheduling was already convinced, but still held reservations about whether 100 percent of the workloads could be fully distributed. In general, there was some uncertainty at the start of the project about whether GENIOS would work as advertised. Today, everyone is grateful that we took this step into the

unknown. We have computed many variants with the optimizer.

GENIOS showed exceptional value during the coronavirus pandemic: many drivers were off sick. GENIOS created new duty schedules for us within two days. Today we can confirm that the requirements for timetables and duties remain dynamic. Using GENIOS, I am able to meet all of them. The number of duties has thus far remained the same despite a steady increase in kilometer performance. But with GENIOS in hand, expectations of these duties also remain high.

MENTZ, Andreas Marthaler: How flexible would you say is MENTZ's duty scheduling optimization software regarding different operating conditions and requirements? Did you have to make any adjustments or new requirements during or after introduction that had to be implemented by MENTZ?

Tony Zedel:

Initially, connecting to GENIOS and its operability in DIVA R17 was a bit cumbersome. GENIOS runs more smoothly on DIVA R19 and is also better integrated into this newer version of the system. The same applies to the settings for parameterization. I am certainly happy with GENIOS's classic graphical user interface (GUI), but R19 now gives you more room to maneuver than the previous version.

Daniel Botta:

GENIOS has numerous options for settings. Results can be viewed very quickly, which allows planners the ability to determine whether a setting was effective.



We would also like to heap praise on the MENTZ support team. They are always ready and willing to answer questions and help us when issues arise or when parameterizing new or changed requirements.

MENTZ, Andreas Marthaler: Yes, that is right. MENTZ Support can parameterize any requirement with little to no intervention by the development department. The white box approach, where the first result can be seen immediately after starting the optimization, can also help in decision-making. Did you have to modify internal processes to get the best results or to implement the results in operations? GENIOS does not necessarily create duties in the manner that an experienced colleague might. I have heard the following reaction so many times: 'We would never have created the duty like that!' Did you change timetable planning and vehicle scheduling, like creating blocks or block parts that fit the duty schedule?

Tony Zedel (laughs):

We have several unique requirements. For instance, we have employees who only want to work one duty part. We want to prioritize reductions in shift duration and break times. We also want to be an employer that people enjoy working for. A shortage of trained experts, high employee turnover, and the resulting limits to the range of services we can offer all led to a closer examination of duty quality. In general, we like to seize on the "desirability" that GENIOS has stirred up. There is more of a focus on the duty schedule's content. Thanks to GENIOS, we now have more time to dedicate to it.

»Now we cannot imagine life without GENIOS. Our drivers are happy with the distribution of duties.«



Matjaz Hess

Head of Duty Scheduling, Zurich Transport Authority, VBZ

Duty scheduling and timetable planning are in the same department at our company - and when creating the vehicle schedule, we already try to structure vehicle blocks in a sustainable manner that also works for duties.

Daniel Botta:

For the first time, we introduced resource planning in the team. Last year, we worked at full capacity. A bottleneck always seemed to occur in the planning process (timetable creation, duty scheduling, personnel assignment) around duty scheduling. This year, that is no longer the case. Planners can rest easy at night because GENIOS helps them react more quickly to unplanned or sudden changes to the duty schedule.

GENIOS has given us some new impulses where the initial reaction was: the type of duties and their composition make no sense. Upon closer inspection we realized that they make perfect sense and it affords us more time to model the duty schedule. GENIOS takes care of some cumbersome preliminary work. More detailed work still falls on duty schedulers, but only because it saves the time one would have to invest specifying exact parameters for GENIOS. One such example involves precise route changes that may only rarely occur. GENIOS can also compute them, but creating the parameters to do so might involve just as much time and effort.

We create 150 different duty schedules annually. In the past, a planner would have worked for a week if major changes needed to be made. Today we just need to run GENIOS overnight.

Matjaz Hess:

GENIOS introduced new ideas to us, such as paid breaks in duties. This practice raised a few eyebrows at first, but is now widely accepted. The managing director and controlling department see the improvement that occurs as a result. For instance, accepting paid breaks may even save an entire shift from being planned.

MENTZ, Andreas Marthaler: How well was GENIOS accepted within the transport authority? I can imagine that depending on the interest group, implementing software of this kind could be viewed from different angles and evaluated more critically in some corners as opposed to others.

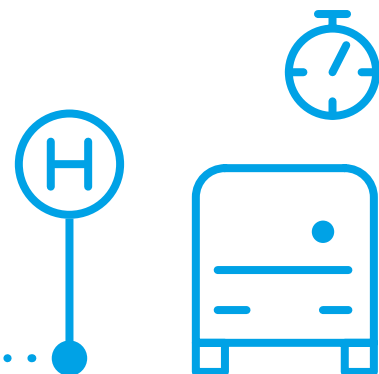
Tony Zedel:

The quality of the data speaks for itself. We used to receive many requests about the duty schedules. Today, this type of feedback is much less frequent. Acceptance of the software was achieved by repeatedly presenting different duty schedule variants. The committee responsible for implementation could transparently see for themselves how various scenarios would affect the final schedule. And finally, GENIOS has convinced management to support paid breaks for drivers.

MENTZ, Andreas Marthaler: Yes, that is right. I also noticed during implementation of GENIOS that it worked a bit more with paid breaks when compared to manual planning. Previously, this practice had not been used as frequently in city transport planning in Switzerland. It became necessary to first promote the understanding that paid relief of duty could ultimately lead to a better result.

Matjaz Hess:

A number of advantages and disadvantages were indicated and actively communicated during staff training. Not all drivers were fully behind the changes. But thanks to GENIOS, "what-if" questions could be probed and simulated so that any undesirable scenarios could be justifiably dismissed. We use questionnaires to involve drivers in the duty scheduling process and thus modify GENIOS's parameterization.



»Planners can rest easy at night because GENIOS helps them react more quickly.«



Daniel Botta
Head of Duty Scheduling,
Zurich Transport Authority,
VBZ

MENTZ, Andreas Marthaler: How do you use GENIOS? How frequently, and for which purposes? Do you think optimization reduces your workload in duty scheduling or do you consider it more a tool that supports your work?

Tony Zedel:

GENIOS is used when small changes do not lead to a usable result. We also use GENIOS when changes need to be made on short notice. A worst-case scenario would be the sudden closure of the Quai Bridge. A new duty schedule would need to be created early in the morning, and we would use GENIOS to do it. The main reason is because we know that GENIOS can create duties that comply with the labor agreement in the shortest amount of time. The duty schedule can be implemented directly and only requires basic parameterization.

Matjaz Hess:

We now use GENIOS to experiment a bit. Previously, we had to experiment on operational systems and did not create a separate duty schedule.

MENTZ, Andreas Marthaler: What concrete improvements could be observed after GENIOS optimization was used? Was there a reduction in long shifts or more varied duties, or more efficiency in duty scheduling? Are there metrics or key performance indicators (KPIs) that can be used to measure GENIOS's effects?

Tony Zedel:

Yes, there are. Shift length or duty duration is noticeably shorter. We create significantly shorter shift lengths for all 234 duties on a daily basis. Previously, we had 13-hour or 14-hour shifts with four-hour breaks. GENIOS has helped us to significantly reduce break lengths. We were thus able to do good on a request from our drivers, the majority of whom prefer split shifts – meaning shifts with just one break instead of two.

Editor's note: in Switzerland, up to 14-hour shifts are permitted (total duration).

Daniel Botta:

That is difficult to say for Zurich because, as already mentioned, the framework of the labor agreement was changed at the same time. But I can say this. I have been working at the VBZ for 21 years. For the first time that I can remember, we do not have a shift that lasts over 13 hours, and that is from a pool of 700 duties.

The existing workloads are planned by GENIOS in a way that leaves almost no room for improvement. The result is ideal in terms of efficiency and costs. This certainty can be attributed to the ability to create variants and weigh the advantages and disadvantages when planning trips and scheduling duties.

Matjaz Hess:

The total duration of a shift was and still is an issue for us. On Saturdays and Sundays, spread time could be reduced to ten hours, with a maximum of 160-minute breaks.

The workforce then demanded the same result for the rest of the week. They argued that if it was possible to create more compact shifts on weekends, it should also be possible to do the same on weekdays. But consideration of peak travel during rush hours makes weekday and weekend schedules less analogous.

MENTZ, Andreas Marthaler: What would you like to see happen in the future?

Matjaz Hess:

A roster optimization would be helpful for the viability of duties in a roster.

Daniel Botta:

An integrated optimization would help support duty scheduling for e-buses.

MENTZ, Andreas Marthaler: We already offer solutions for both tasks! Please let us know if you are interested in a consultation.