Changes in Track Maintenance Planning

Railroads have become larger and more complex. As a consequence their abilities to plan and execute properly their system-wide track maintenance programs have also become more complex and difficult. The historical maintenance planning techniques of relying on visual inspection and written reports from the field, then consolidating these reports at headquarters, are being outgrown.

No longer is it sufficient or even adequate to depend solely upon qualitative judgements from the field for short-term and long-term maintenance forecasting and planning. Rather, there is emerging a strong need for maintenance planning based on objective inspection, but with the proper tools for planning. This need is emphasized by the efforts of individual railroads, as well as by industry associations, toward developing special techniques.

Coordinated planning

Besides developing planning tools, the ultimate trends are for the consolidation of these tools into coordinated planning activities. One such maintenance planning system was used for the foundation of the industry's track maintenance planning program.

This system has three key components: a consolidated data base; analysis, planning, and scheduling; and control systems. Each one of these elements represents a large number of activities which must be incorporated into the overall maintenance planning function.

Figure 1 represents a more specific planning program, one that addresses the issue of rail system planning.[1] All three of the elements defined above are included in this program.

Looking at such flow charting in a slightly different manner, it can be seen that the following key elements are included in a coordinated planning system:

a) *Track Inspection Data* — both visual (subjective) and measured (objective). Track geometry, flaw detection and other inspection vehicles represent specific examples of the latter class of data.

b) *Track Data Base* — a consolidation of the track information, inspection data, maintenance history and other information into one central, accessible (computer) data base.

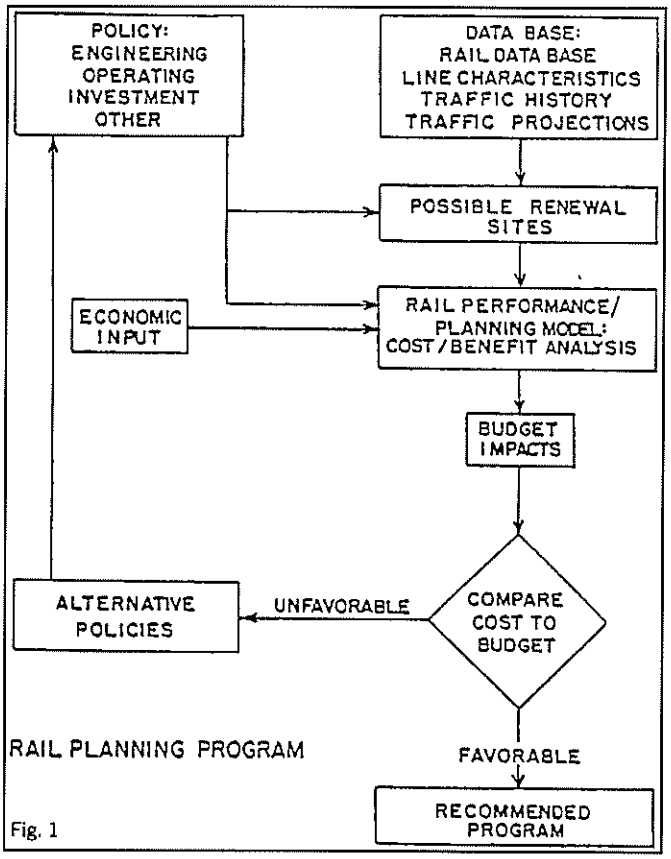

Figure 1 — Rail Planning Program

c) *Track Deterioration Analyses* — relationships that predict the deterioration and/or failure of the key track components and subsystems, based on the information in (a) and (b). (One such relationship was mentioned in last month's *Tracking R&D.*)

d) *Maintenance Requirement Forecasts* — the resulting output of the track deterioration analyses applied to the track segments within the data base.

e) *Policy and Controls* — guidelines that define the application of maintenance procedures to the individual maintenance requirements forecast above.

f) *Costs* — economic and financial constraints

imposed upon maintenance activities.

g) *Maintenance Programs* — short-term and long-term work programs.

The combination of all of these elements into one large consolidated and computerized system is still a goal for the most part. However, there is a clear trend toward the development of many of these individual elements, since in many cases they have current, stand-alone value.

A clear example of this is with the track inspection vehicles that are now routine equipment in most railroad maintenance programs. These vehicles, such as the track geometry cars, provide objective, quantitative information about the condition of the track. While their original role was limited to the finding of local defects or exceptions, almost all of the modern systems now record their measurement data onto magnetic tape. This permits the data to be entered into a computerized data base, a process which some railroads have begun.

The resulting computerized data can then be analyzed and compared with past and future data. The next step is to use this information to project track degradation, to thereby plan maintenance (steps c and d above). It is an activity that railroads have certainly thought about, if not implemented.

Another area of attention has been to use as actual practice the central computerized data base. At least several railroads have begun to put their track records and track charts on computer. This represents the beginning of a track data base. As more information is added to this base the ability to utilize this information in maintenance planning will lead directly to the development of maintenance forecasting and planning systems. It is a capability that will become increasingly important as railroads strive to improve their track infrastructure while at the same time reducing costs.

Reference:

1. Webb, H. G., Wells, T. R., and Zarembski, A. M., "Track Maintenance Research Program: An Overview", Bulletin of the AREA, Vol. 82, Bulletin 683, June-July 1981.