



Crew Pairing

Crew Pairing is the process of combining flights into patterns (pairings, trips or crew rotations), starting and ending at a crew base.

Maximizing productivity while achieving stability

BASIC FUNCTIONALITY

All Jeppesen crew and fleet planning products share certain basic components; an optimizer, a modeling language for legality, costs and quality (Jeppesen Rave™), a report generator (Jeppesen 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. minimizing costs for hotels, per diem and passive travel, limiting the use of crew changes, distributing production correctly to different bases and creating multi-base pairings to increase solution robustness). Coupled with Jeppesen Rave the optimizer makes it possible to set up and meet the desired trade-off between costs, stability and quality.

Jeppesen 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.

Measurability

Using Jeppesen Rave Publisher you can create any specific analysis report. Exactly the same costs and legality definitions used in the pairing 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 synthetics, duty time, deadhead hours, and hotel nights.

Integrated with

Jeppesen Crew Rostering to receive detailed information about resource bottlenecks.

Jeppesen day of operation systems to synchronize pairing properties with real operations.

Jeppesen Tail Assignment to create fleet connections that are also effective in the crew planning process.

Product Content

- Pairing optimization
- Graphic pairing editor
- Jeppesen Rave (rule and quality modeling language)
- Reports (Jeppesen Rave Publisher)
- Regular new releases
- Standard support (office hours support and regular Installation Quality visits)

Options

- Timetable Manager (general flight timetable database)
- Bid-line generator and editor
- Extended support

Technical Information

Time schedule format:

SSIM, TPTS

Data storage:

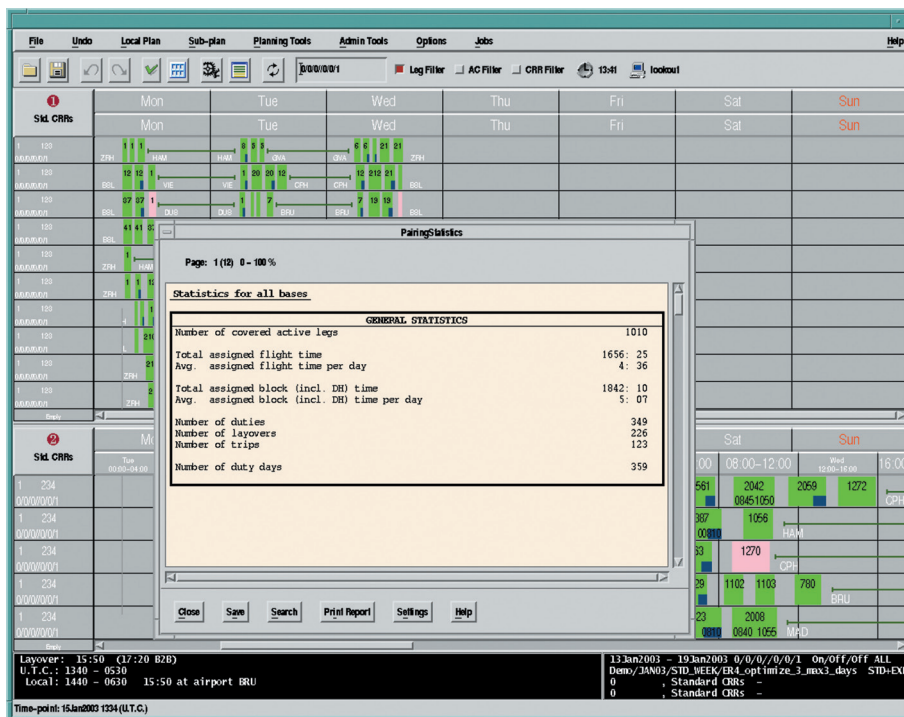
Files (Oracle database is optional)

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



An analysis report for one scenario delivered from the pairing optimizer.

Customization

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

THE PROCESS

Define Scope

Read the timetable. Decide which fleet to plan, which other carrier deadheads to allow and which crew positions to cover.

Select

Use the graphic user interface to select the flights to be planned. It is possible to use standard daily or weekly solutions, as well as creating dated solutions from scratch. When applying a pairing solution to a new timetable, information about cancelled flights, amended flight times and new flights will be updated automatically.

Solve

It is possible to build pairings interactively or use the pairing optimizer. During both manual and automatic pairing construction, legality controls are always carried out. Using the optimizer it is possible to create pairings with a minimal total crew cost, robust connections – with minimum critical crew changes – and satisfactory crew quality. The pairing optimizer handles sophisticated aspects of crew pairing construction, such as synchronizing cockpit and cabin pairings, other airline deadheads, ground transports, variable crew needs and multiple crew bases, coupled with corresponding daily base constraints.

Evaluate

While the optimizer is running the user can always monitor the continuously improved solutions via the graphic user interface. It is easy to analyze and edit pairings created by the optimizer. A wide range of analysis reports are available to make the analysis of the pairing solutions more effective.

Communicate

When the solution is ready, the pairings are sent to the roster system, and reports are generated for preliminary hotel reservations, crew ticket reservations and meal load orders.

Retiming Overview and Benefits

Retiming is the concept of changing the departure and/or arrival times of flights a little (e.g. 5 to 15 minutes) to accommodate better crew pairing solutions. Potentially efficient pairings which are illegal with the current schedule – typically due to connection time or duty time rules – become legal with minor schedule changes.

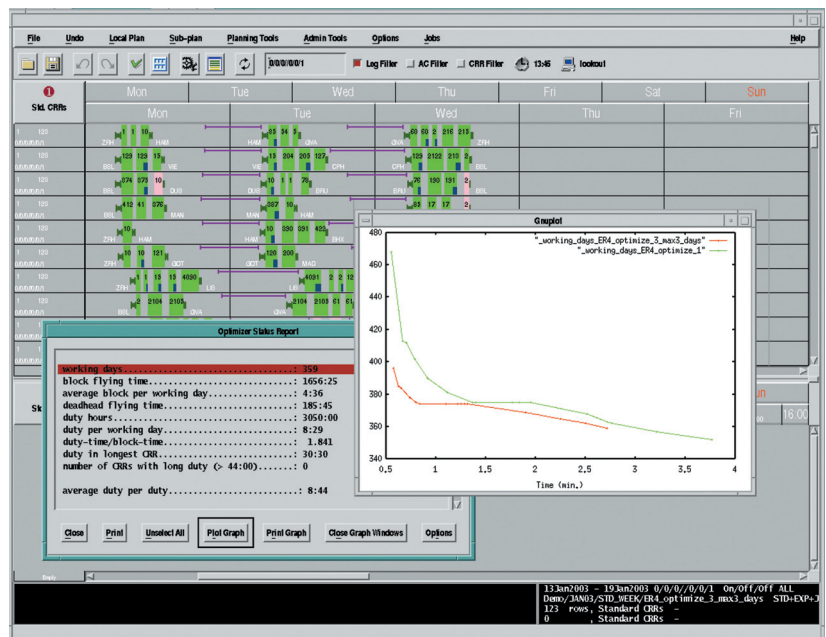
Used as part of the pairing solving process, retiming possibilities are evaluated against common pairing objectives such as stability, rosterability and crew quality.

As a first step towards integrating optimization between Fleet, Tail, and Pairing, it is possible to limit potential schedule changes on various criteria such as slot or commercial constraints and aircraft minimum connection times.

Jeppesen Remote Planning

With the Remote Planning service, the customer can realize savings from highly optimized planning very quickly. Our experience is that introducing Jeppesen Crew Pairing and Jeppesen Crew Rostering will generate savings in the magnitude of 3 to 15 percent of total crew costs for our clients.

As an alternative to a full scale implementation, Jeppesen is able to offer Jeppesen Crew Pairing and Jeppesen Crew Rostering in a Remote Planning mode. Pairings and rosters are produced at Jeppesen and delivered to our Remote Planning clients in accordance with a predefined time schedule.



Comparing how required duty days vary between two optimization scenarios.

Questions and Answers

What savings can Jeppesen Crew Pairing deliver?

Of course the amount saved depends on how effective the user's current process is. Initial savings of our clients typically range from 3 to 15 percent. The savings can be obtained by reducing the crew costs or by increasing the crew productivity. It is also possible to reduce direct costs (e.g. hotels, passive travel and per diem). Savings can be obtained for both short-haul and long-haul operations.

In addition, there is also a second saving phase. When planners become skilled in controlling the system, it is possible to fully exploit the simulation potential, e.g. in agreement negotiations, or when providing the commercial department with feedback about a change request. This phase is harder to measure, since it is about avoiding cost increases from a new and expensive agreement or from not being able to meet promised delivery capacity. Based on feedback from clients we estimate that the savings from the simulation potential are comparable to the initial savings.

What problem size can Jeppesen Crew Pairing handle in one optimization run?

We can handle challenges from the largest airlines in the world. We already assist some of the largest carriers with their optimized planning. A wide variety of planning concepts are supported, including daily and weekly solutions and dated solutions from scratch. Our clients currently solve up to 25,000 dated flights, directly from scratch. Daily solutions with 1,500 flights are not a problem. Mixed short-haul and long-haul operations for large cabin population are also planned by our existing clients.

Can Jeppesen Crew Pairing handle complex, or even multiple, agreements?

Yes, Jeppesen Rave makes it possible to handle any agreement structure. We currently handle clients with many different union agreements in the same fleet. We also have clients where each individual crew member can choose between different agreements.

Can Jeppesen Crew Pairing obtain proper crew quality?

In our experience the definition of crew quality varies a lot between operators. During implementation, Jeppesen's staff works closely with expert planners (and sometimes with crew union representatives) to define exactly what crew quality means for the client. The crew quality criteria are then modeled in the Jeppesen Rave language.

Since most of the quality criteria are not stated on paper, but are rather a result of company culture, this process requires a lot of communication with the airline's experts. As a result, the airline's management receives documentation of exactly how the quality policy really is applied. After implementation the modeling of the quality criteria is taken over by the airline, ensuring that quality criteria always match the company's policy.

How does Jeppesen Crew Pairing deal with solution robustness?

There is a wide range of tools to ensure that the proper robustness can be achieved. The detailed robustness criteria are modeled in Jeppesen Rave. The optimization tools also support concepts such as base distribution (moving production between bases to match real crew availability), base variants (ensuring that a certain percentage of the pairings can be easily moved between bases), crew synchronization (keeping different crew categories together during the entire duty or during critical connections) and many more means for achieving solution stability. It is also possible to let Jeppesen Crew Pairing feed a fleet product, such as Jeppesen Tail Assignment, with suggestions on critical crew connections that must be respected.

How does Jeppesen Crew Pairing deal with changes (new aircraft type, changed agreements, new bases, changes in surrounding systems, etc)?

All our systems are designed to handle real changes and support what-if scenarios. The access to Jeppesen Rave and the Jeppesen Rave Publisher makes it easy to change bases, fleet structure, union agreements and quality or stability criteria. The flexible design of the graphic user interface also makes it easy to change interfaces to surrounding systems or to modify the planning process itself.

Jeppesen Systems AB

PO Box 192, SE-401 23

Visit: Odinsgatan 9, SE-411 03 Göteborg, Sweden

Phone: +46 31 720 81 00

Fax: +46 31 720 81 20

Email: crewsolutions@jeppesen.com

JEPPESEN.COM

