

Improving Quality of Mobile Flash Butt welding – An Overview

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Synopsis

Mobile Flash Butt Welding is the advent of technology in welding. Flash butt welding is partially superior over the conventional Thermit welding. An attempt is made in this paper with the details of mobile flash butt welding, methods, preventive methods and action for improving the quality .

1.0. Introduction

- 1.1. Only very limited firms own Mobile flash butt welding plants to do the welding of rail joints In the Indian Railways. IRCON also owns MFBW plants. But they insist for welding huge quantity at a particular location in any Railway and not willing to shift from place to place.
- 1.2. As the technology is new for the Railway personnel, the welding agencies monopolies and do the welders are mainly interested to give a good progress rather than concentrating in quality of welding the track . This results in the finished joints are not according to the standard, either as high joints or low joints or different horizontal alignments.
- 1.3. In the quality of the work done by the machines, strict vigil and quality assurance shall be monitored.

2.0. SKV welds - limitations

- Fatigue life only 50 % of Rail
- Skill of welder very important
- Quality control difficult
 - Heating
 - Tapping
 - fusion
- The Age of weld also becomes a factor
- Requires very close in service monitoring
- USFD
- Joggle fish plating
- Hindrance in track maintenance
- Its Failure causes biggest concern for P way Engineers

3.0. The Mobile Flash butt Plant

- Plant mounted on a Road Truck modified to run on track also
- Speed on track 5 kmph
- Unlike Rail cum Road vehicle Turn table not provided
- Earthwork to be done in continuity of LC road to align the vehicle along the track
- Fencing to be removed to facilitate turning of vehicle

3.1. Working- On track

- ◆ Welding of running rail on which plant is standing is possible
- ◆ Being done in construction projects, however Problem of high joint/ mismatching of rail head has been reported

- ◆ Progress in open line will be limited because of limitation of traffic blocks

3.2. Depot Welding by MFBW plant

- ◆ Each depot requires a level ground of about 80-100 x 10 mts.
- ◆ The top surface preferably should be at sleeper top level.
- ◆ Length of depot = length of welded panel +length of feed rail + working space.
- ◆ Length of panel - decided by the handling and trucking effort required to take the panel and put it along the track for TRR.
- ◆ Presently 3 rail panel is being made in depot

3.3. Welding- From 3RP to LWR

- 3 rail SW Panels welded in depot are kept in between the rails on the track for further in situ welding
- Short Panels are not inserted in track and welded to avoid getting high joints
- In between the rails sufficient level working space is available
- Running rail will infringe the working of plant if rails are kept outside the track.
- By keeping 3 RP on the roller in between the rails as is done in depot Proper head matching and proper butting force for welding to be ensured.

3.4. Maximum Length?

Welded panel of any length as required can be made subject to track features like LC gate, bridge, points and Xing, SEJ etc.

4.0. Steps involved in Mobile Flash Butt Welding

4.1. The welding sequences

- 4.1.1. Aligning pre straightening of rails
- 4.1.2. Preparation of grinding the ends of rails.
- 4.1.3. Initial burn off
- 4.1.4. Preheating
- 4.1.5. Flashing
- 4.1.6. Forging
- 4.1.7. Striping
- 4.1.8. USFD testing of welds by the agency
- 4.1.9. 10% test check by the end user.
- 4.1.10. A record shall be kept in accordance with correction slip no 7 to flash butt welding manual, Annexure III

4.2. Precautions

- 4.2.1. The machine may form the vertical bend on the rail causing high joints at the end of the welding.
- 4.2.2. Calibration and certification by RDSO for the machines.
- 4.2.3. Ensure forging, butting pressure, Voltage in accordance with the calibration.
- 4.2.4. The rails used are NEW and if old same type and equal amount of wear.
- 4.2.5. The stripping plates (profiling) are to be used for, not more than 1000 stripping.
- 4.2.6. Not more than 50 welds are permitted per shift.

4.3. After the welding....

4.3.1. A printed out put to be collected and recorded.

4.3.2. Immediately after the welding is completed, the finishing is done with grinding wheels.

4.3.3. It shall be ensured that no low joints is created because of the grinding of the welds.

4.3.4. No defective rails which are bent during transportation and unloading shall be used in the welding process.

4.3.5. At every 500m, a gap is left out for future destressing and welding.

5.0. Tests

5.1. Parameter validation of plant by RDSO

5.2. Squareness of rail cut to check the fitness of rails.

5.3. Geometric tolerance of weld after grinding.

5.4. USFD testing.

5.5. Load test.

6.0. Testing of FBW joints

6.1. Sampling size.

6.1.1. One in 100 for and up to 1000 joints

6.1.2. After that 1 joint for every 500 joints

6.1.3. For breaking loads

6.1.4. Deflection

6.1.5. Transverse

6.1.6. Vertical

6.2. Macro examination of 1 joint for every 1000 joints

7.0. Other precautions/activities

- 7.1. Measuring the corrosion pit
- 7.2. Match marking of rail ends to ensure head matching
- 7.3. Painting of old corrosion pit of liner contact
- 7.4. Sealing of liner contact area

8.0. Case study

Works between KQN-MDU Doubling section

Date of checking /KM	Total welds /welds beyond tolerance	0-1mm	1-2mm	2-3mm	3-4mm	Above 4.0mm
09.01.10 455/0 – 463/800	1440/87	24	18	17	14	14
11.01.10 Km.463/800- 470/0	992/23	22	20	10	9	1
12.01.10 km.470/0 – 476/500	1040/66	33	24	4	4	1
13.01.10 km.476/500 – 483/100	1056/23	7	4	7	4	1
16.01.10 Km.486/700- 494/000	1168/10	0	2	2	2	4

9.0. Problems faced

- 9.1. Synchronizing the work
- 9.2. Feeding the rail
- 9.3. Observed high peaks in OMS and TRC runs due to defective high/low joint welding
- 9.4. Locations without manned LC gate.

10.0. Training

Two days course for supervisors in flash butt welding can be planned at SRCETC/TBM.

11.0. Conclusion

Mobile flash butt welding is a new concept for the field Engineers. Adopting the correct procedures as listed above can ensure the quality of the welding. Further proper training is also a must to the field Engineers for the correct procedure of mobile flash butt-welding.