

GLOSSARY

AAR – Association of American Railroads

Alinement (Line) – The horizontal location of the rails as described by curves, tangents, and spirals. [2]

Axle loads – Total (gross) load carried by each axle of a railway vehicle. Usually equal to the car weight divided by the number of axles.

Ballast – Selected material placed on the roadbed for the purpose of holding the track in line and surface. [1]

Battered Joint – Degradation of the ends of the rails, in the region of the joint bars, associated with repeated impact of wheels on the end of the rails. [5]

Buckling – see *Track Buckling*

Cant – The inward inclination of a rail, effected by the use of inclined-surface tie plates, usually expressed as a rate of inclination, such as 1 in. 40, etc. [1]

Carbon Steel (or Plain Steel) – Steel containing only the elements carbon, manganese, phosphorus, sulfur and silicon in addition to iron, the properties of which are due essentially to the percentage of carbon in the steel. [1]

Compound Fissure – Progressive fracture in the head of the rail generally starting as a horizontal separation which turns up or down, or in both directions, to form a transverse separation substantially at right angles to the running surface [4]

CWR (Continuously Welded Rail) – A number of rails welded together in lengths of 400 ft. or longer

Corrugation – Rail head anomalies that appear on the surface of the rail in a repeatable, i.e. periodic, manner along the length of the rail. They appear as “waves” or regularly spaced (periodic) discontinuities on the surface of the rail head. [5]

Contact Stress (Rail) – Localized stress on the head of the rail at the wheel/rail interface.

Crossing (Track) – A structure, used where one track crosses another at grade, and consisting of four connected frogs. [1]

Cross-Level – The distance one rail is above or below the other. [2]

Cross-Tie – The transverse member of the track structure to which the rails are spiked or otherwise fastened to provide proper gage and to cushion, distribute, and transmit the stresses of traffic through the ballast to the roadbed. [1]

Curve (Compound) – A continuous change in direction of alinement by means of two or more contiguous simple curves of different degrees having a common tangent at their junction points. [1]

Curve (Simple) – A continuous change in direction of alinement by means of an arc of a single radius. [1]

Data Base – A computerized collection of data organized for rapid search and retrieval.

Decay – Disintegration of the wood substance due to the action of wood destroying fungi. [1]

Degree (of Curve) – The angle subtended at the center of a simple curve by a 100-ft. chord. [1]

Depth (Ballast) – The distance from the bottom of the tie to the top of the subgrade. [1]

Derailment – Anytime the wheels of a car or engine come off the head of the rail.

Detail Fracture – A progressive fracture originating at or near the surface of the rail head. These fractures should not be confused with transverse fissures, compound fissures or other defects which have internal origins. Detail fractures usually have their origins in the following types of defects, and progress crosswise into the head of the rail. [1]

1. *Shell* – see *Shelling*

2. *Head Checks* – see *Shelling*

Elastic Limit – The greatest unit stress which a material will sustain without a permanent deformation remaining after complete release of the forces producing the stress. [1]

Elastic Fastener – Rail fastener which includes an elastic clip or elastomeric component to attach the rail to the cross-tie.

Elevation – see *Superelevation*

Equilibrium Elevation – The elevation (superelevation) which exactly offsets the centrifugal force generated by a vehicle negotiating a given curvature at a given speed. A vehicle at equilibrium elevation (balance speed) will place an equal amount of its weight on each rail [2].

FAST – Facility for Accelerated Service Testing, railroad test track, located at the Transportation Test Center in Pueblo, Colorado.

Fastener (Hold Down) – Cut spike, screw, or other device used to fasten the tie plate to the cross-tie.

Fastener (Rail) – Component or system of components used to fasten the rail to the cross-tie or tie plate.

Fastener (Track) – Joint bars, bolts, and spikes or other alternatives to spikes used in track construction.

Fatigue – Progressive failure of a component under repeated, cyclic, or fluctuating loads.

FRA – Federal Railroad Administration of the U.S. Department of Transportation.

Frog – A track structure used as the intersection of two running rails to provide support for wheels and passageways for their flanges, thus permitting wheels on either rail to cross the other. [1]

Gage – (*Track*) – The distance between the gage lines, measured at right angles thereto (Standard gage is 4 ft 8½ in.). [1]

Gage Widening – Widening of the track gage from design value (usually 56½")

Geometry – see *Track Geometry*

Geotextiles (filter fabric) – Material designed to permit the passage of water through it, but not particles of soil or dirt carried by the water. Used within or under the ballast layer [6].

Grinding – see *Rail Grinding*

Hardness – That physical property which enables a material to resist indentation or abrasion. [1]

Horizontal Spilt Head – Progressive longitudinal fracture in the head of the rail, where separation along a seam spreads horizontally through the head, parallel to the running surface [4].

Instability – see *Track Buckling*

Joint (Rail) – A fastening designed to unite the abutting ends of contiguous rails. [1]

– (*Insulated*) – A rail joint designed to arrest the flow of electric current from rail to rail by means of insulation so placed as to separate the rail ends and other metal parts connecting them. [1]

Joint Bar – A steel member, embodying beam-strength and stiffness in its structural shape and material; commonly used in pairs for the purpose of joining rail ends together, and holding them accurately, evenly and firmly in position with reference to surface and gage-side alinement. [1]

Joint Gap – The distance between the ends of contiguous rails in track, measured at a point 5/8 in. below the top of the rail on the outside of the head. [1]

Lateral Load – A wheel/rail load or vector component of that load applied laterally (parallel to the plane of the tops of the rails and perpendicular to the longitudinal axis of the rail) to the head of the rail.

L/V Ratio – Ratio formed by dividing the value of the lateral load by that of the corresponding vertical load.

Lateral Resistance – Resistance to lateral movement of the track structure.

Longitudinal Load – A load along the longitudinal axis of a rail.

Lubrication (rail) – The application of a friction reducing medium (liquid or solid) to the gage of the rail head, to reduce wear and wheel/rail friction.

Model (Computer) – A computerized set of algorithms or programs designed to mathematically replicate a physical behavior.

Modulus of Elasticity – see (*Track Modulus*).

Plastic Flow (lipped, flowed rail) – A condition of deformation or flow of the rail steel at the field or gauge sides of the rail head. Usually associated with very high contact stresses.

Profile – A line representing the ground surface or an established grade line, or both, in relation to the horizontal. [1]

Rail (Track) – A rolled steel shape, commonly a T-section, designed to be laid end to end in two parallel lines on cross ties or other suitable supports to form a track for railway rolling stock. [1]

Rail Grinding – The process of removing metal from the surface of the rail head through the use of rotating grinding wheels.

Rail Head Profile – Transverse (cross-sectional) geometry of the rail head extending from one bottom fillet radius to the other bottom fillet radius of the rail head [5].

Rail Section – The cross-sectional design and configuration of the running rail. The shape of the end of a rail cut at right angles to its length. The rail mills identify the different shapes and type of rails by code numbers, as for example, 131-28 for the 131 RE rail section. [1]

Rail Testing – Non-destructive inspection of the rails for internal defects.

Rail Wear – Deviation from the original rolled cross-sectional profile of the rail head. These deviations result from either wear (abrasive, rolling, etc.) or plastic flow [5].

Rail Welding – see *Welded Rail*.

Right of Way – Lands or rights used or held for railroad operation. [1]

Roadbed – The foundations on which the rails and ties are placed [6].

Shelling (Gauge corner shelling) – A progressive internal separation that develops beneath the cold worked region in the gauge corner of the high rail. This separation propagates longitudinally along the rail, and may crack out at any level on the gauge side, generally near the upper gauge corner. The shell can turn into a transverse defect (detail fracture) [5].

Shoulder (Ballast) – That portion of the ballast between the ends of the cross-ties and the toe of the ballast slope [6].

Spalling – A localized degradation at the running surface of the rail, most commonly found at the gauge corner of the high rail. This condition manifests itself initially as head checks at the gauge corner. These surface cracks can also be found on the top of the rail, often in the low rail of curves [5].

Special Trackwork – All rails, track structures and fittings, other than plain unguarded track that is neither curved nor fabricated before laying. [1]

Spiral (Curve) – (When used with respect to track) A form of easement curve in which the change of degree of curve is uniform throughout its length. [1]

Stability – see (*Track Buckling*)

Stone Blowing – The technique of adjusting the surface of the track by inserting a pre-measured amount of stone under the ties. Technique developed by British Rail using air to blow the stones through an open tube inserted in the ballast.

Subgrade – The finished surface of the roadbed below the ballast and track. [1]

Superelevation – The intentional height the outer rail is raised above the inner rail on curved track [2].

Surface (Track) – The condition of the track as to vertical evenness or smoothness. [1]

Surface Batter – A flattening of the surface of the rail head, resulting in a downward distortion of the surface.

Switch – A track structure used to divert rolling stock from one track to another [1].

Tamping – The technique of adjusting the surface of the track by compressing ballast particles directly beneath the cross ties. Can be performed using manual or mechanized techniques.

Tangent – Any straight portion of a railway alignment. [1]

Tie – see *Cross-tie*.

Track – An assembly of rails, ties and fastenings over which cars, locomotives and trains are moved. [1]

Track Buckling – Progressive or instantaneous instability of the track structure in the lateral plane resulting in a lateral irregularity in track alignment. Usually associated with excessive longitudinal force in the rail due to temperature variation.

Track Geometry – The three dimensional configuration of the track structure. Generally defined in terms of Gauge, Alignment, Surface, and Cross-Level.

Track Modulus – Modulus of elasticity of the track support. The amount of load in pounds on a one inch length of rail, required to depress the track by one inch [3]. Usually defined in terms of lb/in/in.

Track Quality Index (TQI) – A number, derived from a formula, used to represent observed track data, and which relates to the ability of the track to perform its function [5].

Track Stiffness – see *Track Modulus*.

Track Strength – The load carrying capacity (strength) of the track structure. Often refers to the gage strength of the track, i.e. the ability of the track structure (particularly the ties and fasteners) to withstand gage widening under traffic loading.

Track Surfacing – The maintenance of the geometry of the track, particularly the surface and cross-level of the track, through tamping or other track maintenance techniques.

TSC (VNTSC) – U.S. Department of Transportation, Volpe National Transportation Systems Center.

Turnout – An arrangement of a switch and a frog with closure rails, by means of which rolling stock may be diverted from one track to another. [1]

– *Equilateral* – A turnout in which the diversion due to the angle of the turnout is divided equally between the two tracks.

– *Lateral* – A turnout in which the diversion due to the angle of the turnout is entirely on one side of the track from which the turnout is made.

Underbalanced Elevation – The distance that the elevation is less than equilibrium (balance) elevation for any given combination of speed and curvature [2].

Vehicle Dynamics – The behavior of a moving vehicle with respect to the track and the corresponding forces generated by that moving vehicle onto the track structure.

Vertical Load – A wheel/rail load or vector component of that load applied vertically (perpendicular to the plane of the tops of the rails) to the head of the rail.

Warp (Twist) – Difference between two cross level values a fixed distance apart.

Weld – A seam where two members are joined, formed by any of the several heating processes resulting in melting and fusing together of the metal on either side of the joint, sometimes with the addition of filler metal [6].

Welded Rail – Two or more rails welded together to form a length less than 400 ft. CWR (See also Continuous Welded Rail). [1]

Wheel Load – Total (gross) load carried by each wheel of a railway vehicle. Usually equal to the car weight divided by the number of wheels. One half of the axle load.

Wheel Impact – The dynamic force generated by a wheel on a rail. Severe wheel impact forces associated with defects or discontinuities on the surface of either the wheel or the rail.