'Greasing' the way to Savings

In the face of growing evidence of the benefits of rail lubrication in extending the wear life of standard carbon rails, increased attention is being focused on the techniques used to apply lubrication to the rail head. While rail lubrication has been in use for many years, it has met with varying degrees of success. However, recent test data, particularly from the Facility for Accelerated Service Testing (FAST), has shown that *effective* lubrication can extend the wear life of standard carbon rail by factors of three or more for moderately and heavily curved track. This in turn has led to more careful examination of the practices and technologies surrounding rail lubrication.

In general, there are two approaches which can be taken in lubricating rail: wayside lubricators (units that are permanently located at fixed points in the track), and vehicular mounted lubricators (devices on moving vehicles).

The traditional way

The first approach, wayside lubricators, is the traditional method that has been used by railroads for many years. Most wayside lubricators employ some form of mechanical applicator system, such as a wiping bar, to apply a predetermined amount of lubricant to each passing wheel-flange. As a consequence, every wheel of every train gets a small amount of lubricant applied to its flange. The wheel flange in turn carries the lubricant along and applies it to the rail (or rails) for some limited distance.

Thus, wayside lubricators must be located at intervals along the track. Along with other factors, level of lubrication applied to the rail can vary according to the: distance from the lubricator, temperature, train speed, and grease characteristics. Still, the remote locations of wayside lubricators make difficult their inspection and maintenance chores.

Recent developments in wayside lubricator technology have addressed the issue of developing more reliable wheel sensing and applicator systems, as well as having the railroads focus more specific attention on lubricator inspection and maintenance.

It is in the second approach, vehicular-mounted lubrication systems, where a great deal of attention is now being directed. There have emerged three distinct types of vehicle-mounted lubrication systems: hi-rail vehicle systems, locomotive mounted systems, and dedicated lubricator car.

All three of the above have been constructed and tested, including a recent series of evaluation tests at FAST, where they have been compared with wayside lubricator systems.

In general, the benefits gained from the vehicular approach are to some extent similar for all three types of mobile systems. In all cases, applying the lubricant from a moving vehicle does permit a more uniform distribution of lubricant along the track. Also, the specific locations where the lubricant is to be applied can be controlled from on board the applying vehicle either manually or through an automatic sensing system (for curves). Moreover, lubricant can be applied continuously along the right of way, through both tangents and curves.

Lubrication saves fuel

Based on recent FAST test data that shows a 32 percent-plus[1] savings in fuel consumption along the lubricated test track, substantial energy savings may be derived from continuous lubrication (Table 1). The fuel reduction values given were supported by measured reductions in lateral wheel/rail forces on the FAST loop in both tangent and curve sections. Though the FAST track cannot be considered as representative of the normal mixture of tangent and curve track found in the railroad operating environment, the results do suggest that

TABLE 1
FUEL CONSUMPTION TEST DATA*

System Tested	Fuel Consumption (Gallons/MGT)
Dry Track–No Lubrication	5,900
Trackside–Full Lubrication	4,100
Lubrication Car–High Graphite Grease	4,800
Lubrication Car–Low Graphite Grease	5,300
Hi-Rail–High Graphite Grease	5,500
On-board (Locomotive) System–Small Nozzle	6,950 **
On-board System Large Nozzle	5,140

*TTC Technical Note TTC-008 (FAST-TN84) June 12, 1984.
**This result was affected by variations in test procedures.

very significant benefits can be derived from continuous lubrication. And as such, the vehicular-mounted lubricator systems do offer feasible techniques for the continuous lubrication of track.

In addition, the mobile application systems permit the maintenance and inspection of equipment to be carried out in more convenient central locations, such as yards and shops. However, it is essential that mobile lubrication apply a proper amount of lubricant. This requires "frequent" applications by the various vehicular systems, depending on the type of system and the quantity of lubricant applied.

In many cases, such an objective can require a lubrication system on every fourth train for the case of the lubricator car, or on every train with the locomotive-mounted system. It must be pointed out that the locomotive and car systems apply the lubricant to a wheel which in turn applies it to the rail. On the other hand, for the hi-rail system which sprays lubricant directly on the rail, the FAST tests indicated that the level of lubricant applied was not sufficient for high density mainline track, but rather would be more appropriate for less traveled territories.

The vehicular lubricators have had only limited application to date. The lubricator car system, for instance, is still in the research prototype stage. Nevertheless, they offer alternatives for gaining very strong benefits that appear possible with the effective lubrication of track.

Reference:

1. TTC Technical Note: TTC-006 (FAST-TN84) February 17,1984