

M/W First Costs vs. Life Cycle Costs

Traditionally, railroad product purchasing decisions rest upon two factors: performance and cost. Performance implies the ability of the product or component to carry out its function adequately and effectively, while cost refers both to purchase price and maintenance fees.

Performance specifications are often employed to define the range of performance of a component deemed acceptable by the railway. If the component meets the specifications, it qualifies for purchase. Alternatively, a successful history of employment of the same component in track also qualifies it for purchase and use. For example, the traditional cut spike is considered to be an

acceptable fastener in track. This stems from the spike's long history of being successfully used under a broad variety of railroad conditions.

Once a component — or class of components — is found to perform adequately, the question of cost then arises. Given a large number of components, all of which are adequate in performance, the cheapest component traditionally is selected for use. Cheapest means the one having the lowest purchase or *first* cost. However, with some classes of track components, this dependence of purchase on lowest first cost did not always result in the lowest *overall* cost. Such is the case for noncommodity-

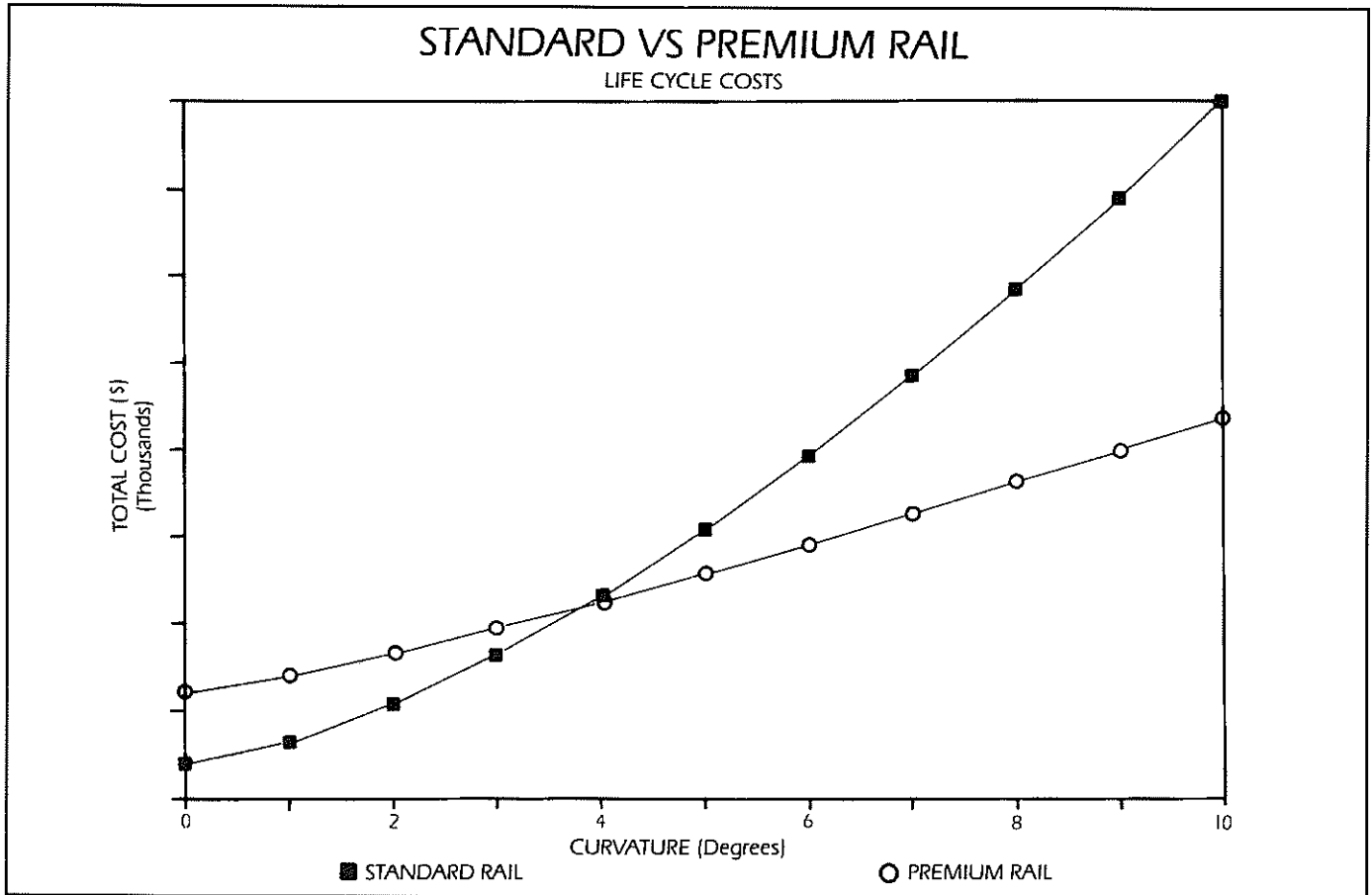


Figure 1 — Standard vs Premium Rail

type components, in which there are distinct differences in performance behavior and thus cost. In fact, in many cases, the lowest first cost product had associated with it a short service life and possibly high maintenance costs as well. This resulted in an overall or *life cycle* cost significantly higher than alternatives having higher first or *initial* costs. A life cycle cost is the total of associated costs throughout the life of a component.

Concept holds for rail

A common example of optimum life cycle costing can be seen when comparing standard and premium rail steels. In all cases, premium rail steel is more expensive to purchase than standard steels. This first or initial cost for premium grade generally is between 20 percent and 50 percent higher than the corresponding cost of standard carbon rail. However, under conditions of high curvature and high traffic densities, the extension of life associated with the premium steels and the corresponding reduction in rail replacement costs can result in significant overall or life cycle savings.

This life cycle relationship is illustrated in the figure, which demonstrates qualitatively the variation between total costs for standard and premium steel rails as a function of curvature. It can be seen that for tangent and lightly curved trackage, standard steels remain cost effective. But as curvature increases, the two curves intersect and then cross over. Thus, for the higher curvature trackage, the premium rail steel becomes lower in overall cost. The exact shape of the curve and the exact point of intersection varies with such factors as level of rail lubrication, traffic density and axle loads. Nonetheless, this overall behavior is now recognized by the railroads as they determine policies governing the use of premium rails in high curvature, high density trackage.

Besides rail, other classes of components that can exhibit the same life cycle economies include all the major track component categories such as ties, fasteners, ballast, special trackwork, road crossings and the like. For example, there is a trend toward using premium ballast materials, even when these have to be transported for long distances. The first high costs associated with the ballast and its transportation can be more than offset by the increase in its performance in track and the associated reduction in maintenance costs.

This trend is also evident in the use of modern rail fastener systems. Here again, premium fastener systems are replacing the low cost, cut spike fasteners along track experiencing high tonnage and severe service—again because of the premium device's capability of reducing overall or life cycle maintenance costs.

In almost all cases, use of premium components — again those components with a high first cost and increased performance and/or life — is on the increase on high density or severe service trackage. This is important because of the continuing reductions in available maintenance time and maintenance windows on such track, which tend to further increase the cost of M/W operations.

As loadings and traffic densities continue to increase, the costs associated with future replacement and maintenance will continue to increase as well. This, in turn, can lead to an increase in life cycle costs that can further increase the disparity with first cost. It is therefore up to the railroad maintenance officer to recognize and understand all of the costs involved in his operation. That officer must base maintenance decisions not simply on the first cost of the components but on the overall life cycle costs associated with their use.