

# Track-caused Derailments

Examination of freight railway derailment statistics, in general, and track-caused derailment statistics, in particular, enables railway officers to compare the costs associated with derailments with the level of maintenance attention various types, or categories, of derailments require. In addition, comparisons with industry-wide data allow for an assessment of the effectiveness of a railway's derailment-prevention (as well as general-maintenance) program.

The Federal Railroad Administration, in its annual "Accident/Incident Bulletin," publishes a summary of reported accidents and derailments with their reported costs (1, 2). These statistics provide a measure of the number and cost of all accidents, including track-caused derailments, for the freight industry as a whole. Examination of these statistics provides some useful information to railway officers as to the most-common and most-costly derailment causes, and provides guidance to individual railroads as to the relative degree of effectiveness of their maintenance programs.

The number of train- and track-caused accidents (primarily derailments) consistently decreased during the six-year period 1982-1988, with track-caused accidents representing between 30% and 40% of the total number and dollar value of the reported accidents. Noting that during this same period traffic increased, the corresponding ratio of track accidents per million train-miles decreased from 3.09 in 1982 to 1.56 in 1988 (1, 2). If ton-miles are used instead of train-miles, the associated ratio of track accidents per billion ton-miles decreased from 2.22 in 1982 to 0.96 in 1988 (3). This suggests that on an overall industry basis, track-maintenance programs have been effective in reducing track-caused derailments.

## Track-caused derailments

The three dominant categories of track-caused accidents, by number of incidents reported, are track geometry (40%), rail and joint bars (27%) and frogs and

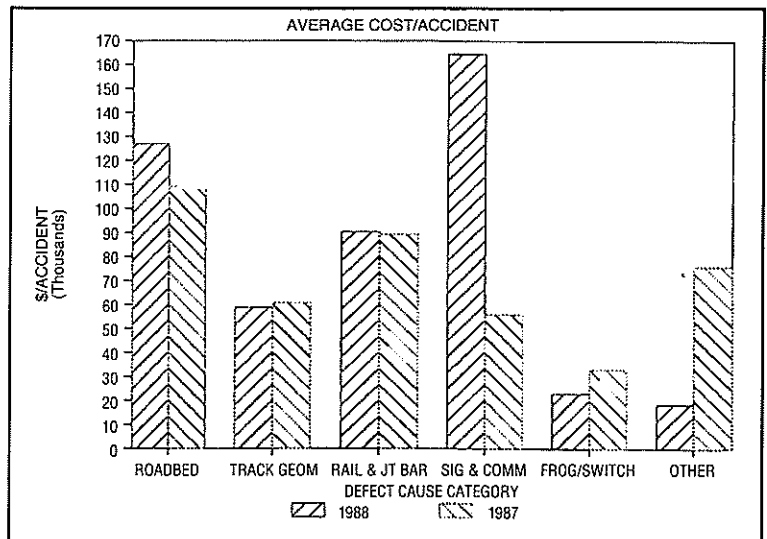


Figure 1 — The average cost per track-caused accident reported by the FRA (1).

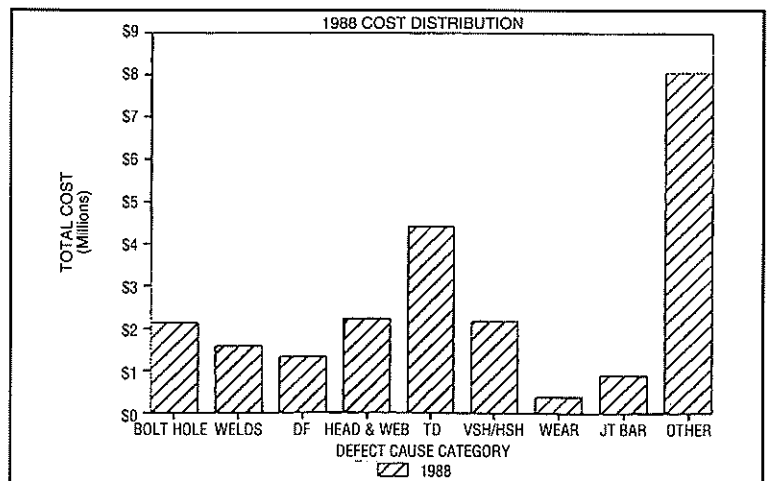


Figure 2 — The 1988 cost distribution of track-caused accidents reported by the FRA (2).

switches (26%). As Figure 1 indicates, the cost per accident can vary significantly from category to category, with the cost of the average rail/joint-bar accident (\$90,500) being somewhat greater than the average track-geometry-caused accident (\$59,000) and signifi-

cantly higher than the average frog/switch accident (\$23,000). On a reported cost basis, rail accounts for 40% of the cost of all track-caused accidents — the highest overall cost; track-geometry accounts for 39% of all track-accident costs. (These two categories alone account for almost 80% of the reported accident costs, and over 75% of the number of reported accidents.)

A closer examination of track-geometry defects, for example, shows variation between the number and average cost of geometry-related accidents. Wide gauge, for example, caused the greatest number of derailments (199), but its cost per derailment was only \$26,000. Alignment, including buckled track, had the greatest total cost (accounting for almost 50% of the geometry-accident costs) and an average cost per derailment of approximately \$150,000. Crosslevel, which accounted for almost 20% of the number and cost of the geometry-caused accidents had an average cost per accident of \$50,000 (1).

In the rail-cause categories (Figures 2 and 3), the greatest total cost was incurred by transverse defects/compound fissures (excluding the “other” category), but the large number of these incidents (55, or 21%, of the total in 1988) results in a cost per accident that is slightly less than average. The rail category with the largest cost per accident (excluding broken welds, which appears to be very high due to two severe derailments in 1988) was detail fractures from shelling, with a cost per accident of \$134,000 in 1988. Bolt-hole-caused derailments accounted for both a high cost per accident and a significant total cost (approximately 10%).

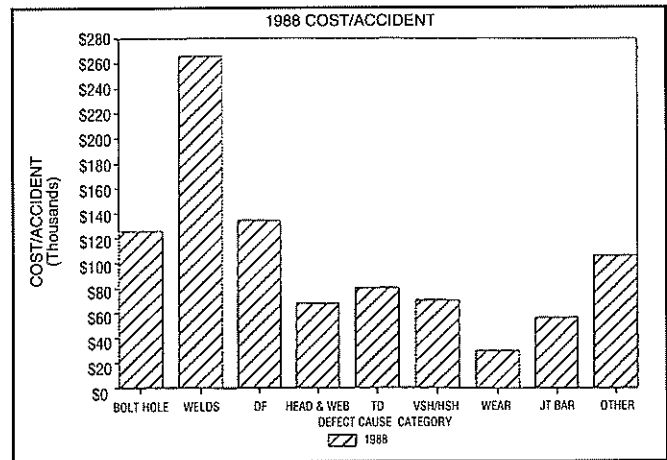


Figure 3 — The 1988 cost per rail-caused accident reported by the FRA (2).

While the analysis of accident statistics must remain an ongoing activity, periodic evaluation of a railroad’s accidents, and comparison with industry trends, can provide maintenance officers with valuable insights into the effectiveness of their maintenance programs.

#### References

- (1) “Accident/Incident Bulletin, Calendar Year 1988,” U.S. Department of Transportation, Federal Railroad Administration, Office of Safety, Bulletin No. 157, June 1989.
- (2) “Accident/Incident Bulletin, Calendar Year 1987,” U.S. Department of Transportation, Federal Railroad Administration, Office of Safety, Bulletin No. 156, June 1988.
- (3) “Railroad Facts, 1989 Edition,” Association of American Railroads, Information and Public Affairs Department, November 1989.