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Rail Replacement Planning

Rail represents a railway's costliest asset. It's no wonder, then, that railways pay close attention to rail wear and surface conditions, especially in curves where gauge-face wear can dramatically reduce the life of rail in track. Thanks to automated rail profile measurement systems, which are found on most rail-bound and hi-rail geometry cars, accurate rail profile and wear measurement data are readily available.

replacement plans. Software programs, such as the *Holland Co.'s* ***Industrial Metrics' Rangecam*** Track View and Track Analyst programs, allow engineering/maintenance personnel to not only view current rail profile conditions, but to query the data for vertical, gauge or combined wear — the types of conditions that dictate corrective maintenance activities, such as rail grinding or rail replacement.

While identifying rail in need of replacement is good, determining when rail will need to be replaced based on wear trends before it reaches its change-out limits is better. ***Rangecam*** Track Analyst software incorporates a rail replacement planning module that does just that: it calculates rail wear rates by time or tonnage and projects the dates at which each rail segment (curves and tangent segments) will meet the railway's unique rail wear limits. The information is presented in report form (see Figure 1) and graphically in a visual rail replacement plan (see Figure 2).

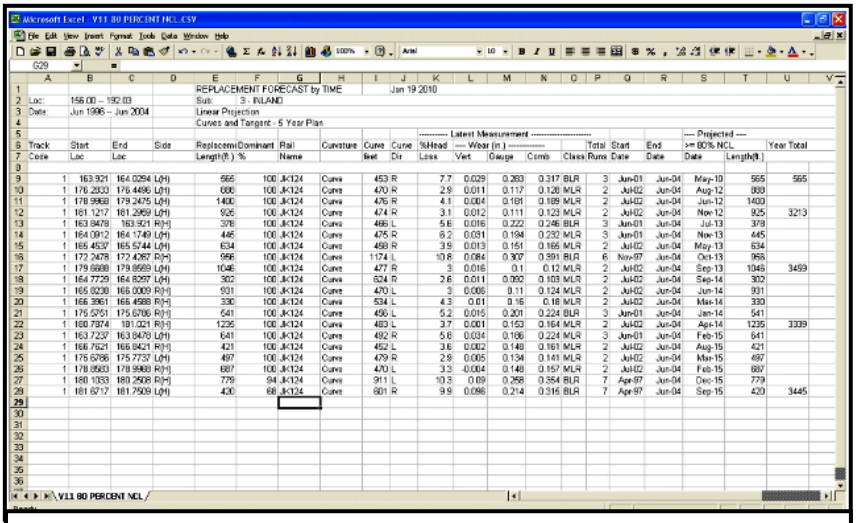

Figure 1. Rail Replacement Forecast

While both reports are important planning tools, a Visual Rail Replacement plan allows planners to cross reference the data by double clicking on the wear charts to obtain a “two-up” profile window (see Figure 3), which shows the current and historical wear at any given location — an invaluable tool for examining wear conditions at specific locations in track, and verifying the replacement planning report.

Fig. 2 Visual Rail Replacement Plan

Rail Replacement Plan

Reliable rail replacement forecasting requires accurate information about the measured rail type. The software must be able to accurately identify and model the rail section in order to determine wear. This typically requires accurate rail head, web and base measurements. While some railways model only the head of the rail, with one or two reference points at the base to identify wear, several railways and all of Holland’s TrackSTAR vehicles measure the complete rail profile.

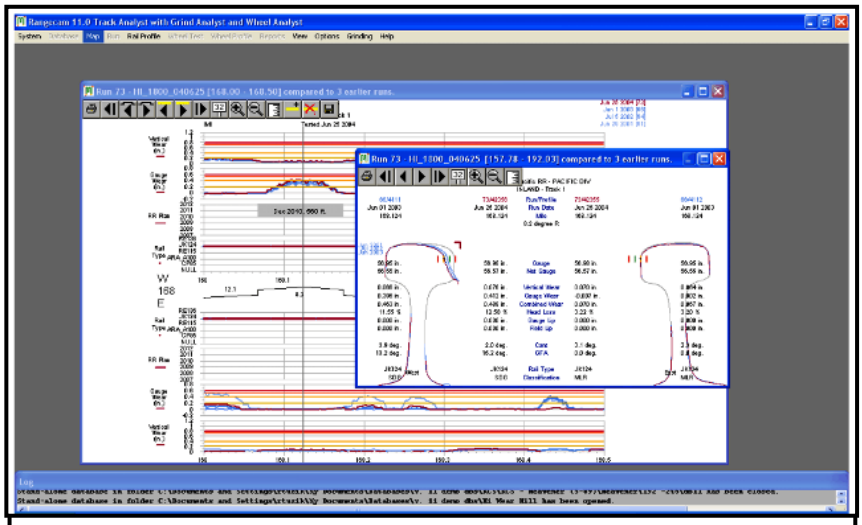

Fig. 3, Rail Wear and Scheduled Changeout Date with a "Two-Up Porfile Window Fig. 2 Visual

Rail profiles are typically collected at 10-foot intervals, though they can be collected more frequently in tight-radius curves, for example, if necessary. The profile data is imported (along with geometry data) and aligned to previously collected data, when available. This allows the data to be reviewed along with critical geometry data such as curvature, crosslevel, gauge, etc., and track features, such as turnouts, road crossings, bridges, tunnels, etc., in order to get a more complete picture of the overall track conditions at any given location. The corresponding data can help maintenance planners understand “spikes” or unusual wear patters in the data, and better decide how to deal with them.

Rail maintenance planning software provides several ways to examine rail wear:

- reports (generated by queries) identifying specific wear conditions such as 3/8-inch gauge-face wear or 5/8-inch vertical wear, etc.
- "two-up" profiles that show the actual measured rail profile shapes. These are typically overlaid with previously collected data to show wear over time.
- charts that graphically illustrate vertical, gauge and combined wear, along with percentage of head loss. This data can be looked at on a curve-by-curve (track segment) basis, by mile, or by milepost location. Rangecam allows the user to magnify any segment of the chart or to drill down to an individual profile for a closer look at wear conditions anywhere on the system.
- rail trend charts that show when railroad-defined wear limits will be crossed for each curve, if the historical wear trends continue. The software automatically recognizes when rail has been replaced, and restarts the trend line after the replacement date. This information can also be augmented by a graph showing the wear history of each measured profile within the segment (see Figure 4).

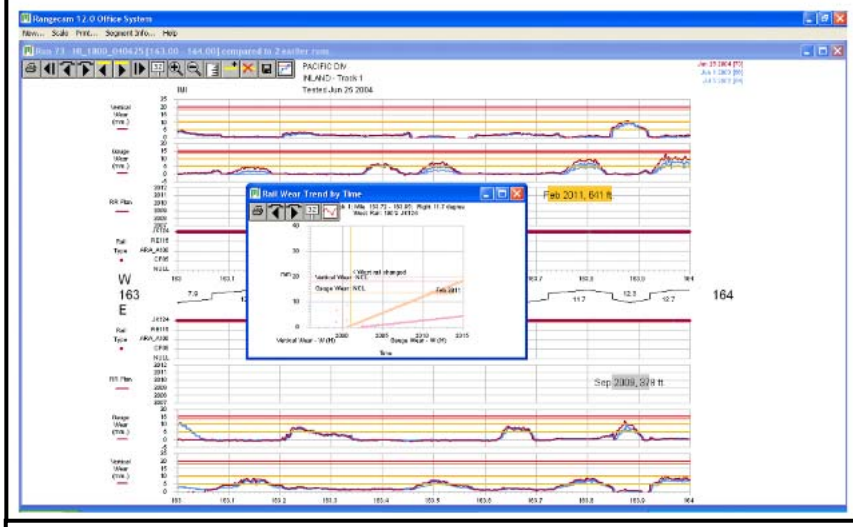

Figure 4. Rail Wear Trend charts show when rail will each near condemning limits.

The rail replacement planning software can also query the database to identify rail that has reached or is approaching its replacement limits, based on the rail section, historical wear and the railway's replacement criteria. Three data sets (historical runs) or more are typically required to accurately project replacement dates. A rail replacement forecast report can be printed for distribution and verification in the field, as needed. The information can also be used to generate a Visual Rail Replacement Plan that graphically shows the length and location of each rail (right or left) that is identified for replacement for each segment of track. The report can be edited on screen to change the date of a projected replacement to coincide with rail/tie gang schedules, or to extend or reduce the length of the rail scheduled for replacement.

Railways that collect rail profile data on a regular basis have a wealth of data that can be used to plan maintenance. They can do it by manually working through the measurement data, or

they can use sophisticated software programs that provide a better opportunity to replace rail at the optimal time – neither too late nor too early in its lifecycle.

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