



Making the Most of Resources

ResourceManager - the essential system for
managing valuable resources

Connecting IT and Transport

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Benefitting from Better Operational Planning

Inefficient use of human resources and rolling stock costs passenger and freight operations money. In an increasingly competitive industry, managers need to know that their operational support systems help them make the best use of staff and resources. Funkwerk Information Technologies has used its experience in the industry to create ResourceManager, a system that aids the routine planning and management of resources, and supports short-term operational decisions during disruption.

ResourceManager

ResourceManager delivers a big step up in the capabilities of systems designed to assist operators replan and deliver their services. It is designed to:

- Allow crew and vehicles to be efficiently and effectively allocated to schedules
- Provide an overview of the current situation for both crew and vehicles (The Big Picture)
- Assist operators in managing changes to crew and vehicle schedules and avoiding incidents.

In doing so, ResourceManager delivers a capability that is normally only found by combining a number of separate systems. This integration delivers efficiencies in both the control and delivery of rail services, and real potential to significantly reduce operating costs.

Vehicle and Crew Scheduling

Familiarity delivers efficiencies, so the Vehicle and Crew Gantt display, for example, can be configured so that the interface looks and feels familiar to users. The configurability of the system allows users to specify the appearance or language of the display to suit their own

needs. This ensures that the user is able to have:

- Clear views of the resources available in the past, present and future.
- Data in context so that informed decisions can be made.

- Features that users would expect, such as the means to assign resources to cover duties or to swap resources on the graphical displays.

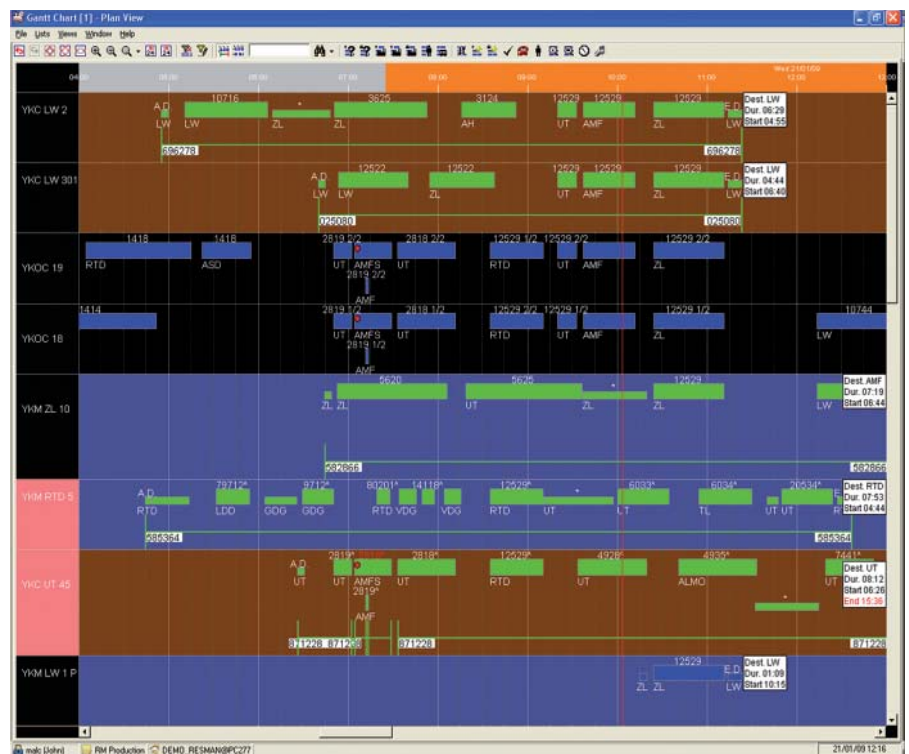


Figure 1: Vehicle and Crew Gantt
This view shows both vehicle (blue) and crew (green) resources on the same Gantt.



Identifying Need and Allocating Resource

Any plan will only work if the resources are in place to deliver it. Resource-Manager can help its users to ensure those resources, both crew and rolling stock, are in place. The system can display a base resource schedule where work for ‘anonymous’ resources, is displayed. The Gantt view used also shows

where work has already been allocated and which specific resources have been assigned to it. Importantly, the system also shows to the user any work that is not covered, and quickly finds suitable options to enable it to be covered.

Managing Consists and Set Formation

Accurate and up to date knowledge of the availability of rolling stock is

crucial to covering planned work. The allocation of rolling stock resources to tasks is made easy using elements of ResourceManager’s capabilities. The key elements include:

- The capability to drill down into set details.
- The ability to manage sets by clicking and dragging.
- The rapid display of tables, forms and graphs.
- Easy access to data for analysis of previous day’s work.
- Flexible and secure user access – multiple user access from multiple locations.

On longer timescales, planning for vehicle maintenance in pre-allocated schedules is straightforward, and vehicles can be kept in service where previously they might not. Importantly, vehicles will be where they need to be when they need to be for service delivery, for maintenance, for cleaning, and for refuelling. Services will therefore run more smoothly, whether planned days or hours in advance, and costs will be reduced.

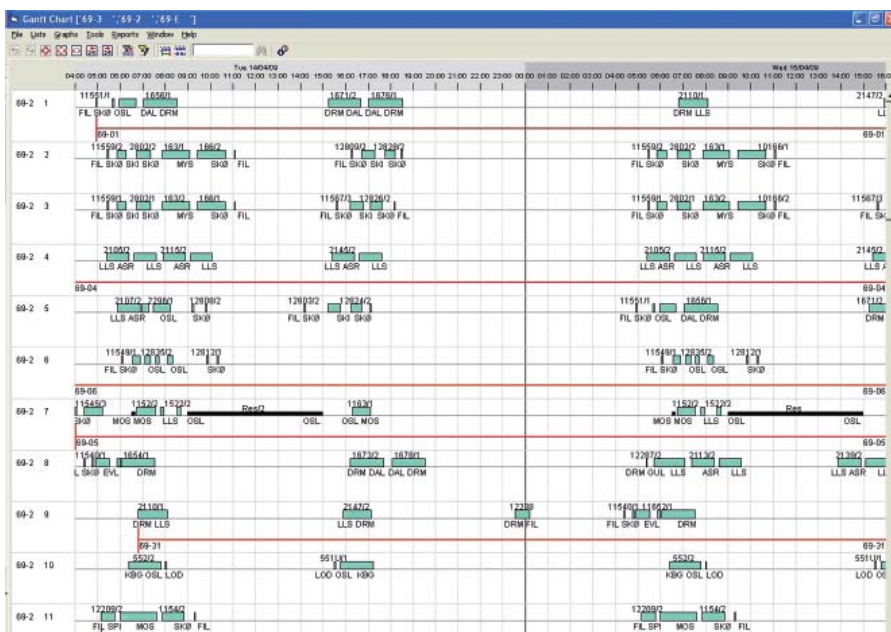


Figure 2: Plan View Gantt

Matching Resources to Needs - The Big Picture

Resources can be quickly and efficiently matched to work requirements using ResourceManager, be they locomotives, coaches or wagons, trainsets, or crews. Rolling stock and crew can be assigned to appropriate work tasks, and all the required information is made accessible to authorised users.

Assignment Validation Made Simple

The safe operation of a railway demands that the right resources with the right capabilities are assigned to specific tasks. This is true for both crew, where specific knowledge of rolling stock and routes is often required; and for rolling stock, where specific route clearance may be needed.

Assignment validation is straightforward with ResourceManager. Problems

can be pre-empted as the system checks whether or not the right set-type has been assigned, or by checking if there is a possibility that the allocation will lead to rolling stock becoming overdue for maintenance. This validation is not just performed on initial assignment to work. If, for example, a train is diverted whilst en-route, the assignment validation is immediately updated to reflect the changed situation.

Operational warnings can be managed through user configurable operating targets that allow for factors such as distance travelled or “time in traffic” to be considered. The system will warn users of potential problems, and allow controllers to see their options at a glance. Any restrictions on resource use, including temporary ones are automatically recorded and managed.

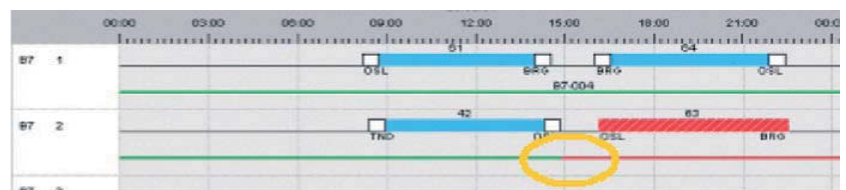


Figure 3: Assignment Validation

This shows how the set assignment changes colour where maintenance distance would be reached.



Seeing the Big Picture

ResourceManager provides an overview of the current situation for both crew and rolling stock, the so-called Big Picture. Knowing the options available helps problems to be managed more efficiently and effectively. ResourceManager offers the flexibility to consider alternatives, and provides quick and effective ways to alter tasks. It allows users to focus on relevant information

by changing the view on the display screens. That view can be as simple or as complex as required. Graphically rich views, like Gantt charts and time-distance graphs, help deliver easily understood overviews of the status of resources. A range of views are simultaneously available, providing different perspectives that allow the user to better understand the overall situation. Complex data is clearly and accurately

presented in an easy-to-use format that helps users to understand how tasks relate to one another. For example, ResourceManager's Gantt chart enables the user to manage and schedule resources and activities.

Organising Maintenance for Optimum Performance

Failure to meet the maintenance requirements for rolling stock can increase operating costs, shorten its operating life and adversely affect its reliability in use. ResourceManager is designed to make sure that all vehicles arrive for maintenance at the right time and in the right place. The system holds maintenance targets for all vehicle sets, matching these to the overall maintenance needs of the whole fleet and the capabilities of the depots. Targets may be defined in terms of distance accumulated, time in traffic, calendar date, or any combination of these.

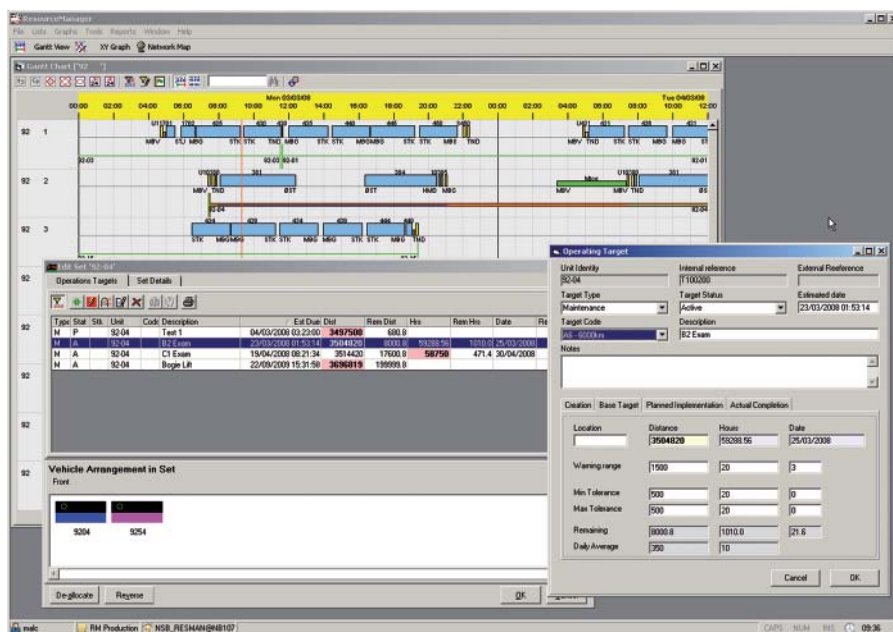


Figure 4: Vehicle Plan View Gantt with operating targets

Planned maintenance intervals for vehicles can be represented by “operating targets”, as seen here. This might include a regular vehicle examination, for example.

Managing Changes and Avoiding Incidents

ResourceManager assists users to resolve incidents quickly and effectively, thereby reducing costly delays. The system gives an instant overview of the current operational picture, and makes it easy for the operator to see the extent of delays, assess what action is needed, and to see its effect. Incidents and their resolution are recorded for review at a later date, and can be used for management, training purposes, and assisting with disputes.

An Overview of Incidents

ResourceManager comes into its own when the railway suffers operational problems. User-friendly features allow operators to amend the production on-the-day to meet immediate or emerging needs, whilst ensuring that the crew relief requirements, vehicle maintenance needs, and stock balance constraints are all still satisfied. This then allows service incidents to be managed efficiently, and the effects of disruption to be actively reduced. Once information about an incident has been recorded, all affected

trains can be identified and tagged on the system. ResourceManager can be configured to record trains that have been cancelled, altered, delayed or wrongly formed. Sharing the information on what has happened and what is likely to happen with stakeholders means that they are also able to make informed decisions and so help reduce disruption to the network. Controllers can then hand over at the end of a shift, safe in the knowledge that any problems are logged, and that their continued management is secured.

Time Horizon

Controllers need to know exactly what is happening, what has happened, and what will happen. ResourceManager is easily adapted to suit each individual time horizon. Planning for vehicle maintenance in pre-allocated schedules is straightforward, and vehicles can be kept on the move, where previously they might have been held up. ResourceManager helps to ensure that services are kept running smoothly, and where disruptions occur, it helps the

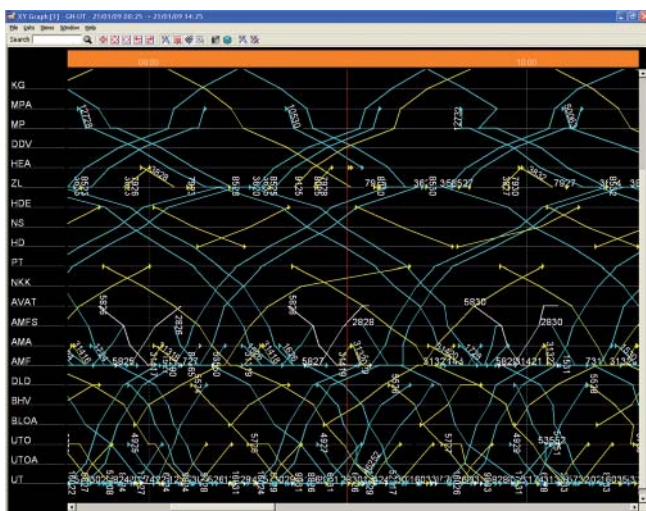


Figure 5:
X-Y or time/distance graph shows the train services as lines.

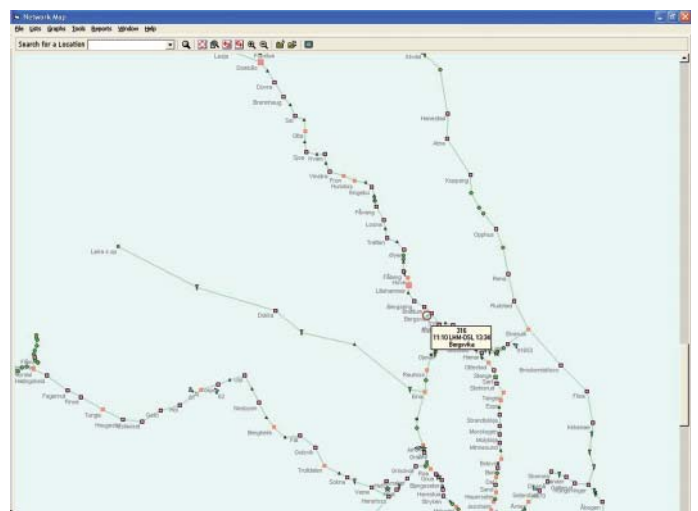


Figure 6: Network Map
Information can also be presented in the format of a map showing the rail network from a bird's eye view. This shows where resources and staff are placed and where they are in relation to each other.



controller return to planned operation as soon as possible.

In situations where trains are run to meet production demand, such as heavy haul freight, ResourceManager allows them to be added to the system one by one. The events that affect each train can be recorded and any needs dealt with as necessary.

Time-Distance Graphs for Problem Analysis

Time-distance graphs are familiar to most users, and are one of the key

tools for managing incidents, whether planned or unplanned. Any blockages caused can be clearly displayed, and the system can be interrogated to identify all affected train journeys. The user is then able to rearrange the service and organise resources using the functionality of ResourceManager to overcome any problems caused by the blockage.

Conflict Alerts

Unexpected hitches are a part of life. At times, delays to incoming rolling stock or crews may mean that trains are

incorrectly resourced, which leads to them leaving late. Alternatively, controllers may be concerned about station or yard track capacity being breached. ResourceManager's conflict alerts make it easy to react quickly. As soon as the system identifies a problem, users are alerted. Critical information is immediately available to those who need it so that the situation can be dealt with.

References

ResourceManager already has a proven track record with over five years use with Norwegian State Railways (NSB). A current implementation to manage all passenger trains in the State of Victoria, Australia is underway.

In summary

ResourceManager offers a state-of-the-art solution to the age-old problem of matching railway resources to operational needs. Its resource planning and resource scheduling functions assist operators and controllers to allocate resources efficiently, and to validate the assignment of those resources against the prevailing business rules. Crucially, ResourceManager provides an overview of activities affecting railway operations, and in doing so aids the management of incidents as they happen.

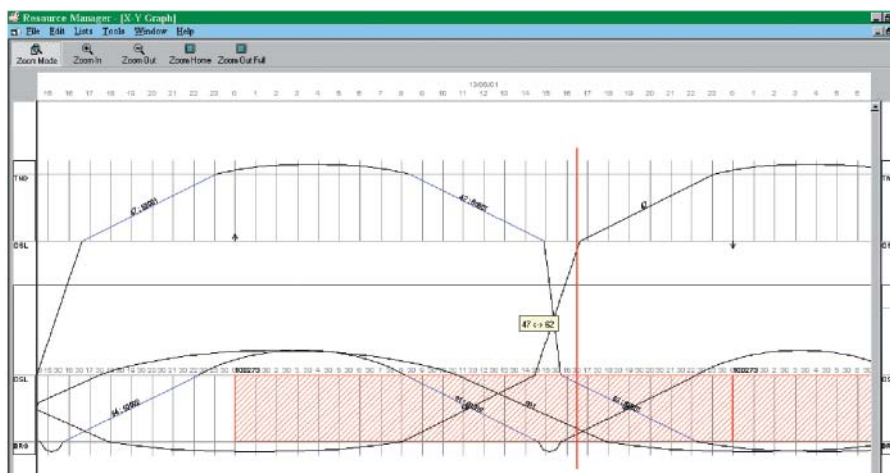


Figure 7: Another time-distance graph shows the area with the blockage clearly defined by shading.



**Funkwerk Information Technologies
York Ltd**

Jervaulx House, 6 St Mary's Court
Blossom Street, York, YO24 1AH
UK
Tel.: +44(0)1904 63 90 91
Fax: +44(0)1904 63 90 92
E-mail: info.gb@funkwerk-it.com

**Funkwerk Information Technologies
Malmö AB**

Stadiongatan 65
SE-21762 Malmö
Sweden
Tel.: +46(0)40 671 65 00
Fax: +46(0)40 671 65 99
E-mail: info.se@funkwerk-it.com

Funkwerk Information Technologies GmbH

Edisonstrasse 3
D-24145 Kiel
Germany
Tel.: +49(0)431 24 81-4 88
Fax: +49(0)431 24 81-5 01
E-mail: info@funkwerk-it.com

Funkwerk IT Polska Sp. z o.o.

Al. Jerozolimskie 195 B (Philips-Building)
02-222 Warszawa
Poland
Telefon: +48(0)22 340 30 33
Telefax: +48(0)22 340 30 30
E-Mail: info.pl@funkwerk-it.com