Industrial Case Study on Door Lock and Door Interlock of Plug-in-Box in BBT

Yash Dhenge[1]
[1] UG Student, Department of Mech, G.H Raisoni College of Engineering, Nagpur, RTMN University

ABSTRACT

This paper is about the industrial case study on the Door lock and Door interlock in the Plug-in-box (PIB). Plug-in-box is one of the component present in Busbar Trunking System (BBT). In BBT, PIB boxes are required to tap power from the straight bus-ducts. PIB are installed at a specific interval for tapping power from busbar trunking system. PIB is provided with non-fused circuit breakers (MCCB) of various current ratings. Door lock is used to close the PIB door and Door interlock is used to fix the PIB to the busduct. After testing this PIB, many errors were generated and to overcome this problems it was necessary to come with the solutions and this solutions will result in the launching and installing of this product.

Keyword: - *PIB , BBT, Door Lock, Door Interlock, Busbar*

1. INTRODUCTION OF BBT

Busbar trunking system involves distribution of electric power using set of Cu/Al busbars enclosed with high degree of protection against any ingress of foreign bodies. Busbar trunking system in compact design is the most efficient, safe and ideal system for electricity supply to industrial installations and high rise structures, offering a wide current range from 125A to 2000A in type CBC (Copper conductor) and 160A to 1250A in type CBA (Aluminium conductor) with possibility of feeding loads upto 400A with standard plug-in boxes.

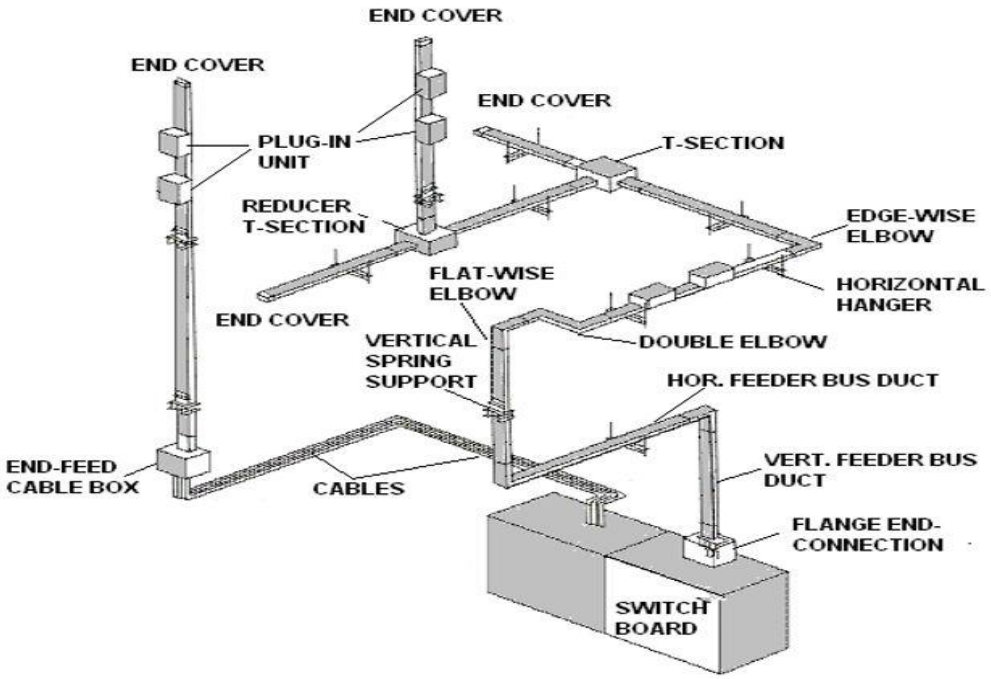

Fig. 1: Diagrammatic view of various busduct

1.1 Plug-In-Box (PIB)

Plug-In-Box are required to tap power from the straight bus ducts. Typically, PIB are used in plug in type busbar trunking systems (vertical risers). PIB are installed at specified intervals for tapping power from a bus trunking system. PIB is provided with non-fused circuit breakers (MCCB) or SDFs of various current ratings.

Fig 2 : Plug-In-Box

2. Case Study 1:- Door Lock

The door lock is used to close the door in PIB. This Door lock plays the major role in supplying the current to the busbars. Objective of the door is to remain closed when the PIB is in ON condition. To fulfil this many such components are designed in PIB. PIB includes flexible arm, door defeator, Driving arm. This all components together involves the locking of the door using the door lock.

2.1 Problem

Initially door lock was used to act as a barrier that not to open in ON condition,but during testing MCCB was short, but as it was in ON condition it was unable for us to open it,so we break out the door and switched off the door. To avoid this , we implemented the solution for avoiding the breaking out of the door in such condition.

Fig 3 : Door Lock (Before)

2.2 Solution

For the solution we decided to crete such a design which will remained closed in ON condition as well as can be open in ON condition only by manually that too from outside. This design gave us the best result and can be control even if there is short circuit in MCCB or even if MCCB burned.

Fig 4 : Door Lock (After)

3. Case Study 2:- Door Interlock

Door Interlock is the new design I have implemented for fixing the PIB with Busduct. Door lock with the new clamps will help the PIB to be placed on BBT without any help. The shear force and Bending moment will also act less on the BBT frame. After Stress analysis we also concluded that PIB will put less stress on Busduct.

3.1 Problem

Initially the PIB was just placed by using the clamps,but the force acting on the clamp was too much that it result into the sagging of the busduct as the busduct acts as a simply supported beam. The force acting on the clamp was also too much that sometimes it caused the clamp to fail. And when we installed the PIB against the gravity,the complete shear force was acted on the centre of the busduct. This installation was not the lifelong solution.

Fig 5 : Back Side of PIB box with simple clamps

3.2 Solution

After braking of the stress caused on the busduct we decided to create the perfect solution for this PIB assembly. I designed the Door interlock component. It is the component which is placed on the top of the PIB box. This component is used to stay on the BBT in the ON condition of the BBT. To remain it permanently on the Busduct 4 clamps were used in proper position to avoid the shear force acting only on the one position. The complete stress acting on the busduct was divided and the deign was safe.

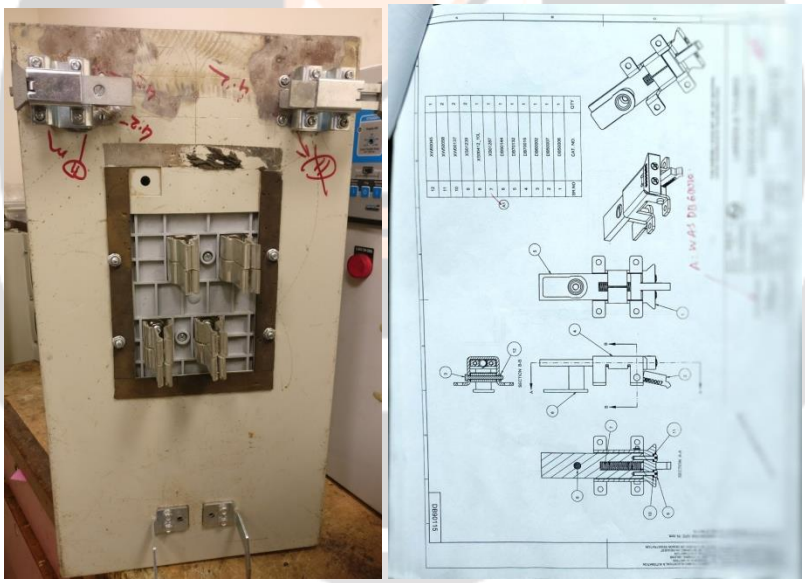

Fig 6 : Back Side of the PIB box after installing Door Interlock and Creo Design of Door Interlock

4. CONCLUSIONS

The implementation of this Designs was successful. This design acted as a perfect solution for the PIB. After applying this designs the total errors produced in the PIB installing were reduced successfully and supply to current to the busduct was also improved. This design reduced the stress acting on the busduct. The material used in the busduct also produced less shear stress in the busduct frame. This modification increased the life of the busduct and the PIB frame.

5. REFERENCES

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