

Rail Lubrication Caveats

At this point in time, the practice of rail lubrication has been well documented, and railroads are moving rapidly to take advantage of the benefits it offers. But it is worthwhile to recall a few caveats with regard to lubricating rail (and the wheel as well). These cautionary comments are in no way meant to detract from the benefits of rail lubrication. Yet, what follows should be borne in mind in relation to problems that might arise as a railroad's lubrication programs are expanded. There are three main areas of concern: overlubrication, wheel/rail dynamics, and wear vs. fatigue.

Overlubing problems familiar

Overlubrication of rail has been defined as a condition where lubricant is present on top of the running surface of the rail.² Several problems can arise from this, stemming from, among others, operating difficulties associated with wheel-slip. These problems include the stalling of trains on grades because of the reduction in friction between the wheel and the rail and thus a corresponding lowering of effective traction.

Track maintenance problems from overlubrication can evolve, for one, from the formation of engine burns from wheel slippage on the head of rail. There can also be a decrease in the efficiency of ultrasonic rail inspec-

tion if a layer of lubricant and dirt is built up on top of the rail.

Problems in wheel/rail dynamics associated with rail lubrication have been reported recently as a result of an investigation into its effect on wheel/rail forces.³ Specific concerns here relate to the lubrication of one rail of either a curve or tangent track.

Figure 1 illustrates the results of wheel/rail force measurements, and Figure 2 rail head deflection measurements, both for tangent track having varying degrees of rail lubrication. It can be noted that as lubrication is increased on one rail, the wheel/rail forces, the corresponding L/V ratios and the associated lateral deflections (dynamic gage widening) all increase. On the other hand, if lubrication is applied simultaneously to the other rail, both the forces and corresponding deflections generated are shown to decrease.

Similar results are also reported for curves.³ In fact, the report concludes that, "large differences in coefficient of friction between high and low rails can lead to large gage spreading forces."³

Considering rail fatigue

The third area of concern regarding the increased use of rail lubrication is the emergence of rail fatigue,

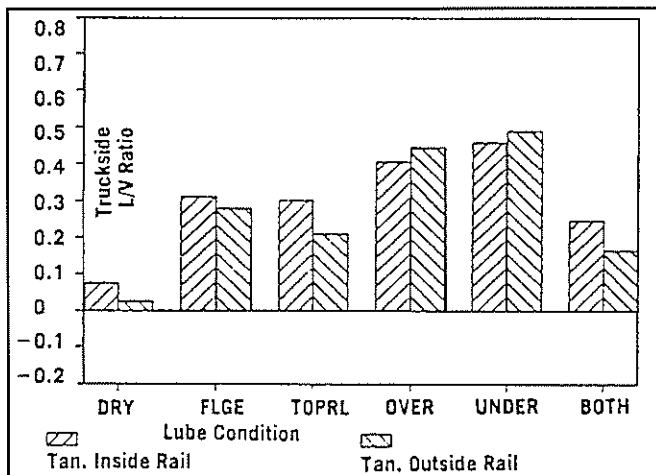


Figure 1 — Effect of Lubrication Level on Truckside L/V Ratio, Tangent Track Notch 8, 40 MPH, "Worn" Pedestal Liners.

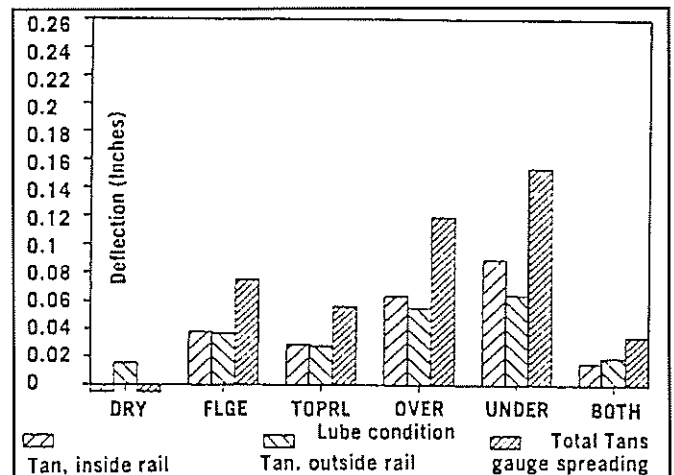


Figure 2 — Effect of Lubrication level on rail Deflections. Tangent Track, Notch 8, 40 MPH, "Worn" Pedestal Liners.

both surface and internal, as the dominant failure criterion for curves and for tangent track as well. While this has been discussed in an earlier *Tracking R&D* column (RT&S February 1986), it is worth commenting again on rail fatigue in the context of rail lubrication.

The change to this failure mode comes about primarily because of the extension of rail life from the reduction of wear due to lubrication. Consequently, rail fatigue does replace the easily monitored and gradual failure mechanism of wear with one more difficult to monitor. There is also a greater potential for catastrophic failure of rail breakage from fatigue.

In general, the documented benefits of rail lubrication indicate that increasing its use is economically justifiable. In fact, lubrication offers the potential for significant savings in several areas. These include wheel and rail wear, and fuel consumption. Still, as for any maintenance procedure, railway officers must be aware of rail lubrication's potential problems.

References:

1. Association of American Railroads, Wheel/Rail Lubrication Symposium; Memphis, TN, June 1987.
2. Reiff, R. P., "Preventing Overlubrication," Answers to RT&S Questions; RT&S, June 1987.
3. Wilson, N. G. and Lalne, K.J., "Effect of Wheel/Rail Lubrication on Wheel/Rail Forces"; Wheel/Rail Lubrication Symposium; Memphis, TN, June 1987.