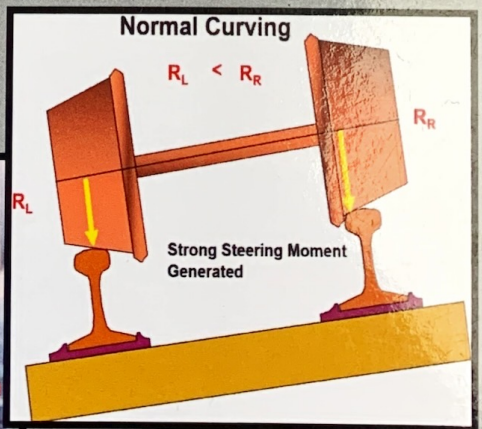
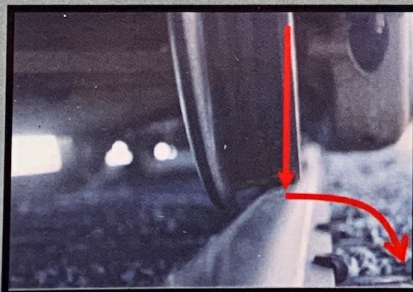
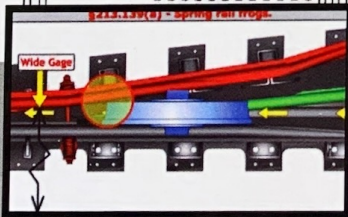
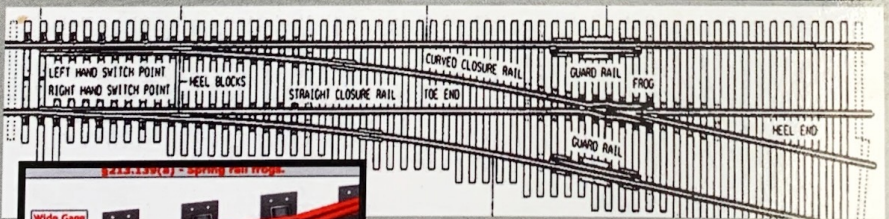
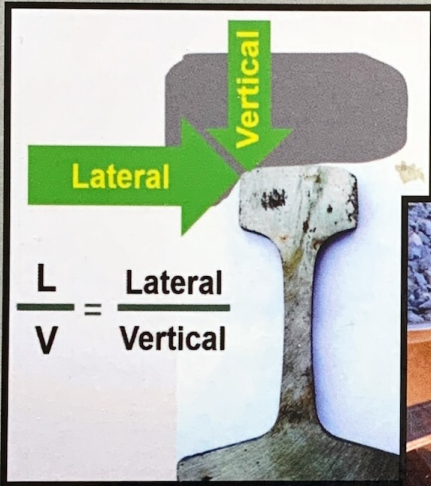


The Complete Field Guide to Modern Derailment Investigation



Gary P. Wolf

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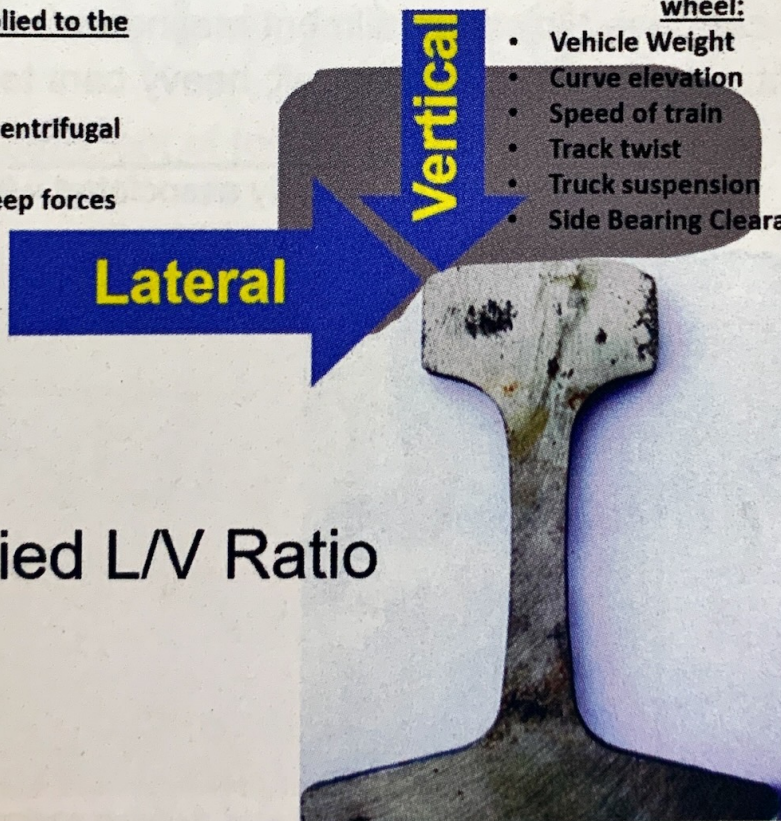
summary, it is evident that the development of wheelset lateral and vertical forces involves many complex, interrelated, factors. As a rail vehicle traverses a curve, and is subject to track elevation, twist, and alignment irregularities, the wheelset forces change dynamically, foot-by-foot, second-by-second. This makes simple calculations of applied vertical and lateral wheel forces near impossible. Only with the advent of computer software, in the form of vehicle dynamics simulation programs, can these calculations be made in real time. This is why computer simulation analysis is the best method for understanding the root cause of derailments. With simulation analysis, each factor can be isolated and its contribution to the net wheelset force can be calculated with a high degree of precision.

Lateral Forces applied to the wheel:

- Degree of curve
- Speed of train/centrifugal forces
- Flanging and creep forces
- Drawbar force
- Coupler angle
- Rail lubrication

Vertical Forces applied to the wheel:

- Vehicle Weight
- Curve elevation
- Speed of train
- Track twist
- Truck suspension
- Side Bearing Clearance



The applied L/V Ratio

The L/V index, or threshold, is the limiting value at which wheels that are subjected to some applied L/V ratio will either climb a rail or roll a rail outward. When dealing with the L/V index for wheel climb, it is primarily a function of the angle between the wheel flange on the gage face of the rail, and the friction present at the wheel-rail interface. The L/V index for

the L/V index for wheel climb, it is primarily a function of the wheel flange on the gage face of the wheel at the wheel-rail interface. The L/V index for the location of the wheel-rail contact points for the wheel is a function of the railhead. The contact points are further away from the railhead. The contact points are further away from the railhead and railhead wear. The L/V index for wheel climb is a function of the height and base dimension of the wheel.

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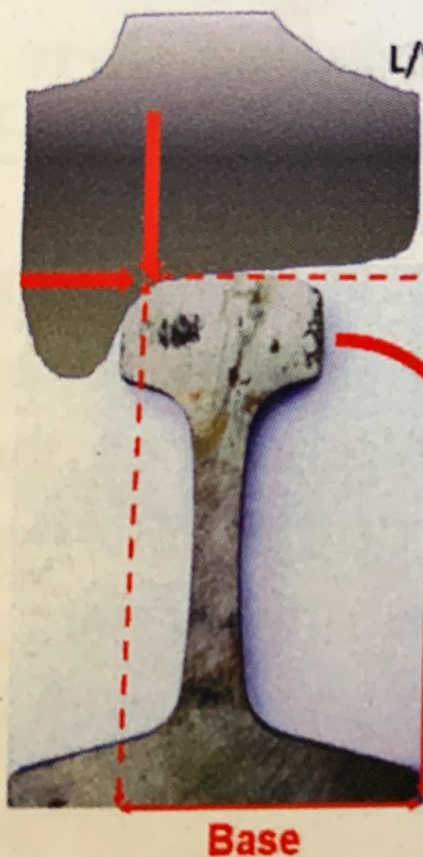
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Typically a

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L/V for rail rollover is a function of:

- Wheel/rail contact points for vertical and lateral loads
- Height of rail and base dimension of rail (called B/H ratio)
- Wear of the rail head and wheel surface

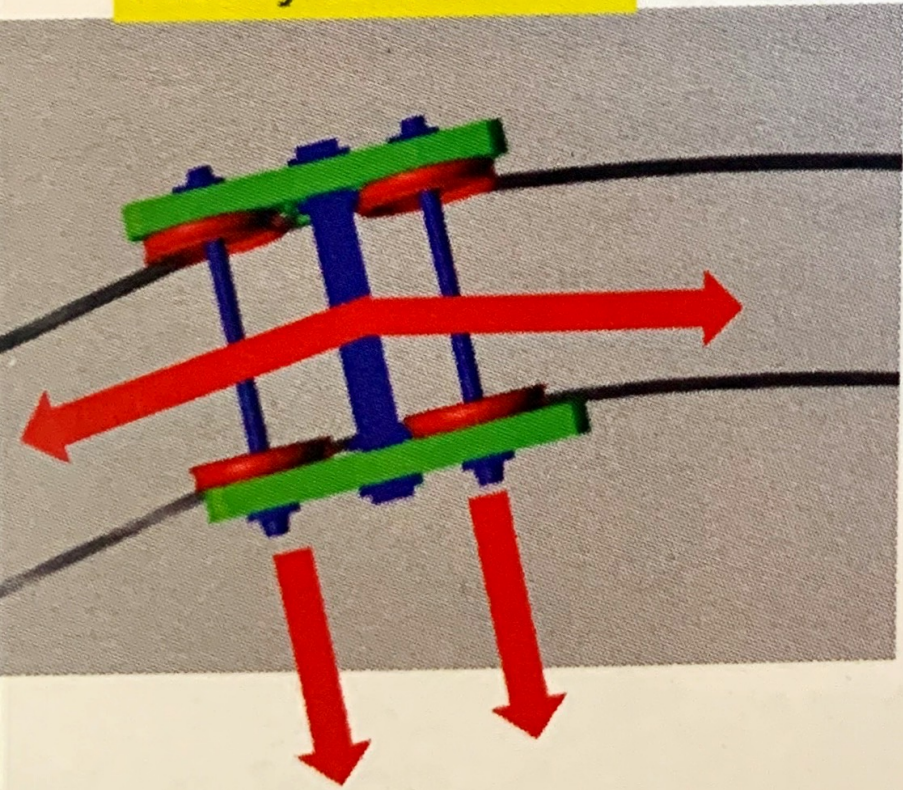
Height

Base

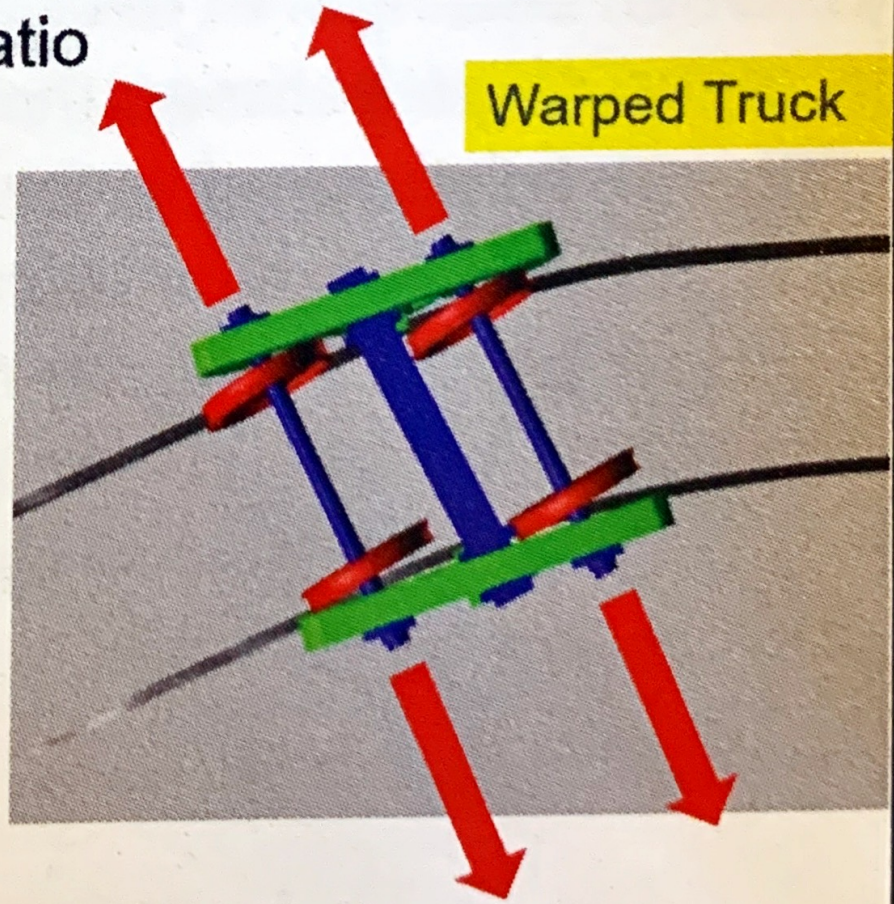
Rail rollover is typically a truckside L/V (two axles), Usually a lead truck

Rail rollover typically associated with a truckside
L/V ratio

Heavy draft force



Warped Truck



Both axles of a truck acting to spread gage or roll rail