CARMEN SYSTEMS
RESOURCES IN BALANCE

Carmen Tail Assignment

Airlines

Tail Assignment is the process of combining flights and maintenance into full tail rotations, and still be able to adapt to changes in passenger demands.

Maximizing revenue while optimizing fleet costs

The process

Define scope

Read the timetable. Decide which fleets need planning, which period and for which sectors.

Select

Use the graphic user interface to add or modify any information. Select all flights or only a subset to plan or improve. Load individual aircraft data with flight records, scheduled maintenance activities, operational deficiency list etc. Revenue data can also be loaded to allow for late changes in fleet assignments.

Solve

Aircraft rotations can be built interactively on the screen, or the optimizer can be used for automatic construction. Automatic legality checks are carried out during all routing construction. The optimizer creates routings that maximize aircraft utilization, prioritizes robust connections with few critical aircraft changes and that are maintenance feasible.

The optimizer can also be utilized to consider changes in fleet assignments, and thereby create solutions that accommodate late changes in passenger demand, while maintaining feasible aircraft routings. Furthermore, information about crew pairings can be used to guide the generation of aircraft rotations. It is therefore possible to protect connections that are crucial for maintaining stability from a crew perspective.

Evaluate

The output of the optimizer is the most efficient combination of aircraft rotations. Standard reports are available for rapid feedback on key performance indicators. Tailor-made reports for specific requirements are also available.

Communicate

When the solution is ready, aircraft rotations are sent to systems for maintenance control and aircraft control. Requests for maintenance activities can be communicated directly to systems at the maintenance hangars or printed and distributed manually.

Maximize robustness while granting as many crew requests as possible

Integrated with

Carmen Crew Pairing to ensure aircraft connections are effective in the crew planning process.

Revenue systems to allow changes in fleet allocations.

Fleet assignment system to guarantee flyable schedules.

Maintenance system to guarantee maintenance-feasible assignments.

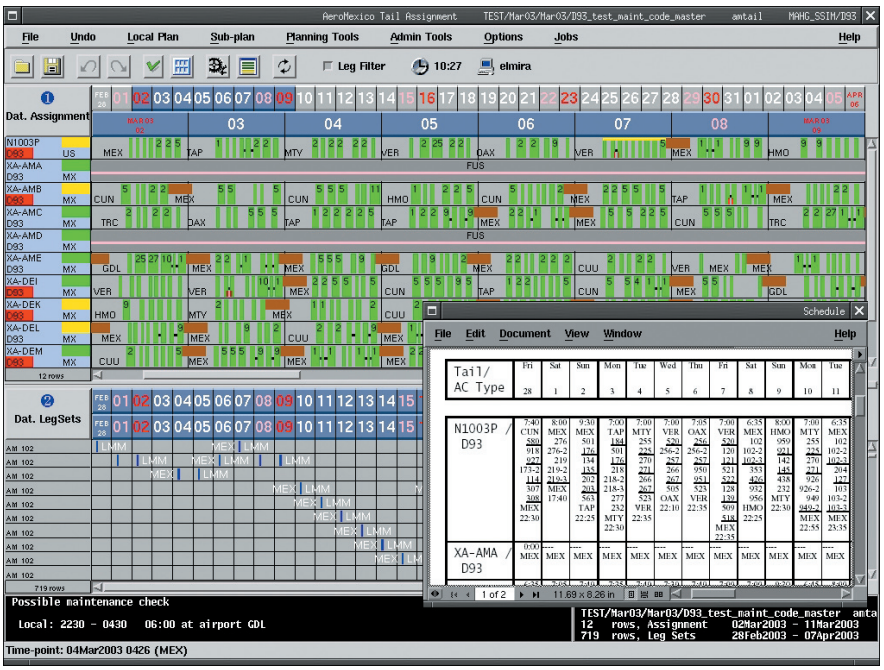
Carmen integrated operations control to provide input to operation and to get feedback for evaluation and planning.

Product content

- Tail Assignment optimization
- Graphic aircraft editor
- Carmen Rave (rule and quality modelling language)
- Reports (Carmen Rave Publisher)
- Regular new releases
- Standard support (office hours support and regular Installation Quality visits)

Options

- Carmen Ti database)
- Database



The upper window shows a solution with aircraft assignments. Warnings about maintenance due, are shown with information about available maintenance opportunities. The report gives a text schedule about each aircraft for communicating with other departments.

metable Manager (general flight timetable

storage of solutions and input data (Oracle)

Technical information

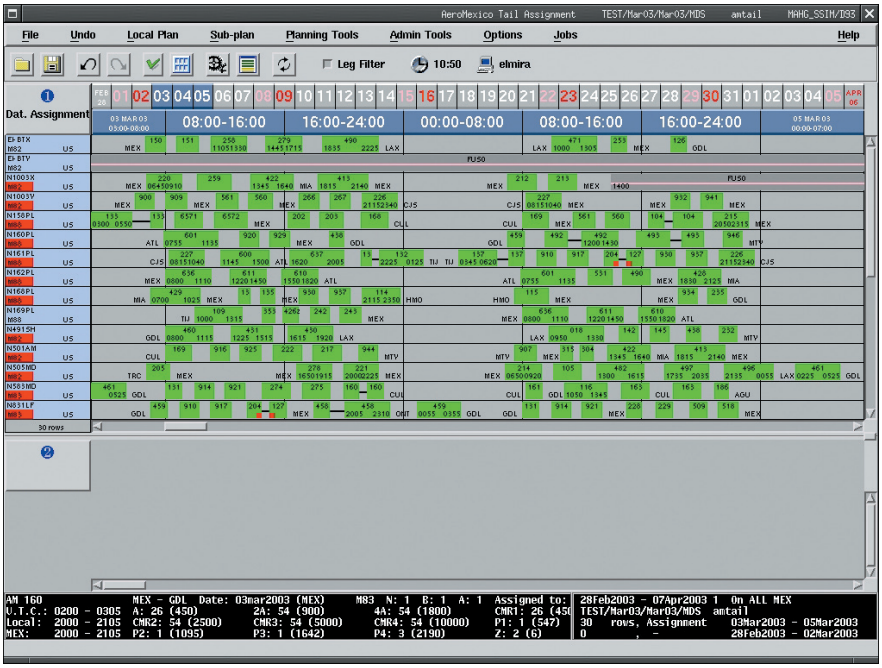
Time schedule format:
SSIM, TPTS

Tail data format:
ASCII files

Data storage:
Files (Oracle database is optional)

Output:
Standard text based transfer format. Plug-in for client specific formats available as options. PDF and ASCII reports

Platform:
Unix server, Unix / Windows clients



Aircraft assignments for flights with standbys prioritized (many long stops at MEX).

Basic functionality

All Carmen products share certain basic components; an optimizer, a modelling language for legality, costs and quality (Carmen Rave), a report generator (Carmen Rave Publisher) and full customization abilities of system details.

Optimization

The optimizer makes it possible to rapidly test many different scenarios, and control important solution properties (e.g. maximizing revenue, minimizing costs for parking, noise fees and fuel, providing opportunities for standbys, and distributing production evenly among the aircraft). Coupled with Rave, the optimizer makes it possible to meet the desired trade-off between revenue, costs and stability.

Carmen Rave

The Rave language handles legality as well as quality and cost aspects. Usage varies from adding new quality control parameters and carrying out minor simulations, to rewriting and evaluating entire agreements. Our clients appreciate the short lead times for introducing changes to the system. But an even more important aspect is that Rave allows changes to be made by the client. Because new rules or quality constraints can be tested within a few hours, this puts the client in direct control of an ever-changing operation.

Report generator

The report generator enables reports to be added at any time (e.g. cost statistics, stability statistics and hotel bookings). Reports can be displayed on screen or on paper. The report generator also creates text data files that can be used to interface surrounding systems.

Customization

With Rave, the client can constantly change quality, legality and cost aspects. The report generator makes it possible to add new reports. Colours and objects in the graphic user interface can also be customized to visualize a solution's most important features.

Questions & Answers

What savings can Carmen Tail Assignment deliver?

Revenue can be increased by adopting to changes in passenger demand via small changes in the fleet allocation.

It is also possible to increase production stability. By using the aircraft effectively, it is possible to free up more aircraft for standby duty. An aircraft standing on the ground for a couple of hours is a waste of resources, while an aircraft on the ground for 6 hours or more is available for standby duty. By promoting very long connections and very short connections, the available standby time can be doubled.

Furthermore, by using input from the crew planning process, aircraft rotations can be adopted for crew needs. This leads to significant savings in crew costs and increased stability in the crew rosters.

Is it possible to mix fleets in the Tail Assignment process?

Yes, it is possible to let Carmen Tail Assignment re-create part of the fleet allocation based on the airline's own revenue data. Thereby, the user can find optimal strategies for swapping aircraft among the fleets to maximize profit while still maintaining feasible aircraft rotations. If part of a fleet has to be grounded, it is also possible to model how this can be recovered so that business is least affected.

Is it possible to consider crew aspects in Carmen Tail Assignment?

Yes, thanks to the modelling language Rave it is simple to introduce new constraints and tailor them depending on the situation. Information about critical connections can be imported into Carmen Tail Assignment from Carmen Crew Pairing. This information is used to guide the optimizer to prioritize routings that allow crew to follow the aircraft where an aircraft change would lead to broken pairings. It is also possible to consider more complicated crew aspects. For example, an aircraft routing should always include a connection long enough to change crew during an 8-hour period. By including some crew information in Carmen Tail Assignment, it is possible to consider aspects of crew stability against revenue and other aircraft routing aspects. This integration typically leads to savings of 1—2% in total crew costs without any negative impact on aircraft routings.

How can Carmen Tail Assignment handle restricted destinations?

It is easy to include any information about individual aircraft. Rules regarding restricted destinations are easily described with Rave. Only aircraft equipped to fly overseas will be allocated to overseas flights. An aircraft without hush kits will not be sent to noise-restricted airports. An aircraft requiring an external power supply will not be sent to airports where such a service is not available. An aircraft with malfunctioning in-flight entertainment systems will be prioritized for short-haul operations. All these factors are already encountered when an aircraft rotation is being planned. Thereby, they are monitored carefully, and will not appear as surprises when the final operational plan is produced.

How does Carmen Tail Assignment consider maintenance requirements?

Maintenance status of the individual aircraft is input into Carmen Tail Assignment and Rave is used to define all the maintenance rules. In addition to mandatory maintenance rules, it is possible to define soft rules stating, for instance, that maintenance should be done a certain number of block hours before the absolute limit is reached. The system uses this information to ensure that all rotations produced meet all the maintenance requirements. Major maintenance activities are included in the flight plan as pre-assigned activities. The user can let the optimizer determine the optimal time and place to do maintenance for minor maintenance work.

It's important for us that production is distributed evenly among the aircraft. Can we be sure that this is reflected in the results?

Yes, Carmen Tail Assignment allows the user to balance the utilization of the fleet. Accumulated flight hours per aircraft are accounted for during optimization. This information can also be used to distribute the production among the aircraft.

If you have any questions about Carmen Tail Assignment, please contact us at carmen@carmensystems.com

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