Replacing Branchline Rail

Usually, questions of when and where to replace rail are asked generally in regard to mainline track, for which the economics of and the criteria for rail replacement tend to be well understood.

As has been noted previously in this column, combined technical and economical models have been developed to determine the optimum time from an economic point of view for the relay of rail as a function of traffic and track conditions — and on a site specific basis.[1,2]

Drawing attention too is the important issue of replacement strategies for rail on branch lines and secondary track. In particular, the application of the above-mentioned economic models for rail to the system-wide evaluation of rail for *all* requirements has been the subject of a recent study on a major eastern rail system.[3]

Through proper practices of rail cascading, it is possible to generate rail for secondary and branchline applications. Appropriateness of the rail would be based on the same rigid economic justifications that are applied to mainline rail installations. It must be remembered that the usual source of the rail used on secondary and branchlines is the mainline track.

Figures 1 and 2, respectively, present the distribution of the sources of rail and its uses for the eastern railroad mentioned above.[3] In examining the sources of rail for that system, nearly half of the total rail used (46 percent) was generated internally. An additional 7 percent stemmed from retirements of old lines.

As a consequence, over half the second-hand rail laid is coming out of existing track on the railroad. An additional 5.5 percent of second-hand rail is purchased. Therefore, the proper management of this rail asset, and the development of suitable criteria for the removal and/or cascading of it, is of major importance to a Class I railroad like the one noted previously.

Mainly relay

It is readily apparent from Fig. 2 that the use of the vast majority of rail is for large rail relay programs (70 percent) and curve patch programs (16 percent). Mainline track generally gets new rail, with the second-hand or relay rail going to secondary and branch lines.

Given the significant proportion of total rail installations that rely on this second-hand or relay rail — over 58 percent of the rail is second-hand — it is important that we define the 'proper' rail cascading procedures. These permit the best use, in an economic sense, of the rail.

Rail cascading can take several different forms as follows:

Use in branchline track of rail from mainline(s). This is the most common application. After new rail is

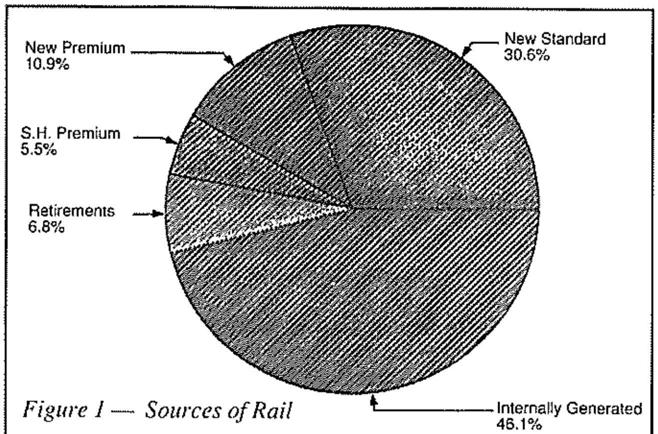

Figure 1 — Sources of Rail

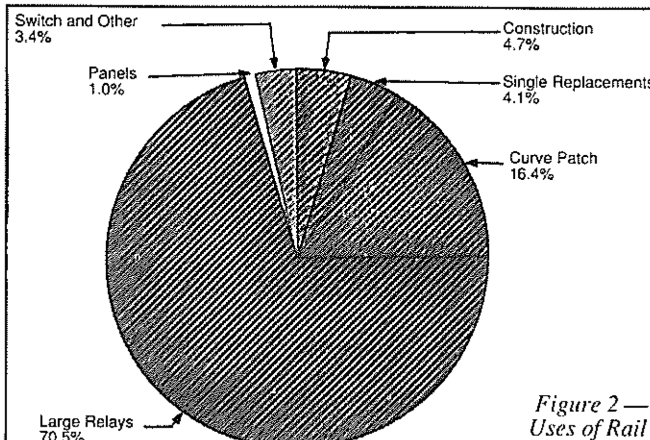

Figure 2 — Uses of Rail

laid on mainlines, the "released" rail is sent to "high cost" secondary or branch lines. Mainline rail with a large number of defects per mile and with its associated high cost and risk, is released to a lower density branchline where the defect rate becomes quite acceptable. The rail in question usually replaces rail that is in even poorer condition.

Cascading or rail from tangent to curves. This approach is particularly applicable on medium and low tonnage lines, where the rail can be economically removed from tangent to "patch" an adjacent curve having an immediate need for rail. It is, in fact, closely akin to rail transposition.

Cascading of rail from branch lines to industry and yard track. This is the 'third positioning' of rail, in which the rail released from branchline service is in "near scrap" condition, and for which any rail — though usually with a significantly larger cross section — would be an improvement.

Through the use of models in economic analysis, such as that presented in Reference 3, the economics of branchline rail relays can be evaluated in the same way currently being employed for mainline track. This can be carried out as part of a cascade program analysis, or on a 'stand-alone' basis for specific locations.

Either way, given the large amount of track requiring the relay rail, together with the large volume of rail released annually through new rail programs, abandonments, and secondhand rail programs, it is apparent that planning for replacement can be of real value for the small railroad as well as the larger system.

References:

1. Wells, T. R., "Rail Performance Model: Evaluating Rail"; AREA, Chicago, Ill. March 1983.
2. Wells, T. R. and Gudiness, T. A., "Rail Performance Model: Technical Background and Preliminary Results"; Association of American Railroads, Report R-474, 1981.
3. Staplin. D. E. and Wells, T. R., "Branchline Rail Replacement Strategies"; Transportation Research Board Workshop on Rail Replacement Strategies and Maintenance Management, Champaign Illinois, June 1987.