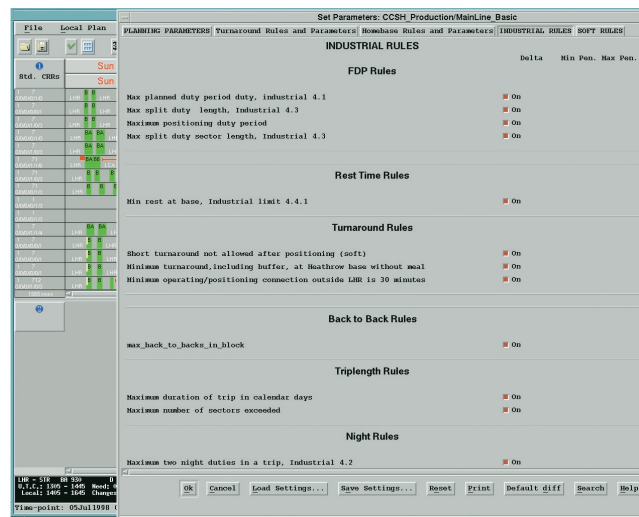


*Rave ensures that all manually violated rules always result in a warning. The optimizers will never be able to introduce illegalities.*



*When a rule or parameter is introduced, it automatically appears in the rule and parameter control panel.*

# Questions & Answers

## Isn't Rave just making things more complicated?

When we deliver a production system, legality and quality rules are presented together with parameters that allow authorized planners to change costs and quality limits. As long as there is no change everything functions well. Our experience shows that the transport industry is a dynamic business where agreements, fleet structures, costs, opinions about good quality, bidding processes are subject to changes.

When a new rule structure is agreed or when per diem or overtime calculations are altered, it is necessary to adjust the system. The rule language allows the client to introduce such changes. This is very useful when performing agreement negotiations, and also when trimming the everyday operation. Rave gives our clients the opportunity to ensure that their systems keep track with reality.

## Can Rave model many agreements?

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

## Do your clients actually use Rave?

From our ongoing service work we know that all our clients appreciate and actively use the simulation and change capabilities that Rave provides. Over 50% of our clients have actually been able to calculate the financial consequence of the added value that Rave brings. Of course it differs on a case-by-case basis, but the average is more than 2% in additional savings. This is a substantial saving, especially on top of the initial savings that good optimization provides.

## Why not JAVA or C++ instead?

Modelling rules with a domain-specific language or even with a general programming language is not so difficult. However, it is difficult to get the rules and cost calculations to work together with optimization. To make it possible for our clients to constantly add rules and cost parameters has required a major development process. The Rave language is tailor-made for describing properties in the transport industry, while working very effectively with optimization.

*If you have any questions about Carmen Rave, please contact us at [carmen@carmensystems.com](mailto:carmen@carmensystems.com)*



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# Carmen Rave

Carmen Rave is a global modelling language that describes legality, costs and quality constraints. Rave supports all Carmen products and is essential both for tuning everyday production and performing simulations.

Carmen Rave is used as a legality, cost and quality modelling language and is accessible from all Carmen products. The language is specially designed for the transportation sector and to work effectively with advanced optimization. The calculations in Rave are also available from the report generator, Rave Publisher.

## Constant legality control

Rave ensures that the proper legality controls are constantly carried out. Rules and parameters introduced in the language automatically appear in the planner's control panel.

## Solving the right problem

The planner can always change the legality by switching a quality rule on or off, or by changing the value of a cost or a quality parameter.

In addition to this flexibility, it is simple for our clients to change a legality rule or adjust the cost structure by changing the Rave code. The change will be immediately effective. It is possible to introduce modifications in the legality or the cost structure within hours. In the real world the target has a tendency to change all the time. If you can't respond rapidly to change, you end up with the perfect solution for the wrong problem.

## Simulations

What is optimal today may not necessarily be optimal tomorrow. New agreements are negotiated, new bases are opened, timetables are revised, new equipment is introduced, and so on. Carmen Rave provides the means for quickly adjusting to the ongoing change process. With the optimization technology in all of Carmen's products Rave is also a

```
rule max_duty=  
    %duty% <= 10:00;  
    remark "maximal duty";  
end  
  
%pairing_cost% =  
    %salary% +  
    %hotel% +  
    %per_diem% +  
    %positioning% +  
    ...
```

*A rule ensuring that it is impossible to plan a duty for more than 10 hours and an example of a cost function with cost components for salary, hotel, per diem and positioning travel.*

powerful tool for analyzing what changes should be introduced, and what the financial consequences will be. The ability to redefine the legality and cost structure combined with the ability of using many different rule sets, has proved to be vital when carrying out simulations.

## Report calculations

Carmen Rave is used to calculate values in all reports available from the Carmen Rave Publisher. It is crucial to have all the detailed cost calculations displayed when analyzing the consequences of legality or quality changes.

## A standalone Rave server

Rave is also available as a standalone application that provides our clients with a robust

rule system for their in-house applications. Rave is easy to maintain. When you have to modify a rule, you simply make the changes in the Rave code, and they are applied to all applications that utilize Rave.

### Technical information

- Requires an ANSI C++ compiler
- Rave is available as a stand-alone application on a Unix platform