CHAPTER – III

PROFILE OF GOLDEN ROCK RAIL WORKSHOP, TIRUCHIRAPPALLI
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The researcher classified this chapter broadly into two areas such as Indian Railways and Southern railways to understand the facts and figures related to the history of Indian railway and the nature of work involved by employees. Evolution of railway industry from the early era to modern days in and around India. It helps the researcher to undergo his further studies.

3.1 HISTORY OF RAILWAYS

The history of railway transport in India began in the mid-nineteenth century. The core of the pressure for building railways in India came from London.

A plan for a rail system in India was first put forward in 1832 by the British East India Company. The first rail line of the Indian sub-continent came up near Chintadripet Bridge (presently in Chennai) in Madras Presidency in 1836 as an experimental line. In 1837, a 3.5-mile (5.6 km) long rail line was established between Red Hills and stone quarries near St. Thomas Mount. A rail line was established on 22 December 1851 for localised hauling of canal construction material in Roorkee.

The Great Indian Peninsula Railway (GIPR) was established in 1845. The country's first passenger railway, built by the Great Indian Peninsula Railway (GIPR), opened in 1853, between Bombay and Thane. The East Indian Railway Company was established 1 June 1845 in London by a deed of settlement with a capital of £4,000,000, primarily raised in London. The Great Southern India Railway Co. was founded in Britain in 1853 and registered in 1859. Construction of track in Madras Presidency began in 1859 and the 80 mile link from Trichinopoly to Negapatam was opened in 1861. The Carnatic Railway founded in 1864, opened a Madras-Arakkonam-
Kancheepuram line in 1865. The Great Southern India Railway Company was subsequently merged with the Carnatic Railway Company in 1874 to form the South Indian Railway Company.

A British engineer, Robert Maitland Brereton, was responsible for the expansion of the railways from 1857 onwards. The Allahabad-Jabalpur branch line of the East Indian Railway had been opened in June 1867. Brereton was responsible for linking this with the GIPR, resulting in a combined network of 6,400 km (4,000 mi). Hence it became possible to travel directly from Bombay to Calcutta. This route officially opened on 7 March 1870, and it was part of the inspiration for French writer Jules Verne's book Around the World in Eighty Days. At the opening ceremony, the Viceroy Lord Mayo concluded that "it was thought desirable that, if possible, at the earliest possible moment, the whole country should be covered with a network of lines in a uniform system".

By 1875, about £95 million were invested by British companies in India. By 1880 the network had a route mileage of about 14,500 km (9,000 miles), mostly radiating inward from the three major port cities of Bombay, Madras and Calcutta. By 1895, India had started building its own locomotives, and in 1896, sent engineers and locomotives to help build the Uganda Railways.

In 1900, the GIPR became a government owned company. The network spread to the modern day states of Assam, Rajputana and Madras Presidency and soon various autonomous kingdoms began to have their own rail systems. In 1905, a new Railway Board was constituted, but the powers were formally vested under Lord Curzon. It served under the Department of Commerce and Industry and had a government railway official serving as chairman, and a railway manager from England and an agent of one of the company railways.
as the other two members. For the first time in its history, the Railways began to make a profit.

In 1907 almost all the rail companies were taken over by the government. The following year, the first electric locomotive made its appearance. With the arrival of World War I, the railways were used to meet the needs of the British outside India. With the end of the war, the railways were in a state of disrepair and collapse. Large scale corruption by British officials involved in the running of these railways companies was rampant. Profits were never reinvested in the development of British colonial India. In 1920, with the network having expanded to 61,220 km (38,040 miles), a need for central management was mooted by Sir William Acworth. Based on the East India Railway Committee chaired by Acworth, the government took over the management of the Railways and detached the finances of the Railways from other governmental revenues.

The period between 1920 and 1929 was a period of economic boom; there were 41,000 miles (66,000 km) of railway lines serving the country; the railways represented a capital value of some 687 million sterling; and they carried over 620 million passengers and approximately 90 million tons of goods each year. Following the Great Depression, the railways suffered economically for the next eight years. The Second World War severely crippled the railways. Starting in 1939, about 40% of the rolling stock including locomotives and coaches was taken to the Middle East. The railway workshops were converted to ammunition workshops, and many railway tracks were dismantled to help the Allies in the war. By 1946, all railway systems had been taken over by the government.

3.2 INDIAN RAILWAYS

Indian Railways (reporting mark IR) is a state-owned railway company, responsible for rail transport in India. It is owned and operated by
the Government of India through the Ministry of Railways. It is fourth largest railway network in the world comprising 119,630 kilometers (74,330 miles) of total track and 92,081 km (57,216 mi) of running track over a route of 66,687 km (41,437 mi) with 7,216 stations at the end of 2015-16. In 2015-16, IR carried 8.107 billion passengers annually or more than 22 million passengers a day and 1.101 billion tons of freight annually.

Railways were first introduced to India in 1830s for freight purposes. First passenger train ran from Bombay to Thane in 1853. In 1951 the systems were nationalized as one unit, the Indian Railways, becoming one of the largest networks in the world. IR operates both long distance and suburban rail systems predominantly on a network of broad gauge. Small stretches of its network use meter and narrow gauges. It also owns locomotive and coach production facilities at several places in India, with assigned codes identifying their gauge, kind of power and type of operation.

Indian Railways is the world's eighth biggest employer and had 1.331 million employees at the end of 2015-16. In 2015–2016 Indian Railways had revenues of 1.683 trillion (US$26 billion) which consists of 1.069 trillion (US$17 billion) freight earnings and 442.83 billion (US$6.9 billion) passengers earnings. It had operating ratio of 90.5% in 2015-16. As on the end of 2015-16, IR's rolling stock comprises over 251,256 Freight Wagons, 70,241 Passenger Coaches and 11,122 Locomotives (39 steam, 5,869 diesel and 5214 electric locomotives).

Indian Railways run on average 13,313 passenger trains daily in 2015-16. Mail or Express trains, most common type, run at average speed of 50.9 km/hr. The trains have a 5 digit numbering system. As of at the end of 2015-16, of the total 68,525 km (42,579 miles) route length, 28,327 km (17,602 miles) (45%) was electrified and 28,371 km (17,629 miles) (37%) was Double or Multiple line route.
3.3 ORGANIZATIONAL STRUCTURE

The apex management organisation is the Railway Board, also called the Ministry of Railways. The board is headed by a Chairman who reports to the Minister of Railways. The board has five other members in addition to the chairman. The General Managers of the Zonal Railways and the production units report to the board.

3.4 RAILWAY ZONE

Indian Railways is divided into 17 zones, which are further sub-divided into divisions. The number of zones in Indian Railways increased from six to eight in 1951, nine in 1966 and sixteen in 2003. Each zonal railway is made up of a certain number of divisions, each having a divisional headquarters. There are a total of 73 divisions.

Each zone is headed by a general manager, who reports directly to the Railway Board. The zones are further divided into divisions, under the control of divisional railway managers (DRM). The divisional officers, of engineering, mechanical, electrical, signal and telecommunication, accounts, personnel, operating, commercial, security and safety branches, report to the respective Divisional Railway Manager and are in charge of operation and maintenance of assets. The DRM is assisted by one or two additional divisional railway managers. Further down the hierarchy tree are the station masters, who control individual stations and train movements through the track territory under their stations' administration.

3.5 TRACKS

The total track length of network is 119,640 km (74,340 miles) while the total route length of the network is 66,687 km (41,437 miles). Track sections are rated for speeds ranging from 80 to 220 km/h (50 to 137 mph), though trains don't really clock speeds of 200 km/h. Maximum speed attained by passenger trains is 177 km/h-180 km/h (110 mph).
Indian gauge 1,676 mm (5 ft. 6 in) (a broad gauge) is the predominant gauge used by Indian Railways with 108,500 km (67,400 miles) of track length (94% of entire track length of all the gauges) and 59,400 km (36,900 miles) of route-kilometer (91% of entire route-kilometer of all the gauges). It is the widest gauge in passenger use in the world. The first railway line built in India was broad gauge line from Bori Bunder (now Chhatrapati Shivaji Terminus) to Thane in 1853.

Urban rail transit lines which serve the urban areas are in 1,435 mm (4 ft. 8 1/2 in) standard gauge (except suburban rail which is in Indian gauge). These encompass metro, monorail and trams. As of 2016, lines in operation are Kolkata (Calcutta) tram system, Delhi Metro, Rapid Metrorail Gurgaon, the Bangalore Metro and the Mumbai Metro. These lines are not operated by Indian Railways.

On decreasing routes, the 1,000 mm (3 ft. 3 3/8 in) meter gauge and 762 mm (2 ft. 6 in) and 610 mm (2 ft.) narrow gauges are present. These were initially introduced in hilly regions for cost considerations and simpler engineering. The meter gauge has about 5,000 km (3,100 miles) of track length (4% of entire track length of all the gauges) and 4,100 km (2,500 miles) of route-kilometer (6% of entire route-kilometer of all the gauges), while narrow gauges have 1,500 km (930 miles) route-kilometer (2% of entire route-kilometer of all the gauges), as of 31 March 2016.

3.6 ELECTRIFICATION

Around 23,555 km (14,636 miles) of the route-kilometer or 43,357 km (26,941 miles) of running track was electrified, as of 31 March 2016. India uses 25 kV AC traction on all of its electrified tracks.

Electrification started in India with the inauguration of the first electric train between Victoria Terminus now Chhatrapati Shivaji terminus and Kurla on 3 February 1925 on the then existing Great Indian Peninsula Railway (GIP)
at 1500 V DC. The electric traction on the Central Railway was extended up to Igatpuri on the North East line and to Pune on the South East line. 1500 volt DC traction was introduced on the Western Railway between Colaba and Borivili on 5 January 1928 and between Madras Beach and Tambaram of the Southern Railway on 11 May 1931. This was primarily to meet the growing traffic on these metros. Till Independence, India had 388 km of electrification on DC traction.

In the post-independence era, electrification of the Howrah-Burdwan section of the Eastern Railway was done at 3000 volt DC during the First Five Year Plan period and completed in 1958. The electric multiple unit (EMU) services were inaugurated in Howrah-Sheoraphuli section on 14 December 1957.

Indian Railways decided in 1957 to adopt the 25 kV AC system of electrification as a standard, with SNCF as their consultant in the initial stages. 25 kV AC traction is the most widely used electric traction in the world. The first section electrified on the 25 kV AC system was Raj Kharswan - Dongoaposi on the South Eastern Railway in 1960. The Howrah - Burdwan section of the Eastern Railway and Madras Beach - Tambaram section of the Southern Railway were converted to the 25 kV AC system by 1968. Considering the limitations in the existing 1500 volt DC, a decision was taken to convert to 25 kV AC traction during 1996-97. Conversion from DC traction to AC traction completed in mid-2010s.

3.7 SIGNALLING SYSTEMS

The Indian Railways mostly use colour signal lights. Earlier the older semaphores and discs-based signalling (depending on the position or colour) were used, but these were replaced by colour signals. Except for some high-traffic sections around large cities and junctions, the network does not use automatic block systems. However, the signals at stations are almost
invariably interlocked with the setting of points (routes) and so safety does not depend on the skill of the station masters. With the planned introduction of Cab signalling/Anti-collision devices the element of risk on account of drivers overshooting signals will also be eliminated.

Coloured signalling uses multi-coloured lighting, and in many places is automatically controlled. There are three modes:

1. Two aspect signalling, which uses a red (bottom) and green (top) lamp
2. Three aspect signalling, which uses an additional amber lamp in the Centre
3. Four (multiple) aspect signalling uses four lamps. The fourth is amber and is placed above the other three.

Multiple aspect signals, by providing several intermediate speed stages between 'clear' and 'on', allow high-speed train’s sufficient time to brake safely if required. This becomes very important as train speeds rise. Without multiple-aspect signals, the stop signals must be placed far apart to allow sufficient braking distance and this reduces track utilisation. At the same time, slower trains can also be run closer together on track with multiple aspect signals.

3.8 ROLLING STOCK (Locomotive)

Locomotives in India consist of electric and diesel locomotives. The world's first CNG (Compressed Natural Gas) locomotives are also being used. Steam locomotives are no longer used, except in heritage trains. In India, locomotives are classified according to their gauge, motive power, the work they are suited for and their power or model number. The class name includes this information about the locomotive. It comprises 4 or 5 letters. The first letter denotes the track gauge. The second letter denotes their motive power, Diesel or Alternating current (Electric), and the third letter denotes the kind of
traffic for which they are suited (goods, passenger, Multi or shunting). The fourth letter used to denote locomotives' chronological model number. However, from 2002 a new classification scheme has been adopted. Under this system, for newer diesel locomotives, the fourth letter will denote their horsepower range. Electric locomotives don't come under this scheme, and even all diesel locos are not covered. For them, this letter denotes their model number as usual.

A locomotive may sometimes have the fifth letter in its name which denotes a technical variant or subclass or subtype. This fifth letter indicates some smaller variation in the basic model or series, perhaps different motors, or a different manufacturer. With the new scheme for classifying diesel locomotives (as mentioned above) the fifth item is a letter that further refines the horsepower indication in 100 hp increments: 'A' for 100 hp, 'B' for 200 hp, 'C' for 300 hp, etc. So in this scheme, a WDM-3A refers to a 3100 hp loco, while a WDM-3D would be a 3400 hp loco and WDM-3F would be 3600 hp loco.

Diesel Locomotives are now fitted with Auxiliary Power Units which saves nearly 88% of Fuel during the idle time when train is not running.

3.9 GOODS WAGONS

The number of goods wagons was 205,596 on 31 March 1951 and reached the maximum number 405,183 on 31 March 1980 after which it started declining and was 239,321 on 31 March 2012. The number is far less than the requirement, and the Indian Railways keeps losing freight traffic to road. Indian Railways carried 93 million tonnes of goods in 1950–51, and it increased to 1010 million tonnes in 2012–13.

However, its share in goods traffic is much lower than road traffic. In 1951, its share was 65%, and the share of the road was 35%. Now the shares
have been reversed, and the proportion of railways has declined to 30% and the share of road has increased to 70%. Since the 1990s, Indian Railways has stopped single-wagon consignments and provides only full rake freight trains.

3.10 TYPES OF WAGON:

In 1999, the Konkan Railway Corporation introduced the Roll on Roll off (RORO) service, a unique road-rail synergy system, on the section between Kolad in Maharashtra and Verna in Goa, which was extended up to Surathkal in Karnataka in 2004. The RORO service, the first of its kind in India, allowed trucks to be transported on flatbed trailers. It was highly popular, carrying about 110,000 trucks and bringing in about 740 million worth of earnings to the corporation till 2007. Some of the other important types of WAGON are as follows:

a) BOXN- BOXN-HL, BOXN-HS, BOXN-HL, BOXN-CR, BOXN-LW, BOXN-AL, BOXN-EL.
b) BOBYN
c) BCNA
d) BCNHL
e) BTPN
f) BCACBM
g) BCCN
h) BOBRN
i) BRH
j) BTPGLN
k) VVN

3.11 PASSENGER COACHES

Indian Railways has several types of passenger coaches. The coaches used in Indian Railways are produced at Integral Coach Factory, Rail Coach Factory, Modern Coach Factory, Rae Bareli; including the new LHB coaches.
Electric Multiple Unit (EMU) coaches are used for suburban traffic in large cities – mainly Mumbai, Chennai, Delhi, Kolkata, Pune, Hyderabad and Bangalore. These coaches numbered 7,793 on 31 March 2012. They have second class and first class seating accommodation.

Passenger coaches numbered 46,722 on 31 March 2012. Other coaches (luggage coach, parcel van, guard's coach, mail coach, etc.) numbered 6,560 on 31 March 2012.

3.12 PRODUCTION UNITS

The Chittaranjan Locomotive Works in Chittaranjan makes electric locomotives. The Diesel Locomotive Works in Varanasi makes diesel locomotives. The Integral Coach Factory in Perambur, Chennai makes integral coaches. These have a monocoque construction, and the floor is an integral unit with the undercarriage. The Rail Coach Factory in Kapurthala also makes coaches. The Rail Wheel Factory at Yelahanka, Bangalore and Rail Wheel Plant, Bela, Chhapra, Bihar manufactures wheels and axles, Diesel-Loco Modernisation Works, Patiala upgrade the WDM-2 Diesel loco from 2600 hp to 3100 hp. Some electric locomotives have been supplied by BHEL, Jhansi and Palakkad, and locomotive components are manufactured in several other plants around the country.

3.13 RECRUITMENT AND TRAINING

Staff are classified into gazetted (Group 'A' and 'B') and non-gazetted (Group 'C' and 'D') employees. The recruitment of Group 'A' gazetted employees is carried out by the Union Public Service Commission through exams conducted by it. The Recruitment of Group 'B' for the following post Section Officers, Junior Engineers, Depot Material Superintendent Posts is conducted by Railway Recruitment Board. The recruitment to Group 'C' and 'D' employees on the Indian Railways is done through 21 Railway Recruitment Boards and Railway Recruitment Cells which are controlled by the Railway
Recruitment Control Board (RRCB). The training of all cadres is entrusted and shared between six centralised training institutes.

Indian Railways recruits for lower level positions like ASM, Goods Guard, Clerk, TA, CA, JE, Staff Nurse and Group D through it RRB NTPC (Railway Recruitment Board Non-Technical) Examination. For the year 2016, the examination was conducted to recruit around 18,000 positions.

3.14 ISSUES

Indian Railways is cash strapped and reported a loss of 300 billion (US$4.7 billion) in the passenger segment for the year ending March 2014. Operating ratio, a key metric used by Indian railways to gauge financial health, is 109% for the period April - Dec in 2016. Railways carry a social obligation of over 200 billion (US$3.1 billion). The loss per passenger-km increased to 23 paise (0.36¢ US) by the end of March 2014. Indian Railways is left with a surplus cash of just 6.9 billion (US$110 million) by the end of March 2014.

It was estimated in 2014 that over 5 trillion (US$78 billion) is required to complete the ongoing projects alone. The railway is consistently losing market share to other modes of transport both in freight and passengers.

New rail line projects are often announced during the Railway Budget annually without securing additional funding for them. Between 2004 and 2014, 99 New Line projects worth 600 billion (US$9.3 billion) were sanctioned out of which only one project is complete till date, and there are four projects that are as old as 30 years but are still not complete for one reason or another.

3.15 FUTURE

Indian Railways has a full-fledged organisation known as Research Designs and Standards Organisation (RDSO), located at Lucknow for all research, designs and standardisation tasks.
In August 2013, Indian Railways entered into a partnership with Indian Institute of Technology (Madras) to develop technology to trap solar energy for lighting and air-conditioning in the coaches. This would significantly reduce the fossil fuel dependency for Indian Railways.

Recently it developed and tested the Improved Automated Fire Alarm System in Rajdhani Express Trains. It is intended that the system be applied to AC coaches of all regular trains.

In recent years, Indian Railways has undertaken several initiatives to upgrade its ageing infrastructure and enhance its quality of service. The Indian government plans to invest 9.05 trillion (US$140 billion) to upgrade the railways by 2020. Indian Railways is refurbishing 12-15 year old coaches at Carriage Rehabilitation Workshop in Bhopal to enhance passenger amenities and fire safety measures. Selected passengers with confirmed tickets will now be allowed to transfer them to someone else, but only once. IRCTC is now offering a pay-on-delivery option for train tickets on its website and app, where the customers can book the tickets and pay when it is delivered.

### 3.16 HIGH-SPEED RAIL

India does not have any railways classified as high-speed rail (HSR), which have operational speeds in excess of 200 km/h (120 mph). The fastest train in India is the Gatimaan Express with a top speed of 160 km/h (99 mph), which runs between Delhi and Agra.

Prior to the 2014 general election, the two major national parties (Bharatiya Janata Party and Indian National Congress (INC)) pledged to introduce high-speed rail. The INC pledged to connect all of India's million-plus cities by high-speed rail, whereas BJP, which won the election, promised to build the Diamond Quadrilateral project, which would connect the cities of Chennai, Delhi, Kolkata, and Mumbai via high-speed rail. This project was
approved as a priority for the new government in the incoming president's speech. Construction of one kilometer of high speed railway track will cost 100 crore (US$16 million) - 140 crore (US$22 million) which is 10-14 times higher than the construction of standard railway.

India's Prime Minister Narendra Modi approved the choice of Japan to build India's first high-speed railway. The planned rail would run some 500 km (310 miles) between Mumbai and the western city of Ahmedabad, at a top speed of 320 km/h (200 mph). Under the proposal, construction is expected to begin in 2017 and be completed in 2023. It would cost about 980 billion (US$15 billion) and be financed by a low-interest loan from Japan. India will use the wheel-based 300 km/hr. HSR technology, instead of new maglev 600 km/hr. technology of the Japan used in Chuo Shinkansen. India is expected to have its HSR line operational from 2025 onwards, once the safety checks are completed.

3.17 LOCOMOTIVE FACTORIES

In 2015, plans were disclosed for building two locomotive factories in the state of Bihar, at Madhepura (electric locomotive) and at Marhaura (Diesel Locomotive). Both factories involve foreign partnerships. The diesel locomotive works will be jointly operated in a partnership with General Electric, which has invested 20.52 billion (US$320 million) for its construction, and the electric locomotive works with Alstom, which has invested 12.935 billion (US$200 million). The factories will provide Indian Railways with 800 electric locomotives of 12,000 horse power each, and a mix of 1,000 diesel locomotives of 4,500 and 6,000 horsepower each. In November 2015, further details of the 146.56 billion (US$2.3 billion) partnership with GE were announced: Indian Railways and GE would engage in an 11-year joint venture in which GE would hold a majority stake of 74%. Under the terms of the joint venture, Indian Railways would purchase 100
goods locomotives a year for 10 years beginning in 2017; the locomotives would be modified versions of the GE Evolution series. The diesel locomotive works will be built by 2018; GE will import the first 100 locomotives and manufacture the remaining 900 in India from 2019, also assuming responsibility for their maintenance over a 13-year period. In the same month, a 200 billion (US$3.1 billion) partnership with Alstom to supply 800 electric locomotives from 2018 to 2028 was announced.

3.18 HISTORY OF SOUTHERN RAILWAYS

In 1944, all Railway companies were taken over by the Government. And three years later, when India woke up to independence in 1947, the stage was set for the integration of different Railways into smaller zones. In 1948, immediately after independence, there were as many as 42 different railway systems - a multiplicity of railway administrations, varying in size and standards.

The regrouping proposals put forward by the various committees were studied in great detail to ensure that a unification could be achieved with the least disturbance and dislocation. Important associations of railway-users, Chambers of Commerce and Industry, the State Governments and acknowledged experts both in India and abroad were fully consulted.

Shri. N. Gopalaswami Ayyangar, Minister for Railways, was the principal architect of the regrouping of Indian Railways. In December 1950, the Central Advisory Committee for Railways approved the plan for Indian Railways into six Zonal systems, namely, the Northern, the North-Eastern, the Southern, the Central, the Eastern and the Western.

The Southern Railway zone 9,654 kilometers (5,999 miles) was the first zone to be formed. Created on 14 April 1951 by the merger of the Madras and Southern Mahratta Railway, the South Indian Railway and the Mysore
State Railway, the economic and geographical factors of this zone facilitated an early integrated network. This amalgamation was a major step towards streamlining and organizing the working pattern of the Railway system.

Shri. K. R. Ramanujam was appointed the first General Manager of the newly formed Southern Railways.

3.19 PROFILE OF GOLDEN ROCK RAIL WORKSHOP, TIRUCHIRAPPALLI

The central workshop was set up in 1897 by erstwhile South Indian Railway Company Limited (SIR) at Nagapattinam a port town in the East Coast mainly to cater to the requirement of steam locomotive maintenance. South Indian Railways Company Limited decided to shift the workshop to Tiruchinapoly, presently known as Tiruchchirappalli, owing to its locality advantage and was also nearer to its Head Quarter.

Consequently foundation stone was laid by Mrs. R.P. MUNRO on 20.10.1926. It was shifted to Tiruchchirappalli in 1928 because of its strategic location. The Central Workshop, Golden rock is functioning at Tiruchchirappalli since then. “PONMALAI” (Golden rock) named after the goddess Ponneshwari situated in the hillock of Rock City Tiruchirapalli, Tamil Nadu.

The total area of this workshop is around 200 acres (0.81 km2), out of which 26 acres (110,000 m2) is covered under roof. At present 6091 employees are working in this workshop. This workshop is primarily engaged in the activities of DSL Loco POH, heritage steam locomotive POH, coaching stock maintenance and wagon manufacturing and other sundry activities.

This workshop does have a long traverse way around 600 meters long and 80 feet (24 m) wide. This workshop was involved in repairing of Royal Air Force's Fighter-Bombers during World War II.
This workshop when built had state of the art facilities rarely seen in those days. It had its own powerhouse which generated electricity for the workshop and the colony. In fact, Railway colony, Golden Rock was one of the first places to be lit by electrical lights in Tiruchirapalli city those days.

This is a well-designed and constructed workshop laid with mixed gauge tracks to carry out repairs to both MG and BG rolling stocks. This Workshop has always accepted new challenges and adapted to change in product mix and is known for its excellent quality of work. This workshop is ISO 9001 certified and has completed more than 88 years of service to the nation and has left behind many mile stones of achievements.

The Railway Board in 1950 decided for the regrouping of the Indian Railways into six zonal systems, namely, the Northern, the North Eastern, the Southern, the Central, the Eastern and the Western Railways. The unequal distributions of workload on some of the railways have led to further bifurcation of zones. Eastern Railway was split into two zones, namely, Eastern Railway and South Eastern Railway. Similarly, North Eastern Zone was split into North Eastern Railway and Northeast Frontier Railway. Thus, by the year 1958, there were eight zones on Indian Railways.

The Central Workshops, situated in Ponmalai (Golden Rock), Tiruchirapalli in the Indian state of Tamil Nadu, is one of the three mechanical railway workshops serving the southern zone of the Indian Railways.

This repair workshop is basically a "Mechanical Workshop" which comes under the control of the Mechanical Department of the Indian Railways. The other two mechanical workshops of Southern Railway are located in Perambur, Chennai. They are "Carriage Works, Perambur" and "Loco Works, Perambur". The Integral Coach Factory, Perambur is a production unit and is classified as a factory and not as a workshop.
The primary objective of a Railway Workshop is repair and maintenance work and not production. However, due to changing requirements, many workshops, including Central Workshops of Golden rock, are used nowadays for regular production activities also.

3.19.1 VITAL STATISTICS

<table>
<thead>
<tr>
<th>S No.</th>
<th>Activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sanctioned Strength</td>
<td>6067</td>
</tr>
<tr>
<td>2.</td>
<td>On Roll Strength</td>
<td>5750</td>
</tr>
<tr>
<td>3.</td>
<td>No. of Officers</td>
<td>33</td>
</tr>
<tr>
<td>4.</td>
<td>No. of Supervisors</td>
<td>598</td>
</tr>
<tr>
<td>5.</td>
<td>Total Area</td>
<td>200 acres</td>
</tr>
<tr>
<td>6.</td>
<td>Covered Area</td>
<td>26 acres</td>
</tr>
<tr>
<td>7.</td>
<td>Township Area</td>
<td>600 acres</td>
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<tr>
<td>8.</td>
<td>Power Consumption</td>
<td>629117 units/month</td>
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<tr>
<td>9.</td>
<td>Water Consumption</td>
<td>28900 KL/month</td>
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<tr>
<td>10.</td>
<td>Annual Budget</td>
<td>Rs.368 Cr.</td>
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3.19.2 MAIN ACTIVITIES

3.19.3 MILESTONES

<table>
<thead>
<tr>
<th>Year</th>
<th>Activities</th>
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<tbody>
<tr>
<td>1926</td>
<td>Foundation stone laid by Mrs. R.P. Munro on 20.10.1926</td>
</tr>
<tr>
<td>1928</td>
<td>Steam loco and C &amp; W POH activities commissioned</td>
</tr>
<tr>
<td>1962</td>
<td>Wagon Construction started</td>
</tr>
<tr>
<td>1966</td>
<td>Manufacture of improved Ticket Printing Machine</td>
</tr>
<tr>
<td>1969</td>
<td>Diesel Locomotive POH started</td>
</tr>
<tr>
<td>1976</td>
<td>Heavy Electrical Repair Shop Commissioned</td>
</tr>
<tr>
<td>1977</td>
<td>Cylinder Liner Plating Shop Commissioned</td>
</tr>
<tr>
<td>1979</td>
<td>Coil Manufacturing Shop Commissioned</td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>1985</td>
<td>Workshop Modernization started</td>
</tr>
<tr>
<td>1986</td>
<td>Steam Loco POH activity closed</td>
</tr>
<tr>
<td>1987</td>
<td>System Development Group Started</td>
</tr>
<tr>
<td>1988</td>
<td>Engine Block Reclamation Shop commissioned</td>
</tr>
<tr>
<td>1996</td>
<td>PSU Loco POH undertaken</td>
</tr>
<tr>
<td>1996</td>
<td>MM's Quality Shield for Best Diesel Shop in Indian Railways was received.</td>
</tr>
<tr>
<td>1996</td>
<td>Obtained ISO 9002 Certification for CLP, CMS &amp; EBR shops (Phase I)</td>
</tr>
<tr>
<td>2000</td>
<td>ISO 9002 recertification for all the shops (merging the three phases)</td>
</tr>
<tr>
<td>2002</td>
<td>Flagging off of 100th PSU Loco</td>
</tr>
<tr>
<td>2002</td>
<td>Won the award from MM/NDRB for Refurbishing of coaches with Crash Worthy Feature</td>
</tr>
<tr>
<td>2002</td>
<td>Platinum Jubilee Celebrations inaugurated by Shri. A.K. Moorthy, Hon’ble MOSR</td>
</tr>
<tr>
<td>2006</td>
<td>Flagging off of 1000th BLC Wagons to CONCOR / NDLS</td>
</tr>
<tr>
<td>2007</td>
<td>Flagging off of 100th loco export to Mozambique</td>
</tr>
<tr>
<td>2007</td>
<td>ISO 14001 Environmental Management System Certification</td>
</tr>
<tr>
<td>2008</td>
<td>Flagging off of last rake of 990 BLC Wagon</td>
</tr>
<tr>
<td>2008</td>
<td>23 MG coaches have exported to Tanzania through RITES</td>
</tr>
<tr>
<td>2009</td>
<td>Highest volume of wagon dispatch – 1005 wagons in a single year</td>
</tr>
<tr>
<td>2009</td>
<td>Flagging off of 51st Rake of BLC Wagon by Shri. E. Ahamed, Hon’ble MOSR</td>
</tr>
<tr>
<td>2009</td>
<td>Rolling out of first stainless steel wagon of BOX-N HL Type</td>
</tr>
<tr>
<td>2009</td>
<td>Manufacturing of first WDS6 loco out of YDM4 loco</td>
</tr>
<tr>
<td>2009</td>
<td>Commissioning of high horse power loco overhauling facilities</td>
</tr>
<tr>
<td>2010</td>
<td>GOC workshop has bagged Green Shield Award consequently Second Time for the year 2009-10 constituted by GM/S.Rly.</td>
</tr>
<tr>
<td>2011</td>
<td>GOC workshop has bagged Green Shield Award for third consecutive year 2010-2011</td>
</tr>
<tr>
<td>2011</td>
<td>GOC has obtained an Integrated Management System (IMS), including OHSAS 18001</td>
</tr>
<tr>
<td>2011</td>
<td>Bogie low container (BLC) wagons manufactured by the Golden Rock Railway Workshop was flagged for the Container Corporation of India (CONCOR)</td>
</tr>
<tr>
<td>2012</td>
<td>GOC has been adjudged the best workshop in Southern Railway and bags shield for best performance</td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>2013</td>
<td>Golden Rock Workshop to overhaul power packs of EMD-type engines</td>
</tr>
<tr>
<td>2013</td>
<td>Golden Rock Railway Workshop overhauls high-power Siemens motors</td>
</tr>
<tr>
<td>2013</td>
<td>GOC bags order for 1,000 BLC wagons from CONCOR</td>
</tr>
<tr>
<td>2013</td>
<td>Workshop had carried out period overhauling of 988 coaches</td>
</tr>
<tr>
<td>2014</td>
<td>Golden Rock Workshop garners Rs.75 cr. as Foreign Exchange</td>
</tr>
<tr>
<td>2014</td>
<td>First rake of 45 container wagons of 2011 order to be dispatched</td>
</tr>
<tr>
<td>2014</td>
<td>Golden Rock Railway Workshop bags order for 1,000 container wagons</td>
</tr>
</tbody>
</table>

### 3.19.4 ORGANIZATION STRUCTURE

**CWM:** Golden Rock Railway Workshop is headed by one Sr. Administrative Grade Officer, designated as Chief Workshop Manager (CWM). He is the overall in-charge for complete activities. He is assisted by five Junior Administrative Officers, seven Sr. Scale Officers and 18 Junior Scale Officers.

**Dy. CME/X class:** Deputy Chief Mechanical Engineer/X -class is responsible for POH / conversion of X class locomotives. The Golden Rock workshops has been entrusted with the responsibility of carrying out the POH of X class locomotives (special locomotives which have a toothed cog which engages with the racks available in the railway track in very steep gradients) and manufacturing of new locomotives. At the time of POH, the original coal fired boiler of the loco is converted in to oil fired loco without altering the external looks to preserve the heritage value. The conversion has become necessary in view of the logistics, economy and availability of coal for the loco. At present the workshop has also bagged the order for manufacturing 4 numbers of X class locomotives. In view of the international importance of this railway, the senior most JAG officer of the workshop has been entrusted with the responsibility of this activity.
**Dy. CME/DSL:** Deputy Chief Mechanical Engineer/Diesel is overall in-charge for complete Periodical Overhauling (POH) activities of diesel locomotives and its allied shops viz. EBR, CLP, CMS & HERS. He is also looking after activities related to export locomotives, overhauling of Public Sector Locomotives and steam locomotives. He is assisted by one Sr. Scale and three Junior Scale Officers.

**Dy. CME/P:** Deputy Chief Mechanical Engineer/Production is overall in-charge Production Shops viz. Wheel Shop, Fabrication and Smithy Shop, Machine Shop, Foundry and DSL Component Shop. He is also looking after Production, Planning and Control Organization. He has been appointed as Management Representative for International Quality and Environmental Management Systems (ISO 9001 & ISO 14001). He is assisted by one Sr. Scale Officer and two Junior Scale Officers.

**Dy. CME/Carriage & Wagon:** Deputy Chief Mechanical Engineer/Carriage and Wagon are overall in-charge for periodical overhauling of Carriages and manufacture of wagons. He is assisted by one Sr. Scale and two Jr. Scale Officers.

**Dy. CEE/S:** Deputy Chief Electrical Engineer is in-charge for maintenance of all the Electrical equipment’s and machineries available in the shop. He is also looking after the Train Lighting activities. He is assisted by two Junior Scale Officers.

**Dy. CMM:** Deputy Chief Material Manager is overall in-charge for procurement of raw material and spare parts, stocking and issuing activities. He is assisted by one Sr. Scale and three Jr. Scale Officers.

**Sr. AFA:** Senior Accounts and Financial Advisor is a Sr. Scale Officer looking after Accounts and Finance aspects of GOC Shop. He is assisted by two Jr. Scale Officers.
**WPO:** Workshop Personnel Officer is also a Sr. Scale Officer looking after recruitment, promotion, transfer, retirement and welfare measures. He maintains industrial relationship with trade unions also. He is assisted by one Jr. Scale Officer.

### 3.19.5 CORE BUSINESS ACTIVITIES

**Diesel Locomotive Maintenance**

Diesel Electric Loco periodical overhauling (POH) started in Golden rock Shop in the Year 1969, to cater to the requirements of SR and SCR. It started with a capacity of 0.5 Loco/Month. The capacity was stepped up to 10 locos per month from July 1990 onwards to meet the needs of 5 Railways i.e. Southern Railway, South Central Railway, South Western Railway, West Central Railway and North Western Railway. Presently, Shop is capable of overhauling 12 locomotives per month. In addition to the Locomotives overhauling, Diesel Shop is attached with the following Support shops.

- ✔ Engine Block Reclamation Shop
- ✔ Cylinder Liner Plating Shop
- ✔ Coil Manufacturing Shop
- ✔ Heavy Electrical Repair Shop

**Carriage Maintenance**

GOC Shop is undertaking the following major activities in carriage maintenance.

- ✔ Overhauling of BG AC and Non AC coaches,
- ✔ Coaches of Nilgris Mountain Railways,
- ✔ Refurbishing of interior furnishing under midlife rehabilitation,
- ✔ Conversion and construction of ART coaches,
- ✔ Rehabilitation of in-service MG coaches for exports etc.
- ✔ Furnishing of inspection cars
- ✔ Retro fitment of stainless steel trough floor
- ✔ Refurbishing of toilet
- ✔ Implementation of POH periodicity from 12 months to 18 months
Apart from normal overhauling, GOC Shop had established its expertise in the following areas:
2. Export of old MG coaches to other nations after Maintenance & Re-Modeling by RIETS Limited.

**Wagon Manufacturing Activity**

- GOC Shop started manufacturing wagons in the year 1962, since then it had rolled out 34901 wagons in 53 designs.
- Presently workshop is engaged in mass production of BOXNHL and BLC (container flat wagons for Container Corporation) wagons.
- During the five financial years GOC Workshop captured the majority of wagon building orders for total 2905 Wagons of Container Flat type worth Rs.610 crores from M/s. CONCOR/New Delhi of which GOC till date has manufactured 2770 BLC wagons worth Rs.575.6 Crores. Additionally in last five financial years GOC shops manufactured 830 BOXNHS wagons worth 127 crores. Further GOC shops have an order of 450 Nos. of BLC wagons costing Rs.157 crores.
- The GOC Workshop is gearing up for production of 1000 wagons per year from present level of 840 wagons under Modernisation project considering the huge Wagon demand by M/s. CONCOR and also Stainless steel wagons for Indian Railways
- GOC Workshop has become the first railway workshop in Indian Railways to implement and adopt new state of art technology fasteners as Lock Bolts (Huck/ Avdel) Bolts in place of conventional rivets and successfully turned out 240 High Speed BOXN wagons.
GOC Workshop is awarded with new orders from Railway Board for manufacturing 600 Nos. of BOXNHL wagons, which is a Stainless Steel wagon with High pay load (71 tonnes against 68 tones in normal wagons) designed to overcome the problems of corrosion, body bulging and weak stanchions in the existing wagons. The new design enables to an extra loading of 2.92 tones per wagon and 169 tonnes per rake of 58 wagons which contributes an extra earning of Rs.5800 per wagon and Rs. 3.38 Lakhs per rake. GOC Shop has an order of 599 Nos. of BOXNHL Wagons costing Rs.187 Crores.

Production Wing

Production Wing of GOC focuses its attention mainly on manufacturing of components required for maintenance of locomotives and carriages and wagon manufacturing. It also takes care of the requirement of various divisions by supplying wheels for rolling stock maintenance. Besides, Production wing has taken up the manufacturing of steam locomotives required for Nilgris Mountain Railways and Darjeeling Himalayan Railways. Production wing comprises the following shops:

- Foundry Shop
- DSL Component Shop
- Machine Shop
- Wheel Shop
- Fabrication & Smithy Shop
- Erecting Shop
- Tool Room & Mechanical Mill Wright shop

Support Activities

Besides core business activities, GOC shop is equipped with the following support activities.

- Material management
- Electrical Plant Maintenance
- Mechanical Plant Maintenance
- Industrial Safety
- Basic Training Centre
- Information System
Material Management

Golden rock Workshop is attached with 3 Stores Depots to stock and issue the materials, whenever it is needed for production. Besides stocking depot it is having a scrap store depot to dispose the scrap arising out of production and maintenance activity. Stores depot takes all out efforts to ensure the availability of material always. The availability is used to be in the range of 95 to 98%. Besides of stocking and issuing of material, stores depot is always keen on system improvement. The following system improvements have been achieved in the recent past.

- Vital, safety, passenger amenity & must change items summary with covered / uncovered dues on line.
- Development of various exceptional reports to suit depot requirements based on MMIS module, like details of covered / uncovered dues in single line.
- Other depot stock in Group SPS. Incorporation of NS DBR by linking MMIS module.
- Computerized DBR label card with colour coding.
- Acceptance details of divisional DS8s & Surplus/inactive items list.
- Wastage of time in manual updating of data and taking print out is minimized.
- Monitoring of out of stock / 1 month / 3 months level on daily basis.
- Ready availability of required print out at the specific time.

Electrical Plant Maintenance

There is a dedicated team to maintain the electrical equipment’s and machineries available in GOC Shop. The main objective of the Plant Maintenance Team is to reduce the down time of the machineries available in the shop. Apart from maintaining the Electrical machineries, the team is also looking after electrical power distribution system and conservation measures, with close monitoring of electrical energy utilization, by introducing
regenerative battery chargers, considerable recycling of power has been effected in the battery section.

**Mechanical Plant Maintenance**

Mechanical Plant maintenance is also termed as Mechanical Millwright. The Mechanical Millwright Shop takes care of the up keeping of machineries and equipment’s. In addition to break down attention, it also pays preventive attention to critical machineries like Overhead Cranes, Material Handling Equipment’s and other special purpose machines. Presently, around 1241 machineries are installed in the GOC Shop and are being regularly maintained by the Plant Maintenance Team.

**Safety Cell**

Safety Department at GOC Shop is functioning for the last 30 years for the goal of reducing accidents, injuries and hardship of the labours by improving the work methods and their knowledge in creating awareness in safe working methods. This approach was focused through systemic training, mock drills, shop floor counseling, data updating and scientific elimination of work related hazards, through display of posters, issue of safety magazines incorporating various safety procedures and catching an emotional rapport with audience through tailor made safety modules. The Safety Department has bagged three State level Awards from Government of Tamil Nadu in three different fields for the year 2005.

**Basic Training Centre**

Shop is attached with a Training Centre mainly to cater to the requirement of Act Apprentice courses under Apprenticeship act 1961. This is a statutory in nature. The duration of the training varies from one year to four years depending on the entry level qualification and trade in which the apprentice is to be trained. Apart from act apprenticeship the Training Centre
also takes care of the need based training for the Artisans, Special supervisory skill training for supervisors.

**Computer Centre**

GOC Shop is equipped with a full-fledged Information System required at Management, Operational level. It has developed the following packages.

- Workshop Information System (WISE) application software developed “in house” in 2001
- Implementation of WISE in GOC in 2002
- Assisted M/s. CRIS in WISE implementation @ other 16 Railway Workshops in 2004
- Unified Payroll developed & implemented in Oracle in 2006
- Diesel Loco Maintenance Management Information System (DLMMIS) for Loco sheds developed in Oracle
- Non Stock indent Generation and Monitoring developed & implemented in ORACLE
- Touch Screen Module developed an ORACLE/D2K to know Employee Information, PF details and Settlement information

### 3.20 WORK IN PROGRESS

- Southern railway controlled Periodic Overhaul (POH) and Diesel Locos Maintenance
- Other Zonal railway controlled Periodic Overhaul (POH) and Diesel Locos Maintenance
- Darjeeling and Ooty (Nilgris) narrow gauge line managed Periodic Overhaul (POH) and Diesel Locos Maintenance
- Rail India Technical and Economic Services (RITES) are fully managed by the Indian Railways. (The latter sells locomotives to the former. The RITES then uses the Central Workshop at Golden Rock to
service, maintain and remodel these locomotives thoroughly. RITES then sells off these newly modeled machines to countries abroad)

- Working on orders from Tanzania, Sudan, Senegal, Mozambique and Mali for converted locomotives
- Working on orders from Malaysia on five metre gauge diesel engines

### 3.21 RECENT ORDERS

- Construction of 3 second hand metre gauges for Benin
- Orders from Tanzania, Sudan, Mali, Senegal and Mozambique for converted locomotives
- Diesel engines of 5m gauge types for Malaysia
- Order from railway for 300 rust resistant and durable stainless steel wagons
- Exports of around 111 locomotives that were refurbished during December 2008, by the Central Workshop.

### 3.22 WELFARE ACTIVITIES

**Premature Death Assistance Scheme**

All the employees of GOC Shops (including Stores Department) are in the roll of PDA Scheme and a nominal amount of Rs.5/- from each employee is deducted from their salary towards this scheme. As a social security measure the family members of the deceased employee is given assistance of Rs.10, 000/- under this scheme. The employees who are in the roll of PDAS and retiring from service are presented with a Sonata Wrist Watch and an Executive Bag as a memento for safe keeping of Settlement and service related records.

**Creche**

A Creche is provided near the entrance of the Armoury Gate to take care of the infants / children of the women employees of this workshop and it is run by administration.
**Workmen’s Canteen**

A Modernized canteen with a provision of gas cooking is successfully functioning to cater to the requirements of the employees of GOC Shop. Food is cooked by steam in a very hygienic manner with good quality which has widely been appreciated by the employees. Refreshments such as Snacks / Special Tea / Coffee etc., are arranged and supplied to the employees in their work spot itself. The Canteen contains two dining halls with a capacity to accommodate 160 employees at a time for lunch. The dining halls are very neat and tidy and cleanliness is given top priority here. Around 350 meals are served daily. 9 Booths have been set up from which tea & snacks are sold.

**Homeopathy Clinic**

A homeopathy clinic in Railway Colony is functioning to cater to the requirements of the Railway employees and their family members. The clinic is looked after by a Homeopathy Doctor who is paid from Staff Benefit Fund. Entire expenditure of this clinic is met from SBF.

**Marriage Hall (Kalyana Mandapam)**

Marriage Hall in GOC colony is catering to the requirements of the shop employees adequately. Necessary modifications have been effected by providing false roofing and ceramic tiled floor for better utility and aesthetics. It is managed by a committee of representatives of the administration and recognized unions.

**Schools**

To cater the educational needs of the children of the railway employees working in and around the Golden rock, schools were established during pre-independence itself. In GOC Railway colony, once there were four railway schools and two Kindergartens were functioning. Now due to desertation of residential quarters only one school is functioning.
Quarters

GOC Workshop has 3072 quarters. The entire colony is classified as ‘A’, ‘B’, ‘C’, ‘D’, ‘F’, ‘H’, ‘J’ & ‘G’ Type and Special Bungalow. A housing committee consisting of WPO & APO and members from the recognized unions and one member from the SC/ST Association monitors housing activities. This committee does the allotment of quarters to the eligible employees. Allotment of quarters on out-of-turn basis is not encouraged by the committee. A colony committee of representatives of the administration and recognized unions is functioning. The Colony Committee meets periodically to review the requirement/improvement in the colony. On the Official side it is represented by CWM, WPO, APO and ADEN.

Place of Worship

The colony area has temples like Sri Mariyamman Kovil, Sri Kamatchiyamman Kovil and Om Sakthi Kovil. Churches include St.Joseph Church, St.Peters Church and a CSI Church. Close to the railway colony, there is also a Mosque.