

BLOCK DIVISION

INTRODUCTION:

Block Division is one of the most sophisticated and technically advanced divisions of BLW which is engaged in production of HHP Crankcase, Broad Gauge and Meter Gauge Alco Blocks. Advanced welding & machining techniques are being used in manufacturing of HHP crankcase. It is mainly equipped with CNC Flame Cutting Machines, Sub-merged Arc Autowelders, Welding Machines, several CNC Machining Centres and Coordinate Measuring Machine. Block division also started manufacturing of Cow catcher assembly & Cable harness of Electric Locomotive in FY 2018-19.

Flame Cutting of Components:

Steel plates of sizes up to 80 mm thickness are ultrasonically tested before being precision cut by numerically controlled flame cutting machines, Plasma Cutting Machine.



Components are straightened and machined prior to fitting & tacking on fixture designed especially for engine block fabrication to ensure close tolerance on engine block.

Fabrication of Engine Block/ Crankcase:

Components after flame cutting and various machining operations are fit and tack welded before taking on rollovers. Heavy Argon-CO₂ welding is done on these rollovers. High quality of welding is done by qualified welders. Weld joints are subjected to various tests like ultrasonic, X-rays, Visual etc. Down-hand welding is ensured using specially designed positioners.





Fabrication of Engine block/HHP Crankcase is completed by submerged arc welding using semi-automatic welding machines. Special fixtures are used for making downhand welding possible in inaccessible areas. Critical welds are subjected to radiographic examination. All welders are periodically tested and re-qualified for the assigned period.

After complete welding, marking is done on the weldment for subsequent machining & desired build-up. Weldment is stress relieve, shot blasted and sent to Heavy machine shop for final machining.



Portal

Milling Machine:

HHP Crankcase machining is done on Portal milling machine which is 19 axis CNC machine having SIMENS 840 Dsl control system. This machine is equipped with 05 attachments (head) that are vertical head, horizontal head, universal head, serration head and boring head along with automatic tool changer with 100 pocket tool magazine which make this machine to do any type of machining work in auto mode with very high accuracy. This machine is also supported by 40 minutes battery backup to protect machine and work piece in case of sudden power failure.



Angular Boring Machine:



Angular boring or Liner boring of Crank case is done on this special purpose machine, which has two high precision angular boring bars at 45 degree on which different boring cartridge inserts are mounted. The machine is capable of boring and drilling to different sizes. The cartridge with inserts is mounted on boring bars to achieve evenly distributed cutting load during boring operation. This contributes to accuracy while machining.

Quality Control:

In process inspection is being conducted after every stage of fabrication/machining. Crankcase is sent to next stage only after successful inspection of previous stage. Machined Crankcase is finally inspected at Computer Controlled Coordinate Measuring Machine prior to dispatch for Engine Assembly.



New developments in the Division

Cow catcher assembly and Cable harnessing:

In the dynamic manufacturing requirements of BLW, Block Division has taken initiative to contribute in WAP-7 Locomotive manufacturing and successfully adopted & developed the new manufacturing facility for Cable harness and Cow catcher assembly in FY 2018-19.



Cow catcher assembly



Cable harness work station

Manufacturing of Bogie Frame Assembly of Electric Locomotive (WAP-7 & WAG-9):

Bogie Frame Assembly is an important item of electric locomotive (WAP-7 & WAG-9). Block Division has developed the manufacturing process of Bogie Frame Assembly with utmost quality by using its highly sophisticated and technically advanced existing facilities in financial year 2019-20.



Manufacturing process of Bogie Frame is being carried out in different stages. Cutting of different size of steel plates are being done by 10 torch CNC Oxy acetylene flame cutting machine. These components are then machined on various machines in Heavy machine shop by using different type of fixtures. Sub-assemblies of bogie frame are being setup & tack welded and then welded by using advanced SAW (submerged arc welding) welding process with the aid of various fixtures. These Sub-assemblies are also being machined in Heavy machine shop. Now machined sub-assemblies are used for final set up of Bogie Frame Assembly on main set up fixture. GMAW (Gas Metal Arc welding) is being done on Butt joints and being inspected by ultrasonic testing.



After complete fabrication stress relieving and shot blasting is being done for complete Bogie Frame. Final Bogie Frame is being machined in Heavy machine shop on CNC Horizontal Boring & Milling machine. After machining of Bogie frame assembly, set up and welding of small components is being done. After final inspection by Quality assurance department, bogie frame assembly is being undertaken for painting in Paint shop.

Development of Proto type 12 Cylinder HHP Crankcase for Mozambique Railways:

To optimise the cost of locomotive manufactured for Mozambique Railway, it has been decided that 12 Cylinder Crankcase used for this locomotive will be manufactured in-house in Block Division. 12 Cylinder HHP Crankcases for Mozambique Railways are being manufactured successfully without any extra investment on Jigs/fixtures, templates and raw material. In our existing Jigs/ fixtures, templates used for manufacturing of 16 Cylinder HHP crank case, 15 nos. have been modified in-house and validated by shop for manufacturing 12-Cylinder HHP crankcase. In addition to this, 08 components of 16 Cylinder HHP crank case have been also modified and validated to meet the requirements of manufacturing of 12-Cylinder HHP crankcase. Welding process specifications have also validated by shop. CNC programs for machining of child components and complete 12 Cylinder HHP Crankcase has been developed and validated through Co-ordinate measuring machine (CMM).



Prototype 12-Cylinder HHP Crankcase for Mozambique Railway