

More Rail Grinding Economics

As the technical merits of rail grinding, both conventional rail defect grinding and the newer profile grinding, become accepted to a greater degree, the question of the economic benefits of frequent rail grinding becomes important. The technical merits of such grinding have been described extensively in the literature as well as in this column. We've discussed both profile grinding (see RT&S November 1985) and conventional grinding (see RT&S February 1985). Moreover, the recent Third International Heavy Haul Railway Conference,¹ featured four technical presentations dealing directly with the subject of rail maintenance grinding.

Profile grinding economy

However, while the economic merits of 'traditional' rail grinding — that is for eliminating rail surface defects such as corrugations — have been documented in the past (see RT&S, November 1984), the economic benefits of rail profile grinding as is practiced in North America have only recently been examined.

One such analysis, given at the Heavy Haul Railway Conference² pertained to the case of a well lubricated five-degree curve under unit train or equivalent loading. In this analysis, the high level of lubrication resulted in a significant decrease in rail wear with the corresponding emergence of rail fatigue defects as the primary rail "failure" mechanism (see RT&S January 1985). The use of rail profile grinding to relocate the wheel/rail contact point and thus reduce the accumulation of fatigue damage, and as a consequence extend the fatigue life of the rail, was investigated as an alternative to replacing the rail because of fatigue problems.

The given table presents the results of analyzing the economics of profile grinding for two levels of annual traffic: 25 MGT and 50 MGT. In the 25 MGT case, fatigue life had been extended 4 years by profile grinding, or from 8 years to 12 years. Working out the replacement costs associated with one rail (the high rail) only, this extension of rail life was calculated to be worth \$2900/mile/year. The corresponding cost of profile grinding — with a profiling pass every 25 MGT — is between \$760 and \$1140 per year, giving an annual savings of over \$1700 per mile. For 50 MGT, fatigue life was extended from 4 to 6 years with a net annual savings of over \$4800 per mile.

Reduced corrugation regrowth

Another paper presented at the Heavy Haul Conference³ described savings associated with rail profile grinding on one major North American railroad. In this case, it was noted that rail profile grinding techniques reduced corrugation regrowth by 40 percent. The grinding resulted also in an overall improvement in rail life of 30 percent because of the control it gave over the rail surface defect problem. In light of this data, the paper indi-

| TABLE Cost vs. Benefits for Rail Profile Grinding Case I: Well Lubricated Curve with Surface Fatigue on High Rail | | |
|---|-----------|-----------|
| | 25 MGT | 50 MGT |
| Wear Life (unlubricated) | 3.2 years | 1.6 years |
| Wear Life (lubricated) | 32 | 16 |
| Fatigue Life (5%) | 8 | 4 |
| Fatigue Life (profile grind) | 12 | 6 |
| Rail life extension (grinding) | 4 years | 2 years |
| Equivalent Annual Cost Per Mile (Based on installed rail cost of \$165,000 per mile): | | |
| | 25 MGT | 50 MGT |
| Annualized Cost no grinding: | | |
| Replace Both Rails: | \$10,000. | \$30,840 |
| Replace High Rail Only: | 5,000. | 15,420. |
| Annualized Cost, Profile Grinding: | | |
| Replace Both Rails: | 4,169. | 16,616 |
| Replace High Rail Only: | 2,085. | 8,313. |
| Net Benefit, Profile Grinding: | | |
| Replace Both Rails: | 5,831. | 14,224. |
| Replace High Rail Only: | 2,915. | 7,100. |
| Net Cost Profile Grinding (One profile pass every 25 MGT) per mile: | | |
| | \$760- | \$1,520- |
| | 1140 | 2280 |
| Annual Savings: | \$1,775 | \$4,820. |

Table 1 — Cost vs. Benefits for Rail Profile Grinding

cated further that the railroad could obtain a net annual rail savings of over \$2 million against a corresponding grinding cost of \$250,000.

In both of the traffic cases chosen, rail profile grinding techniques as they are beginning to be applied to North American track, were shown to have significant economic benefits in terms of increased rail life, and thus in reduced rail replacement costs.

References:

1. Third International Heavy Haul Railway Conference, Vancouver, British Columbia, October 1986.
2. Zaremski, A. M., The Economics of Rail Grinding and Rail Surface Maintenance, Third International Heavy Haul Railway Conference Vancouver, British Columbia, October 1986.
3. Lamson, S. T. and Roney M. D., Development of Rail Profile Grinding on CP Rail, Third International Heavy Haul Railway Conference Vancouver, British Columbia, October 1986.