



Hitit



GUROBI
OPTIMIZATION

CASE STUDY



Hitit and Gurobi Collaborate to Transform Crew Leave Planning with Human-Centric Optimization

Hitit can help airlines generate optimal leave schedules for thousands of crew members in as little as seconds with Gurobi.

Each year, airlines face the immense task of coordinating annual leave schedules for thousands of crew members. With so many constraints to consider—such as operational requirements, business rules, and personal preferences—manual planning can often lead to inefficiencies, crew dissatisfaction, and compliance risks.

To help airlines address this challenge, Hitit developed Crane Solution Suite, a comprehensive, cloud-based platform that leverages mathematical optimization to streamline the entire airline business lifecycle—from operations planning to reservation management and accounting processes.



Satisfying Operational Constraints While Boosting Crew Morale

"Coordinating annual leaves for airline crew members is a process that can take weeks with traditional, manual approaches. Before switching to our software, many of our airline partners used Excel-based systems, which can be extremely inefficient and prone to errors," explains Dr. Belma Can, Senior Product Manager, Optimization, at Hitit.

There are a host of constraints that each leave schedule must satisfy, including:

- Daily minimum crew requirements for flight operations
- Quotas for each day or period to limit how many crew members in the same leave group can take leave simultaneously (the user can define leave groups according to airline operational requirements)
- Crew seniority, which is used to prioritize requests
- Leave partners (for example, married couples who want to take leave together)
- Historical satisfaction, ensuring fair distribution over time
- User preferences obtained from smart leave bidding settings on mobile app

“This achievement was made possible through our collaboration with Gurobi, whose powerful optimization capabilities played a key role in shaping a data-driven, scalable solution tailored to the complexities of crew leave planning.”

-Dr. Belma Can Senior Product Manager, Optimization, Hitit

Satisfying each of these constraints using a spreadsheet is a virtually impossible task. That’s why Hitit developed a suite of optimization-powered solutions to instantly generate leave schedules that honor business rules, ensure operational feasibility, and maximize crew satisfaction.



From Manual Processes to Streamlined Solutions

To start the planning process, the Crane Crew Leave Optimizer allows airlines to define their terms, business rules, and other requirements. It then automatically calculates the number of leaves to be planned for each crew in real time. Next, a bidding process begins, allowing crew members to bid for their preferred leave periods. Crew members are notified via a mobile application when the bidding process begins.

Once bidding concludes, the Crane Crew Leave Optimizer gets to work assigning leave periods. To do so, it pulls information from three main sources: a third-party HR system; biddings on the Crew Management System mobile app; and Crane Crew, which contains crew data, settings, quota calculations, and reporting metrics.

This then triggers the optimization engine to model and solve the problem using gurobipy (Gurobi’s Python interface). The model’s objective function maximizes the total satisfaction score based on bid priority, historical fulfillment, and other business-defined weightings.

Closeness is guaranteed for non-granted bids, while schedules for crew without bids are automatically planned. Leave partners will also be scheduled together.

To make the process even more user-friendly, Crane Crew supports real-time dashboards, KPI analysis, and visualization tools that help planners compare different optimization solutions and select the best schedules.

Generating Optimal Leave Plans in Seconds

With the Crane Crew solution, Hitit has helped dozens of airlines achieve a significant reduction in operational time required to plan annual crew leaves.

For instance, Pegasus Airlines used to spend weeks planning crew leave periods, using shared spreadsheets and manual tracking. But with Crane Crew, they can now generate optimal leave plans for their 5,200 crew members in a matter of seconds. In addition, bids are no longer gathered in an Excel file; rather, crew members can easily submit their bids through an intuitive mobile application.

By leveraging Gurobi’s solver, Hitit can offer airlines like Pegasus an optimization-driven solution that turns a tedious and contentious planning process into a streamlined, fair, and efficient operation—improving both crew morale and operational reliability.

“This achievement was made possible through our collaboration with Gurobi, whose powerful optimization capabilities played a key role in shaping a data-driven, scalable solution tailored to the complexities of crew leave planning,” said Dr. Can.

