TracGlide Top-of-Rail Lubrication System

Background

The American Association of Railroads estimates that the wear and friction occurring at the wheel/rail interface of trains as a result of ineffective lubrication costs the country's railroads in excess of $2 billion each year. Currently, the single largest expenditure faced by the railroad industry is rail maintenance and replacement. For this reason, railroad companies and researchers alike are devoting extensive resources to the improvement of lubricants and wheel/rail lubricating mechanisms, as well as to the development of more advanced application equipment. Application of lubricant at the wheel/rail interface significantly reduces track degradation and excessive wear while dramatically decreasing locomotive fuel consumption. However, the rail lubricants currently in use leave residue behind that builds up on the tracks and wheels, resulting not only in potential environmental hazards but also in the excessive lubrication of the tracks. Tracks slippery from excessive lubrication increase the train's braking distance. This is a safety issue. Excessive lubrication can also cause locomotive adhesion problems that may result in increased wheel and rail wear.

Top-of-rail lubrication (TOR), an innovative concept in which a lubricant is precisely applied to both rails, was initially developed as SENTRAEN 2000™ by Texaco and Tranergy Corporation. It is now marketed under the name TracGlide™ by Friction Management Services, a joint venture formed by Tranergy Corporation and the Timken Company. TracGlide holds great promise for the future of the railroad industry in terms of dramatic improvements in energy efficiency and performance and is widely regarded as the most advanced rail lubrication technology available to date.

The Technology

Friction Management Services' top-of-rail lubrication system differs from current wheel/rail lubrication systems that apply lubrication to the wheel flange or rail gauge side in order to reduce friction. This high-tech system delivers an exact quantity of lubrication to the tops of both rails after the final locomotive at the front of the train passes by, ensuring that virtually all of the lubricant is used by the time the train moves past the application point. The fully computer-controlled on-board system gathers data from sensors and then precisely determines the amount of lubricant to dispense based on factors such as the number of cars, wheel angle, train speed, curvature of the track, and axle load. The thin, water-based

The fully computerized TracGlide system precisely applies lubricant to the tops of the rails.

liquid lubricant, produced by Shell Oil Company, is easy to clean up and environmentally safe. Unlike the heavy, greasy lubricants that have traditionally been used, this innovative lubricant does not contain any solids, and it degrades rapidly to prevent buildup on either the tracks or wheels, leaving behind little or no residue. The lubricant also will not freeze, making it highly effective even for operation in extremely low temperatures. Most important, it effectively reduces friction without contributing to an increase in the train's braking distance, significantly lessening fuel consumption and rail and track wear. Tranergy also devised a wheel and rail simulator, the LA4000TM, which acts as a lubrication and traction testing apparatus to measure the actual lateral force exerted by a wheel positioned at a specific angle and level of lubrication.

The TracGlide Computer is installed in the locomotive cab above the locomotive computer.

Commercialization

Preliminary testing of the TracGlide system was conducted by Norfolk Southern Railroad with further testing performed by the Association of American Railroads (AAR). A number of railroads in the United States and Canada, including CSX, have installed and tested the system on their locomotives. Argonne National Laboratory assisted this effort by conducting performance testing of the system's effects on lateral friction forces. Argonne also led the research on environmental issues associated with rail lubricant by-products.

Currently, Canadian National Railway has several TracGlide units in use, while both Norfolk Southern and CSX Transportation are using TracGlide units for coal train and short mining operations. The TracGlide system has been developed and perfected over a period of 11 years, both in the laboratory and on operating rail lines. These efforts have demonstrated that the ground-breaking TracGlide system has potential to revolutionize the railroad industry by delivering unprecedented energy savings while significantly reducing rail/wheel replacement and maintenance costs.

Testing has also been performed by railroads to measure reduction in rolling resistance and gage widening. These tests have demonstrated energy savings of over 7% as well as improved track safety and life. More robust designs have been implemented at the railroads' request to run at –45° F.

Currently, small groups of units have been in service on a number of railroads. In March of 2005, Canadian National purchased a production quantity to run on locomotives in the United States. Canadian National placed another order in 2006 for additional TracGlide systems.

Benefits

- Potential annual fuel savings with TracGlide system estimated at over $400 million (AAR)
- Increases overall productivity by at least 5% by allowing increased speed tonnage, or train length (AAR)
- Reduces rail and wheel maintenance and replacement costs by as much as 25% (AAR)
- Energy reduction over 7%
- 20% reduction in db level

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