



CARMEN SYSTEMS
RESOURCES IN BALANCE



Carmen Crew Rostering

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Crew rostering is the process of assigning duty to a crew member. Individual requests can be managed either by preferential bidding or bidlines.

Minimizing costs while respecting crew preferences

Integrated products

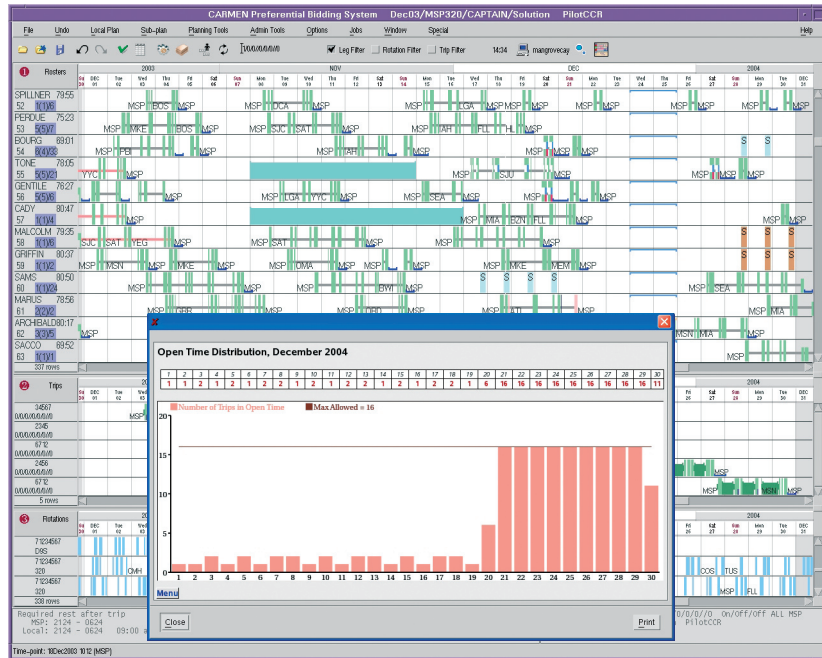
Carmen Crew Rostering integrates seamlessly with other Carmen products, sharing data, legality and user interface. For clients with a complete crew system, the pairing functionality is available together with online data from crew tracking. Carmen Crew Rostering also integrates various rostering concepts, spanning from different ways of creating individual rosters to the management of lines of work (bidlines). This allows the airline to support several rostering models for different crew groups and provides one integrated platform for the evaluation and implementation of future concepts.

Optimization

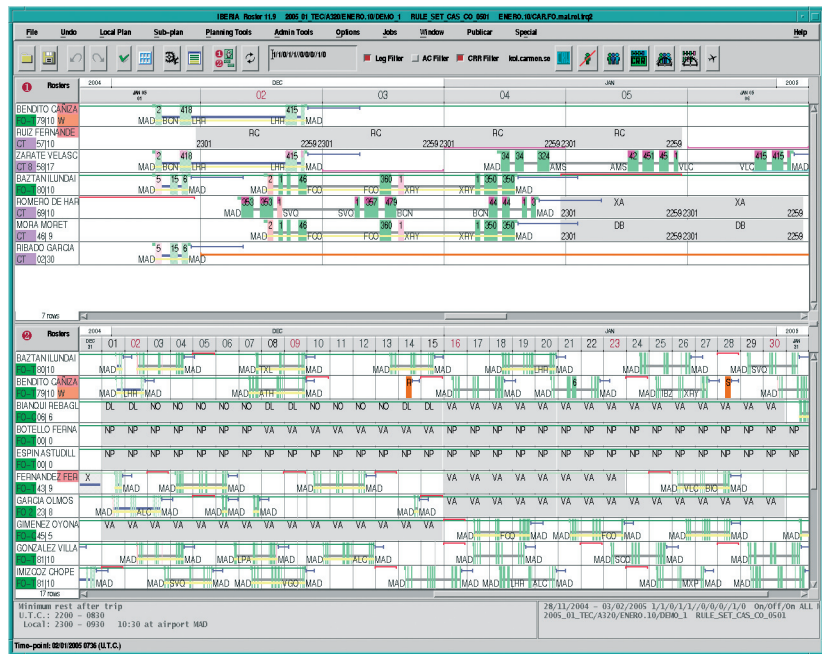
Optimization tools are closely linked to Carmen Rave, ensuring that legality and cost structures are always synchronized with the latest business changes. The optimizer will produce a crew roster that respects all relevant constraints on duty time, rest-time, days off, time zones and other similar aspects. In addition to legality and cost structure Carmen Crew Rostering can manage constraints such as different crew bases, different crew agreements, various training aspects, fly below rank, maintaining and using qualifications, imitating previous rosters and various bid models.

The roster editor

The user interface allows for quick analysis of crew rosters as well as manual creation and adjustment of rosters. Crew members and pairings can be sorted or selected using any criteria. Colours and objects can be used to identify important aspects of the crew rosters such as a crew being scheduled close to minimum rest, low credit pairings, granted or denied bids and crew soon requires a line-check. The user interface also contains many powerful commands for the manual editing of individual rosters.

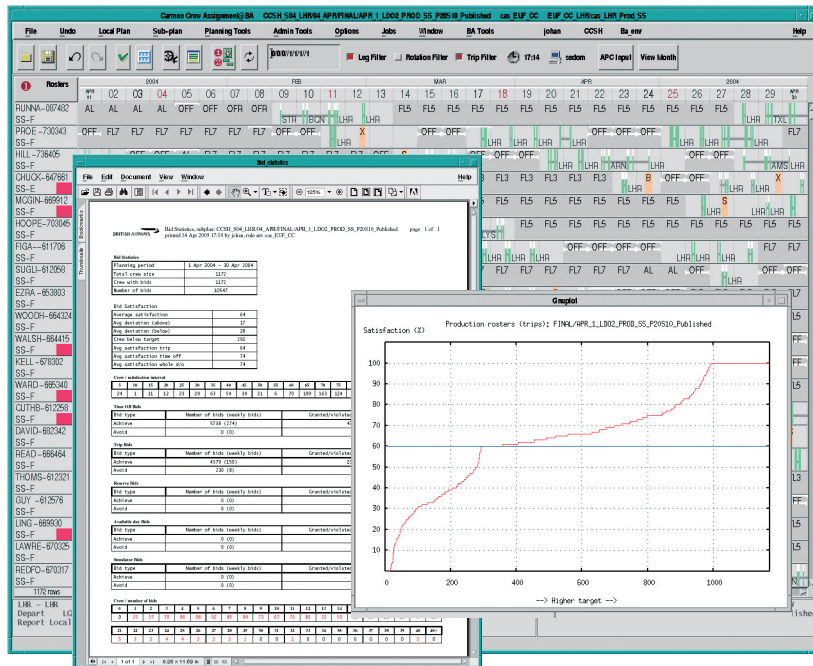


Three working windows showing rosters, incompletely assigned trips and rotations. The report shows the distribution of unassigned production.



Roster sorted by... The bid status... graph indicates... each crew member... ing all feasible... (100% means... 0% means...

Two working windows... ing different views. window 1 all incomplete... crew members are... In working window... of the route training... for two trainees are... (Trainees are marked... green, instructors... and training flights... yellow line.)



... in seniority order.
 ... status report and a
 ... indicating how close
 ... member is to hav-
 ... possible bids granted
 ... all bids granted,
 ... no bids granted).

Preferential bidding

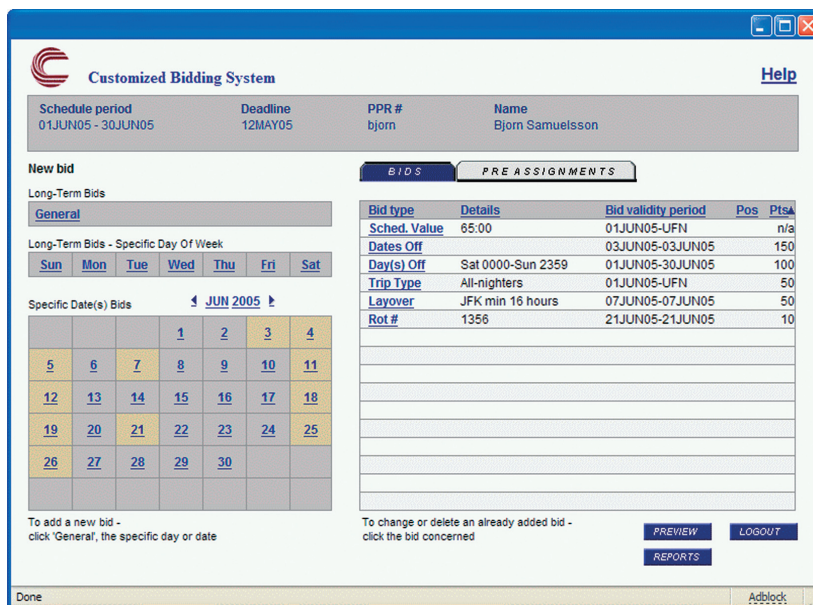
Preferential bidding allows each crew member to bid on roster properties. A bid can be for anything from flight numbers to complex combinations of properties such as attractive layovers, minimum rest, check-in times and credit time limit. Various models are supported to allow a crew member to express priority between different bids. The most common bid models are weighted bids, strictly ordered bids and bid groups.

Optimization and transparency

Carmen's preferential bidding uses unique optimization technology that can solve even the largest and most complex bid award problems. The optimizer can manage bid models with strict seniority (as applied at many US carriers) and with seniority influence. The best available crew rosters are awarded at all seniority levels with constant consideration of contractual rules and company targets such as open time constraints. In order for the planner to analyze the result various reasoning reports and system views are provided. The objective is to provide an analysis that makes it possible to measure and to explain the bid status.

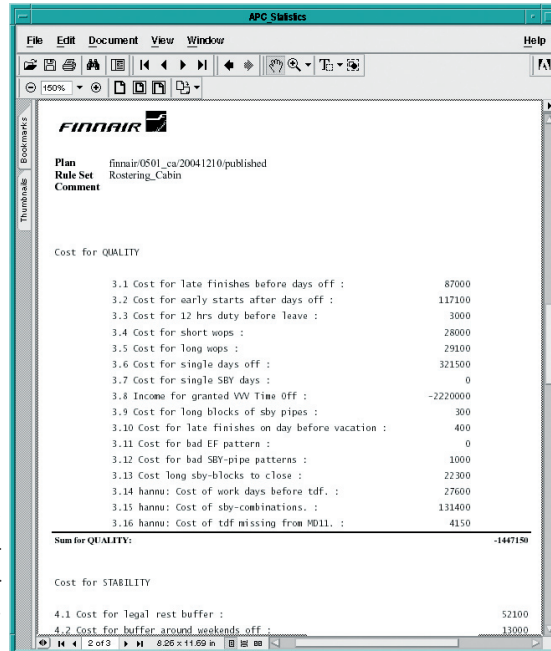
Usability and simplicity

You can enter and update bids from home or from a hotel via internet with Carmen's bid interface, InterBids. The system is very easy to use and no specific software needs to be downloaded. You can easily express your preferences and match these with available general bids. The interface always displays all active bids together with any published roster activities.



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The customized bidding system showing the bids profile for one crew member. Each crew member can rate bids differently. Free weekends can be a top priority for one person, while early checkouts or specific layover stations are more important for others.



The report describes crew costs and aspects relevant to roster quality and roster stability that should be respected in the final solution.

Working with scenarios

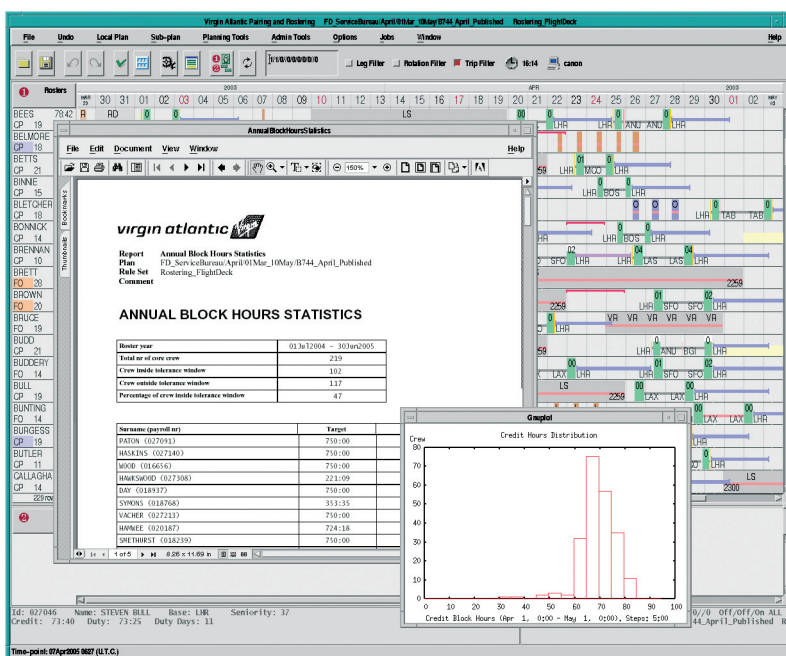
Guessing the consequences of a contractual change can prove to be very costly. A minimal change in rest-time or overtime cost structures may result in surprising effects. The combination of Carmen Rave and the optimizers provides a very efficient way of making detailed simulations. Scenarios containing various data, rules or pairing programs can easily be compared. Scenarios used in production planning can evaluate the impact of changes in flight departures, find the most efficient trade-off between quality and overtime costs and evaluate the combined efficiency of various pairing programs etc.

Measurability

Using Carmen Rave Publisher you can create any specific analysis report. Exactly the same costs and legality definitions used in the roster editor and the optimizer can be used in the customized reports, ensuring that consistent key performance indicators (KPIs) are used in planning and in follow-up reporting. Relevant KPIs could be credit time, required overtime, deadhead hours, standby hours etc.

Equal distribution

Individual bids are often distributed in order of seniority. However, at times it may be desirable to distribute special properties equally between all crew members. Examples could be free weekends, attractive layover stations, overtime payment, annual block time, and the total number of assigned standby days. You can define any number of properties or activities to be distributed between different crew members. You can also spread duties with certain properties between crew members in a specific group. For example, you can distribute unattractive standby blocks between standby crew. Equal distribution can be combined with preferential bidding in seniority order.



The analysis report shows how annual block time is distributed so as not to exceed the annual limit. The graph shows the distribution in the monthly plan.

Questions & Answers

I understand how Crew Pairing can reduce costs by producing effective pairings, but how can Crew Rostering save more money?

With a complex agreement structure and additional quality and stability criteria it is very hard to find the most efficient roster combinations manually. Good optimization can create room for improvement. This can be used to reduce the total costs, increase stability, increase the roster quality or reduce time-to-market.

So far, the average initial saving is about 4%. Substantially greater savings can be made by changing the process to take full advantage of the flexibility and predictability that Carmen Crew Rostering brings. This can be achieved by trading agreement changes for increased crew influence or by increasing the flexibility by publishing free-day patterns, duty periods and the detailed flight numbers at different times.

The crew would like to have greater influence over their rosters. How can I still guarantee efficiency?

You can perform an initial planning scenario without any crew preferences. This will provide a baseline for crew costs and solution stability that the following optimization sessions with crew preferences must respect. It is possible for an individual client to define exactly what cost increase or stability decrease is acceptable in order to receive an even higher ratio of granted crew bids. It is often feasible to raise crew satisfaction while maintaining costs and stability levels.

For senior crew the strict order must remain. Is it possible to award bids differently for junior crew?

You can use different assignment principles for various crew groups. For crew members with many service years the assignment of bids can remain very strict. For crew members with very

few years of service it is possible to let seniority have an impact, but not be totally dominant.

We use bidlines, but plan to move to individual preferences for one crew category. Can the two models work together?

Carmen Crew Rostering contains functionality for bidlines as well as for individual rostering. Both models can be managed in the same system. A small group of the entire crew community can evaluate preferential bidding and it is even possible to mix bid models within the same crew group. For example, by allowing the most junior crew members to move to preferential bidding, while the more senior crew members stay with bidlines.

Can I receive feedback from the day-of-operation process to make the planning more robust?

Yes, it is possible to load a solution from day of operation and display it with the originally published roster to analyze what actually happened.

Can I use Carmen Crew Rostering to achieve a more precise forecast?

With Carmen Crew Rostering you can plan any period, using both real production pairings, approximate standard pairings or even dummy duties. This makes it possible to carry out preliminary planning for long periods to achieve a better understanding of how the available resources match the coming needs.

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



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