'TASK FORCE' ON "RAILWAYS"

IMTMA Delegation Visits to Key Railway Production Units

Rail Coach Factory & Loco Modernisation Works : 16 & 17 November 2021 : Punjab

Key Notings

Rail Coach Factory, Kapurthala –

Officials from Rail Coach Factory Kapurthala (RCF-Kapurthala) present for the 'Interactive Meeting' :–

- Mr. B. M. Agrawal, Principal Chief Mechanical Engineer.
- Mr. Vineet Singhal, Chief Works Engineer (Shell).
- Mr. Gian Singh Negi, Chief Plant Engineer.

Presentation by RCF-Kapurthala :–

- Brief history of RCF-Kapurthala :
  - Established on 17 August 1985, with installed capacity of manufacturing 1,000 coaches.
  - First coach manufactured on 31 March 1988.
  - Transfer of technology for Linke Hofmann Busch (LHB) coaches received on 16 October 1995.
  - First powered rolling-stock manufactured in financial year 1997 - 1998.
  - Installed capacity increased to 1,500 coaches in December 2010.
  - Indigenously developed new LHB designs – LVPH and ACCNE was undertaken in January 2020.
  - 39,748 coaches have been manufactured till October 2021 comprising –
    - 28,163 of ICF design.
    - 8,905 of LHB design, share of which is over 50 per cent in Indian Railways.
    - 2,680 other coaches.
- Product portfolio of RCF-Kapurthala –
  - LHB air-conditioned and non-air-conditioned coaches.
  - LHB 'Tejas' sleeper coaches.
  - AC three-phase Mainline Electric Multiple Units (MEMUs).
  - NG Vistadome – "Vande Bharat" coaches.
- RCF-Kapurthala is spread across 838 acres, of which the Workshop comprises an area of 340 acres. Entire premises is powered with 35.9 megawatt of connected load, and features rain-water harvesting, solid & water-waste treatment and zero discharge.
- RCF-Kapurthala is certified with ISO 9001, ISO 14001 and ISO 45001 accreditations as well as 5S for workplace management. It has also received NABL certification, and is also been certified by "Greenco" for its green-initiatives.

Besides, RCF-Kapurthala has been awarded the 'IRIS' Bronze certification.

- RCF-Kapurthala's recent project has been design and development 'AC economy coaches' – an enhancement in capacity of 83 berths to a coach, against 72 berths in a conventional AC three-tier coach.

- Salient features of 'AC economy coaches' includes **:**
  - AC ducting redesigned to provide individual AC vents for each berth.
  - Improved and modular design of seats and berths, foldable snack tables and water bottle holders.
  - Individual reading lights, mobile charging points with USB port
  - Increased headroom in the middle and upper berths.
  - Public address and passenger information systems.
  - Luminescent aisle markers, illuminated berth indicators integral with night lights with luminescent berth numbers.
  - Improved fire safety furnishing compliant to EN45545-2 HL3 standard.
  - On-board high-voltage switchgear, shifted to underslung.
  - Provided with one disabled-friendly toilet.

- Machines and equipment installed at RCF-Kapurthala **:**

S. No.	*Machines / Equipment*	*Quantity*	*Target Performance*
1.	CNC critical machines.	27.	98.16 %.
2.	CNC machines.	74.	97.36 %.
3.	Conventional machines.	197.	99.78 %.
4.	Fork-lift trucks.	118.	98.99 %.
5.	EOT cranes.	54.	99.97 %.
6.	Traversors.	08.	97.44 %.
7.	Welding sets {without warranty}.	610.	99.96 %.
8.	Welding Sets (Kemppi) Finland {without warranty}.	30.	95.73 %.
9.	Welding Sets (Migatronic) Denmark {without warranty}.	170.	99.16 %

- Type of machines installed at RCF-Kapurthala **–**
  - CNC machines [imported] - 50 quantity.
  - CNC machines [indigenous] - 24 quantity.
  - Conventional machines [indigenous] - 200 quantity.

- Key requirements of RCF-Kapurthala **–**
  - Development of environment-friendly LASER / Plasma / Infrared heating process in place of existing process of heating with mixture of oxy-acetylene gases.
  - Heating with oxy-acetylene flame using four-nozzles.
  - Placing of electromagnet on the outer surface of the LHB shell.
  - Robotic shell assembly jig.
  - Automated bogie assembly line.
  - Unloading system for LCW.
  - Cold-roll-forming line.
  - After-skin tensioning of the side wall (of the coaches).
  - Skin tensioning of side wall (of the coaches).

Views shared by Mr. B. M. Agrawal, Principal Chief Mechanical Engineer :–

- We congratulate IMTMA for its endeavour for a high growth and turnover of the Indian machine tool industry by end of the current financial year.
- There is a shared vision within all constituents of Government of India on "Atmanirbhar Bharat" – this is especially so in Indian Railways.
- RCF-Kapurthala was envisaged to be the most-modernised technology production unit of Indian Railways. However, it was not able to keep pace with rapid technological strides.
- RCF-Kapurthala, therefore, needs improvement in processes as also solutions for its manufacturing requirements.
- RCF-Kapurthala seeks industry support for greater automation and flexibility of its processes.
- All production units of Indian Railways need simple solutions, as well as customised to local requirements.
- There is a desire for a sustainable-partnership between the government and private sector for productivity improvement. This is in line with efforts within Indian Railways to economise workforce and reduce costs.
- RCF-Kapurthala is keen that industry gives ideas and suggestions on improvement of processes and automation.

Views shared by Key Officials of Rail Coach Factory Kapurthala :–

- RCF-Kapurthala desires to have an in-built 'internet-of-things' in bogie automation.
- Government of India guideline on "Public Procurement (Preference to Make in India), Order 2017" is followed for procurement of machines and equipment.
- All new requirements and tenders comes through the Central Organisation for Modernisation of Workshops (COFMOW).
- Automation in bogie assembly lines will be the next key requirement in RCF-Kapurthala, for which inputs and technical solutions are invited from membership of IMTMA.
- Sheet-metal auto-loading and unloading machine is required at LASER machine-station; with sheet metal length of 24 metres.
- Tender for cold-roll-forming machine requirement, for width of 1,250 mm, has been opened for industry participation, details of which are given in COFMOW web site.
- RCF-Kapurthala is open to having one-to-one meetings with individual Members, based on requests.

Machines in RCF-Kapurthala Shop-floor :–

- CNC bogie-booster {Romania, Italy} – two numbers.
- CNC for drilling, tapping and machining [Danobat] – two numbers.
- Cold-roll-forming machine [Stam, Italy] – two numbers.
- Plasma cutting machine [Precision Automation & Robotics India Limited].
- CNC LASER-cutting and welding machine [BALLIU].

- 3-kilowatt LASER-cutting and welding machine [TTM, Italy].
- Press brake [Deratech].
- Press brake [Hudong].
- Press brake [LVD].
- CNC spot-welding machine [Bisiach & Camu, Italy].
- LHB assembly [Steel Craft Private Limited, Batala].

Coordinates of Key Officials in RCF-Kapurthala :–

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Diesel Loco Modernisation Works, Patiala –

Officials from Diesel Loco Modernisation Works, Patiala (DMW-Patiala) present for the 'Interactive Meeting' :–

- Mr. Mukesh Yadav, Principal Chief Mechanical Engineer.

- Mr. Rishi Lal, Chief Works Engineer - II.
- Mr. S. K. Babbar, Deputy Chief Mechanical Engineer (Plant).
- Mr. B. P. Singh, Deputy Chief Mechanical Engineer (PPS & BS).

Presentation by DMW-Patiala :–

- Brief about DMW-Patiala **:**
  - Established, with financial support from World Bank, to supplement Diesel Locomotive Works Chittaranjan in providing maintenance support for diesel locomotives and provide for import substitution.
  - Founded on 24 October 1981, and was initially named as Diesel Component Works.
  - Production of diesel components commenced in 1985-1986 – manufacturing around 250 + critical engine components for providing maintenance support to Indian Railways.
  - ALCo diesel locomotives introduced in 1989 as Phase - II project.
  - Major upgradation of locomotives introduced in 2001 – increasing their power from 2,600 HP to 3,100 HP.
  - Was renamed as Diesel Loco Modernisation Works (DMW) in 2003.
  - DMW-Patiala was made single-point hub for ALCo locomotives in 2010 – supporting about 2,500 ALCo locomotives for Indian Railways.
  - DMW-Patiala manufactured 227 new diesel locomotives between 2010 - 2015.
  - Production of new three-phase electric electric locomotives was introduced in 2017-2018.
  - Manufacturing of new diesel electric tower cars (DETCs) with under-slung engines was introduced in 2018-2019.
  - As per changing requirements of Indian Railways, manufacturing of new three-phase traction motors (6FRA6068) and rehabilitation of Hitachi traction motors have also been introduced from 2018-2019.

- DMW-Patiala is spread across 557 acres, including an area of 207 acres for the Workshop. Entire premises is powered with 25.5 megawatt of connected load, and features an independent oxygen generation plant, rain-water harvesting and sewage treatment plant.

- DMW-Patiala commissioned a two megawatt rooftop-solar-power-plant in its premises with grid connectivity in 2018 at a project cost of Rs. 7.17 crores. One sixth of energy demand is now being met from the plant – and led to 17 % overall reduction in power consumption.

  DMW-Patiala won the second position for 'Energy Conservation' in Punjab in the category of 'Energy Intensive Industries'.

- DMW-Patiala has a workforce of 2,979 employees, including 93 gazetted-officials.

- DMW-Patiala is certified with ISO 9001, ISO 14001, ISO 45001, ISO 50001 and ISO 3834 accreditations as well as 5S for workplace management. It has also received NABL certification for its C&M labs.

  It is in the process of obtaining IRIS certification for all business processes.

- DMW-Patiala is the first production unit of Indian Railways to be awarded a 'Gold Rating' as part of its "GreenCo" certification. Administrative building of DMW-Patiala has been declared as 'Green Building with Platinum Rating' by Confederation of Indian Industry.

- Major manufacturing shop-floors at DMW-Patiala include **:**
  - Loco Shop – manufacturing new locomotives and diesel electric tower cars.
  - Bogie Shop – manufacturing motorised bogies and wheel sets.
  - Traction Machine Shop – manufacturing and rehabilitation of traction machines.
  - Light Machine Shop – manufacturing engine spares.

- Manufacturing activities of DMW-Patiala comprise **–**
  - Manufacturing of new three-phase IGBT based 6000 HP electric locomotives.
  - Manufacturing of new tower cars with underslung engines (DETC/US).
  - Manufacturing and supply of motorised truck assemblies and motorised wheel sets of diesel and electric locomotives to zonal Railways.
  - Rehabilitation of traction machines of all types of locomotives, DEMUs, etc. for zonal Railways.

- Production plan in DMW-Patiala for financial year 2021 - 2022 involves manufacturing of **:**
  - 115 units of three-phase electric locomotives.
  - 80 units of DETCs.
  - 73 units of motorised truck assemblies.
  - 283 motorised wheel sets.
  - 1,295 traction machines.

- DMW-Patiala has a total of 1,290 machinery and logistical equipment in its shopfloors, of which 891 comprise machines. Composition of machines include **–**
  - 70 CNC machines.
  - 14 NC-cum-PLC machines.
  - 30 PLC-machines.
  - 777 conventional machines.

- In the wake of a changeover in manufacturing from diesel to electric locomotives, DMW-Patiala has 71 surplus machines, in working condition.

  DMW-Patiala has offered these surplus machines to other production units and all zonal Railways as well as to COFMOW.

- Machines planned for procurement through COFMOW include **:**
  - Indented at COFMOW – three machines.
  - COFMOW A/T received but machine not received – eight machines.
  - Machine received but not commissioned – one machine.
  - Machine commissioned but PTC not issued – one machine.
  - Machines rejected – two machines.

- Machines planned for procurement directly by DMW-Patiala, under active consideration, include **:**
  - Sanctioned in 2019 - 2020 financial year – eight machines.
  - Sanctioned in 2020 - 2021 financial year – three machines.
  - Sanctioned in 2021 - 2022 financial year – sixteen machines.

- Machines proposed for procurement by DMW-Patiala in 2022 - 2023 financial year include **:**
  - Induction brazing machine, for brazing of stator winding connection of AC motor (TMS) – Rs. 118.26 lakhs.
  - CNC vertical turret lathe of table dia 1,400 mm for wheel (BS) – Rs. 248.55 lakhs.
  - CNC precision rotary table vertical spindle bore and face grinding machine (LMS) – Rs. 1,481.43 lakhs.

- Machines which DMW-Patiala requires modification / upgradation include **:**

S. No.	*Machines / Equipment*	*Remarks*
1.	G & L horizontal boring machine.	Retro-fitment of CNC system and upgradation.
2.	Hob grinder [MW 0095].	Alternative cost effective system on grinding machine itself for gear hob re-sharpening / retro – fitment of existing machine.
3.	CNC twin spindle turn mill centre [MW 1463] {DMG}.	Sauter turret malfunctioning.
4.	CNC auto turret lathe [1109].	Retro-fitment of spindle drive (existing Indramet).
5.	CNC vertical turret lathe [MW 1266].	Retro-fitment for synchronisation of main spindle head and rotary table.
6.	CNC vertical turret lathe [MW 500].	Retro-fitment of clamping system for wheel disc holding + synchronisation of main spindle head and rotary table.
7.	Vertical machining centre [MW 1428] {Jyoti}.	Retro-fitment / modification of ATC and main spindle drive system.
8.	CNC horizontal machining centre [1425] {DMG}.	Retro-fitment of self-centering of stator (6FRA) and complete machining operations in single set-up for machining of Stator.
9.	CNC horizontal machining centre [MW 1361].	Retro-fitment of self-centering of stator (6FRA) and complete machining operations in single set-up for machining of Stator.

- Road ahead for DMW-Patiala **–**
  - Manufacture more variants of new three-phase electric locomotives.
  - Manufacture of new tower cars (DETCs).
  - Support electric locomotive sheds along with diesel locomotive sheds by supplying maintenance spares and assemblies.
  - Take up manufacturing of other variants of rolling stock.
  - Become an active partner in Government of India's initiatives for transformation and sustainable growth.

Views shared by Key Officials of Diesel Loco Modernisation Works, Patiala **:–**

- There is a need to make information about IMTMA Members available in IMTMA web site – coordinates along with their products manufactured, as also classification of products Member-wise.

  This helps in ascertaining IMTMA Member-manufacturers of key machines / equipment.

- Annual target is to manufacture 110 locomotives.

Machines in DMW-Patiala Shop-floor :–

Light Machine Shop [Motor Section] ::

- ➔ Benching area – activity involves grinding a metal block.
- ➔ Drilling and tapping areas – activity involves drilling and sawing.
- ➔ Slotting area.
- ➔ Mig-welding area.

- ➲ NC turning centre {Geminis}.
- ➲ CNC turning centre {'Suraj' – Sahil Alloy & Machine Tools (Private) Limited}.
- ➲ Vertical turning lathe {Premier}.
- ➲ Vertical turning centre {HMT}.
- ➲ Vertical turning lathe {O-M Limited} – idle.
- ➲ Vertical turning lathe {Premier}.
- ➲ Horizontal turning centre {HMT}.
- ➲ CNC lathe machine [Danobat] – idle.
- ➲ CNC vertical machining centre {BFW 'Unicorn'}.
- ➲ Vertical machining centre {Jyoti CNC}.
- ➲ Universal machining centre {DMG}.
- ➲ Gear cutting machine {FFG SFS}.
- ➲ CNC gear grinder {KAPP NILES}.
- ➲ Gear grinding machine {NILES}.
- ➲ CNC internal grinder {Morara} – idle.
- ➲ Universal vertical grinder {ELB Schliff}.
- ➲ Gear hobbing machine {Samputensili}.
- ➲ Hobbing centre {Höfler}.
- ➲ Radial drill machine {HMT}.
- ➲ Fully-automatic under-cutting and deburring NC machine {HYT Engineering}.
- ➲ Electrical system {Werner Kinley}.

Bogie Shop ::

- ➲ Vertical turning centre NC {HYT Engineering}.
- ➲ Wheel lathe {HYT Engineering}.

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