



KEY COMPONENTS

- Optram™ Enterprise
- Optram™ Measurement
- Optram™ Analysis and Forecasting
- Optram™ Programming Extension

BENTLEY® OPTRAM™
RAILWAY MAINTENANCE DECISION SUPPORT SYSTEM

THE CHALLENGE

Today's railways face increasing pressure from customers and owners to improve safety, capacity, and reliability of the rail system – while controlling expenses and tightening budgets.

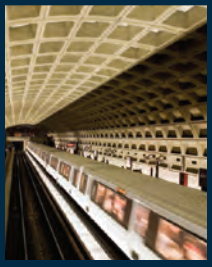
With as much as 20 to 25 percent of annual budgets dedicated to maintenance of the rail corridor, railway operators know that optimal network system performance is dependent upon effective use of accurate, consolidated, and up-to-date asset information.

Bentley offers Optram, a comprehensive decision-support system that enables proactive management of railway assets. Through the ability to compare and analyze volumes of current and historic track and rail asset data, track and structure professionals can greatly improve maintenance strategies and planning.

The hallmark of the Optram system is a unique visual framework that enables users to correlate and view railway information in meaningful ways. By having the right information at hand – and the critical ability to work directly with the visualized data – users dramatically improve the effectiveness of work planning decisions on the railway network. Optram analysis and forecasting tools help users plan preventive maintenance and optimize capital project planning. In addition, data automation tools streamline the day-to-day management of the Optram system and data import.

WHY OPTRAM? RAILWAYS USE OPTRAM TO:

- Improve overall service, safety, and reliability
- Reduce maintenance and equipment costs
- Increase profit margins
- Streamline capital planning and operations
- Reduce temporary speed restrictions
- Improve field-reporting accuracy



Optram powerful data analysis engine automates quality indexing, forecasting, prioritization, and planning of when, where, and what type of repair is needed.

With Optram, railway executives, engineers, field staffs, maintenance managers, and renewal contractors benefit from a consolidated source of asset information – a source to which they also contribute information. By improving the effectiveness of corridor asset management, maintenance managers and planners substantially increase the safety, performance, and reliability of the railway network.

REAP FULL VALUE FROM YOUR RAILWAY DATA

Optram is designed to help track managers turn railway data into actionable information, enabling them to make better decisions about track and other maintenance-of-way assets. Track managers can confidently determine what work needs to be done, where the work should be focused, and when the work should be performed. Historical information helps them to judge the effectiveness of work over time.

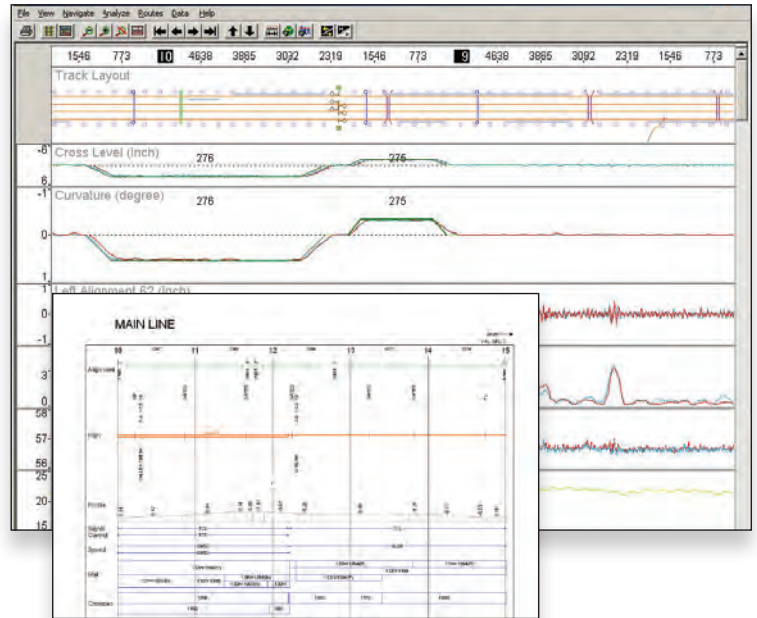
The software displays data in a linear graphical chart so that users can quickly and accurately collect, view, analyze, and manage every dimension of the railway infrastructure and its conditions over time.

At its core is a linear network model that correlates information from many sources – including raw measurement data – into a common location-based reference system.

Around this core, Optram provides tools to help reap value from the data:

Optram Enterprise – Provides integrated viewing of track data for optimized track management

Railway information is clearly presented in linear, thematic electronic track charts that make asset, condition, and historical data comprehensible and exploitable for users across the enterprise. From the chart, users have direct access to the data for graphical editing, analysis,



Optram users can interact with asset and condition data by selecting the type and location for a particular task. Electronic track charts can be viewed live, taken into the field, saved as a PDF document, or printed.

manipulation, and data import. Users can interactively reference more than 200 types of railway asset data simultaneously, including track layouts, curves, rail/ballast/sleepers, planned work, work history, events history, rail defects, gross tonnage, maintenance zones, area zones, track category, and mileposts.

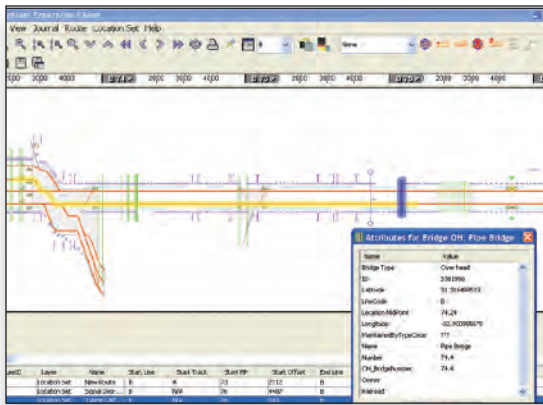
Optram Measurement – Offers unmatched flexibility when working with track-condition data

The software provides features for loading, storing, positioning, checking, testing, and automating track measurement vehicle data. Easy-to-use automation tools enable users to work with:

- Track geometry – managing track geometry measurement and exception data using standard track inspection car data
- Rail condition data – managing longitudinal rail profile measurements and rail defects from popular rail-detection systems
- Catenary wire information – incorporating catenary wire/overhead-line alignment and thicknesses
- Additional measurement data – handling third-rail geometry, ultrasonic, rail corrugation, and more

Optram Analysis and Forecasting – A unique data processing tool that offers substantial return on investment through preventive maintenance

Users can set up and schedule a series of calculations and rules that operate on track network data to generate a wide variety of actionable results. Optram will automatically run analyses of track quality indexes, degradation rates, and condition trending – and predict outcomes over time. It analyzes the effectiveness of tamping work, for example, and quickly gives answers such as historical costs for specific track subdivisions or identification of tracks due for inspection.



Optram produces data-driven electronic Track Charts.

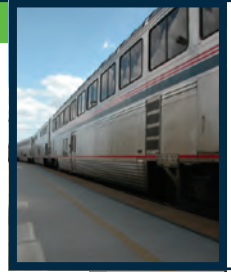
Optram Programming Extension – Allows users to embed Optram track charts in custom applications

Information from an Optram system can be used with geographical information systems (GIS), enterprise asset management (EAM) systems, and computerized maintenance management systems (CMMS). Optram Programming Extension enables third-party applications to display Optram track charts and receive user track-chart interactions such as selecting an asset or adding a work record.

THE OPTRAM ADVANTAGE

Optram runs standalone or can be integrated with other enterprise systems, such as finance or work-order systems, to provide a seamless workflow and enable users to:

- Import a wide variety of data including assets, work, inspection, and track measurement data
- Generate electronic and printed track charts from a common data source
- Integrate existing data systems with live data links
- Link assets to existing documents, images, and applications
- Employ extensive data processing capabilities for analysis and forecasting



A BETTER WAY TO WORK



Optram is an essential business tool for track and structures organizations. Railway professionals are able to target resources, reduce costs, and maximize planned outage times.

Optram helps track managers:

- Make sense of volumes of track data
- Document and analyze track conditions
- Make decisions with a full set of track measurement data
- Drive work order requirements
- Target maintenance activities based on criticality
- Identify root causes and avoid treating symptoms
- Trim maintenance occupancy time
- Control costs for labor, materials, and equipment
- Refine operating budgets based on track condition
- Maximize track capacity and ensure on-time reliability

SYSTEM REQUIREMENTS

Processor

Intel Pentium or AMD AthlonT
(Client and Server)

Operating System:

Windows XP (Client)
Windows 2003 (Server)

RAM

512MB minimum, 1GB recommended
(Client), 1GB minimum, 2GB recom-
mended (Server)

Database Server (Server)

Requires connection to an Oracle or
Microsoft SQL Server database

Hard Disk

1GB of free disk space (Client and
Server)

Display (Client)

Graphics Card supported by DirectX 9.0

ABOUT BENTLEY

Bentley Systems, Incorporated is the global leader dedicated to providing comprehensive software solutions for sustaining infrastructure. Architects, engineers, constructors, and owner-operators are indispensable in improving our world and our quality of life; the company's mission is to improve the performance of their projects and of the assets they design, build, and operate. Bentley sustains the infrastructure professions by helping to leverage information technology, learning, best practices, and global collaboration – and by promoting careers devoted to this crucial work.

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Choose Bentley, a trusted source of proven, cost-effective, and efficient rail solutions.

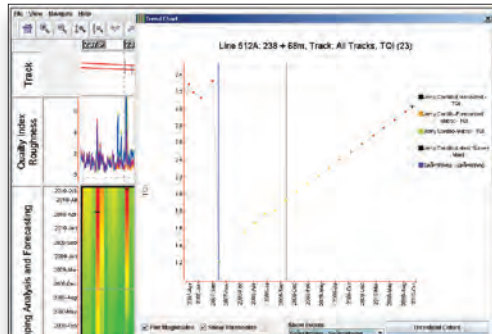
- Take advantage of web, client, and network disconnected deployment configurations
- Build custom applications with interactive track charts
- Provide data security for users and groups using data location and data type
- Build a custom solution from Optram selection of modules and scalable pricing
- Prioritize maintenance projects by track performance
- Identify areas of high costs or repeated repairs
- Focus maintenance operations and resources
- Pinpoint the location of problem areas
- Forecast and prioritize:
 - » Rail grinding locations
 - » Rail replacement
 - » Rail inspection cycles
 - » IRJ replacement
 - » Rail stress and failure
 - » Weld failure
 - » Rail corrugation growth

POWERFUL TRACK ANALYSIS AND MAINTENANCE MANAGEMENT

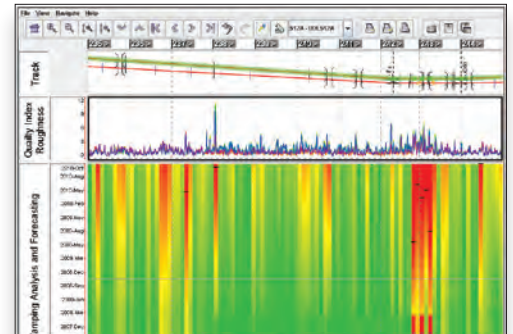
Optram software makes it possible to integrate multiple sources of railway corridor information and perform a wide array of track analysis and maintenance management activities.

For example, users can:

- Process, present, and analyze complex track data
- Evaluate maintenance needs and create work orders in an efficient, integrated process
- Identify the most critical and vulnerable areas
- Analyze historical trends at precise locations
- Determine the root cause of track-related problems
- Achieve a significant reduction in track geometry defects
- Deliver electronic and printable track charts and other information



Trend charts show change in condition over time.



Tamping analysis and forecasting, displaying track quality.