Chapter – II

Working of Stations

Station is a nodal point in dealing trains. As per GR 1.02 (51), 'station means any place on a line of railway at which traffic is dealt with, or at which an authority to proceed is given under the system of working.' A station comprises of a station yard on which trains are dealt by station staff through signals operated from panel room, cabins etc. Station is also the place where passengers board / alight; wagons are loaded / unloaded. Hence, the station is also provided with passenger and other user amenities like platform, waiting halls, circulating area and goods sheds.

Station Yard

A station yard is basically a grid of lines where trains are dealt. The grid is made of tracks which are connected to each other through points and crossings. Some of the types of lines found in a station yard are…

Running lines – The lines in the station yard which have facility for direct reception and dispatch of trains on signals. They are usually track circuited.

Non-running lines – These lines do not have the provision for direct reception and dispatch of trains. They are utilized for stabling, maintenance, shunting, etc. They may or may not be track circuited / provided with shunt signals.

Stabling Lines are non-running lines that are earmarked for the purpose of stabling vehicles. Normally stabling lines are provided only at major stations where activities of examination/loading/unloading are frequent. The number of stabling lines depend upon the traffic handled in the yard/section.

Sidings are lines taking off from station yard for serving various activities like freight train loading/unloading, IOH/POH/ROH maintenance of rolling stocks, stabling of Track machine/Tower cars with their rest vans, saloon sidings for stabling of inspection/VIP carriages, etc. Some of the sidings are short and form part of the yard while some are of longer lead, serving places of loading/unloading owned by railways or by private customers. For such lengthy sidings taking off from the yard, the station is known as serving station.

Pit Lines are sidings normally provided at coaching terminal stations for the maintenance of rake by Mechanical and Electrical departments. These lines are provided with cat walks to check exterior and pits to check undergear.

Sick Lines are sidings where repair of coaches/wagons are done by Mechanical and Electrical departments. These lines are provided with facilities like welding, lifting etc.

Shunting Neck is provided at stations where regular and frequent shunting takes place. Provision of shunting neck ensures that main line train operations are not affected during shunting. Shunt signals / Shunting permitted indicators are usually provided to control the shunting movements to and from the shunting neck. Shunting necks have to be connected to all the lines/sidings of the station yard over which shunting takes place. The length of shunting neck needs to be adequate to avoid multiple shunting.

Most of the stations are provided with few running lines which enable crossing/precedence of trains. Depending on the functions served and the volume of traffic dealt, stations have additional facilities like non running lines, sidings for coaching operations like pit lines, stabling lines, IOH/POH lines, sick lines etc., sidings for freight operations like examination lines, sorting lines, loading / unloading lines etc., tower car sidings, track machine sidings etc.

Running lines

Washing line

Pit line

Signals

The movement of trains in station yards is controlled through signals. Signals are of various types viz. fixed signals, hand signals, detonating signals and warning signals. Most of the station yards are provided with fixed signals but few of them are not. The movements in yards having no fixed signals are fully dependent on hand signals / authorities issued by station staff. The conditions for every movement have to be meticulously ensured by station staff before permitting the same. In stations provided with fixed signals, they are operated by Station Master through a panel or VDU (Visual display unit).

Some station yards have Level Crossing Gate, which is a gate provided at the intersection of road with railway track at the same level. Such gates within station yards are usually interlocked with signals. They are manned by operating staff who ensure that the gate is closed for road traffic during passage of trains.

Station Yard Features

The following are some of the basic features of a station yard…

Station Gradient

Station yards are generally provided on a level gradient. Whenever station is on a steeper gradient, protective sidings like slip & catch sidings are provided.

a. *Slip siding* is intended to prevent vehicles escaping into block section. Slip siding is provided where falling gradient towards the block section is steeper than 1 in 100.
b. *Catch Siding* is intended to catch vehicles coming out of control from the adjacent block section. Such vehicles could have escaped from the adjacent station or caused by train parting in block section. Catch siding is provided where falling gradient towards the station section is steeper than 1 in 80.

Isolation

As per GR 1.02 (32), '"isolation" means an arrangement, secured by the setting of points or other approved means, to protect the line so isolated from the danger of obstruction from other connected line or lines.' On lines where isolation is provided, if vehicles start rolling it should not result in infringement to the movements over the lines from which it has been isolated.

Isolation can be achieved by any of the following methods…

a. Connection to another line or long siding;
b. Provision of short dead end siding; or
c. Provision of trap.

Mechanisms like Scotch block, Hayes derail which ensures derailing of vehicles have also been used to achieve isolation, but they are not in vogue nowadays.

Adequate distance

As per GR 1.02 (2), "adequate distance" means the distance sufficient to ensure safety. Adequate distance is mandated by GR in various occasions like distance between signals, distance required for granting line clear (commonly referred as Block overlap), distance required for taking off home signals on to a line (commonly referred as Signal overlap) etc. These distances are to be made available in the station yard unless exemptions are allowed in the concerned rule duly approved by competent authority.

Interlocking

Signals are usually interlocked with track/routes through track circuiting & relays. Such an arrangement of signals, points and track circuits/axle counters, operated from a panel, interconnected by mechanical / electrical / electronic locking so that their operation must take place in a proper sequence which ensures safety is called Interlocking.

The objectives of interlocking are…

i) Setting of route,
ii) Locking of route,
iii) Holding of route,
iv) Preventing conflicting movements.

As per the method / technology used to achieve interlocking, it is classified as…

Mechanical Interlocking: In yards where points and signals are operated by levers, sequence of pulling levers is ensured by mechanical arrangements in lever frames. Lock bars are provided for locking points. Mechanical slots are provided for ensuring coordination between staff to enable a single operation. However, such interlocking is restricted by the size of the lever frames and hence not feasible for bigger yards. It is also maintenance intensive as alignments need to be consistently checked and maintained so that levers operate smoothly and interlocking is not compromised.

Relay Interlocking: Electromagnetic relays connected to track circuits, point machines and signals are used in relay interlocking. When operations of points and signals in the station are enabled through panels, such interlocking is named as Panel Interlocking (PI). In bigger yards, where interlocking is done between one route and another route such that simultaneous operation for various routes does not lead to conflicting movements, it is named as Route Relay Interlocking (RRI). Another feature in RRI is that the Station Master need not operate individual points in a route and can take off signals by pressing the concerned signal button and route button.

Electronic/Solid State Interlocking (EI/SSI): In this system, the interlocking is achieved through computerized microprocessor based software, which gets its input through relays connected to track circuits, point machines and signals. The complex sets of relays required for achieving route wise interlocking in RRI is replaced by a small computer hardware hosting the designed software. Thus, this system is most advanced, easy to maintain, safest as it is subjected to rigorous testing in factory as well as site and less prone to interference.