Using Rail Information

Track measurement technology has advanced to the point where it is now possible to obtain reliable information about the condition of the head of rail. This data can be derived for a large stretch of track, or even an entire railroad.

The technologies associated with rail head measurement have been discussed in an earlier *Tracking R&D* (see RT&S, June 1986). However, such modern systems now include the capability of measuring both the transverse and longitudinal profiles of the rail by means of high-speed inspection vehicles. This capability, particularly for getting transverse or cross-sectional profiles of the head of the rail, was the subject of a recent seminar.[1]

Also, the methods involved in the use of this technology furnish an extremely large volume of measurement data. This must be analyzed and converted into usable information.

Three types of information

The type of information available from vehicle-borne measurement systems (or from some of the hand-held units currently in use) is illustrated in Figure 1. Included is data on both rail wear and rail head shape, providing:

1. *Rail Section Information* such as head height, head width, lip size (1) and head area (A). This category of data furnishes a representation of the cross-section area of the rail remaining in track.
2. *Rail Wear Information* is the difference between new rail condition and what remains of the rail.[1] This includes rail head height loss (h), gage face loss or wear (g), and head area loss (A*).
3. *Railhead Profile Information* is the shape of the rail head itself. This includes the radii at the different locations in the head of the rail, such as at the top of the head, in the gage corner, and at transition zones. It describes the gage face slope as well.

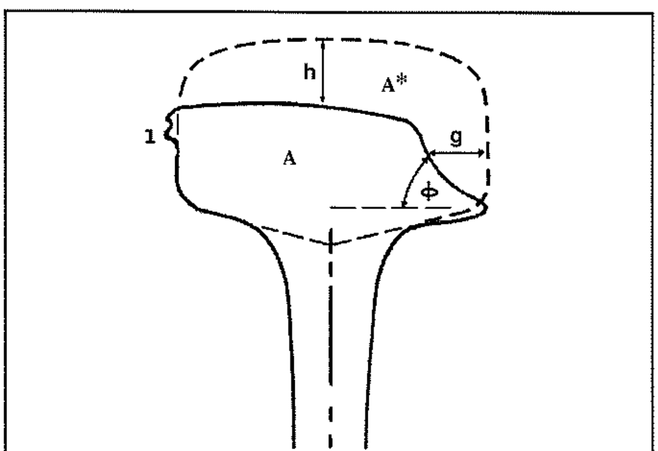

Figure 1 — Railhead Parameters

Such output lends itself to a variety of uses by track maintenance officers. These uses, in turn, can be divided into three classes. Each relates to a particular time horizon:

1. *Short Term Applications* employ the measurement data immediately (on a 'real time' basis) up to a one-year period from the time of acquisition.

   This class includes real-time exception reports for either wear, which are based on the parameters for rail head wear, or on profile. It can be used to direct immediate rail transposition and spot replacement operations. It can also be employed in planning upcoming, or short-term, rail grinding programs. These in turn can be undertaken in conjunction with measuring the longitudinal profile of the head of rail. Such information can be used by local maintenance-of-way forces.
2. *Medium Term Applications* use data taken within a horizon of one to two years from the time of measurement.

   This class of applications relates to the planning activities at the higher M/W department levels, including regional and headquarters. It can serve in planning 'next year's' rail program by defining the required amount and type of rail, and the scheduling of actual rail replacement. Considerations would cover the condition of the old rail for 'cascading' into secondary or yard track, or for scrap.

   Use of the same medium-term information can assist also in evaluating alternative rail programs, along with establishing priorities for rail replacement needs in the event of budget cuts. Similarly, rail profile information can aid in: scheduling next year's grinding program, evaluating grinding activities, and even in monitoring the effectiveness of in-track lubrication.

3. *Long Term Applications* make use of the data within a time horizon of two to ten years, or more, from measurement.

   This third classification addresses the long-term planning requirements of the track maintenance headquarters. It includes inputting data into a long-term track data base. Also, there is the possible use of this information in conjunction with rail deterioration models to forecast multi-year rail requirements. In turn, this permits the generation of multi-year budgets, such as 3-, 5-, and 10-year plans, as well as the evaluation of what the effects of budget cuts will be on the longterm condition of the railroad. Also, within this application classification is the employment of rail information to evaluate alternative maintenance programs, and differing maintenance practices.

In each of these three cases, rail maintenance officers are able to work with the rail data to determine the condition of their track network and the effectiveness of their maintenance practices. Thus they can employ and monitor their expensive rail assets more effectively.

Reference:

1. Seminar: "Machine Vision in Wheel/Rail Maintenance"; Canadian Ministry of Transportation and Communications; Toronto, September 1987