

CASE STUDY OF RALTAM BRIDGE

OVERVIEW

R & M international was awarded the contract to carry out instrumentation of Bridge No.132 and Bridge No. 114 of Godhara-Ratlam section of Ratlam Division of Western Railway.

Bridge no. 114UP of Godhara-Ratlam section of Ratlam Division Of Western Railway located near Dahod have Four spans of 18.3m PSC I Girders.



Bridge no. 132UP of Godhara-Ratlam section of Ratlam Division Of Western Railway located near Dahod having Two spans.

Deflection, Strain and Natural Frequency tests were performed pre strengthening and post strengthening to find the difference with the application of laminates and without it.

TESTS PERFORMED

To find the Deflection and Natural Frequency of the bridge following tests were performed :-

1) **Deflection Test-** To assess the deflection on the girder before and after strengthening the test was carried out using Linear Potentiometer .The deflection was measured at the mid span of the girder. An independent support system using steel cribs was erected to enable recording of the deflection data for the girder with precision.

2) **Vibration /Natural Frequency Test-** To assess the Natural frequency of the girder before and after strengthening accelerometer were used. The accelerometer was placed at the mid span of the girder. The accelerometer was fixed to the bottom chord of the girder.

SOLUTION

- On Bridge No.114 & Bridge no.132 Deflection & Natural Frequency tests were performed before strengthening and after strengthening by placing linear potentiometer & accelerometer under the girders which was connected to National instrument DAQ which was connected to Laptop to obtain the Graph at static load and at dynamic loads. WAG – 7 Engine was used as the load to calculate the deflection and natural Frequencies.
- The data collection and analysis is done with the help of DGC cDAQ 9178 software for deflection. The electric signals through the cable goes to the NI 9205 module which is attached to NI compact DAQ 9178 chassis & this hardware is integrated to the cDAQ 9178 software.

1)



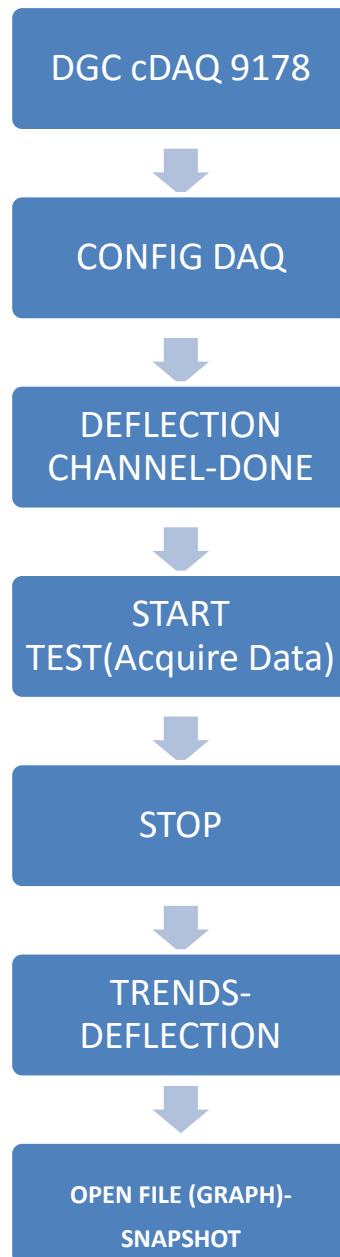
Fig. Linear Potentiometer

2)



Fig – Accelerometer

The flow chart showing measurement of deflection is as given below:-



RESULTS

- Initially when deflection and natural frequency readings were recorded the deflection was quite high as compared to the readings after strengthening.
- Natural Frequency of strengthened girder is more than the cracked girder indicating the enhanced stiffness.
- There was massive change in the Graphs of static and dynamic load deflections pre and post strengthening of the girder.
- The natural frequency of the cracked girder is within 25% of the natural frequency of un-cracked girder.

CONCLUSION

Tests were successfully performed under the supervision of Western Railway officials and the result which was derived for both the bridges was approved.

With the strengthening measures the stiffness of the cracked girder has been improved as indicated by the reduction in deflection and improvement in the natural frequency.