The Advantages of Aluminum in Isolated Phase Bus

Specific to Isolated Phase Bus Duct (IPBD), aluminum is far superior than copper as the center conducting material. First, the center conductor, if copper, requires four to five times the amount of hardware than an aluminum extruded conductor. Second, the cancelation properties of an aluminum cylindrical conductor placed inside a cylindrical enclosure provides better cancelation of transient current. With regard to copper, cylindrical extrusions are not possible. Coppers’ tensile strength is a fraction of aluminums, and copper cannot be extruded as can aluminum. Therefore, copper channels must be used instead of aluminum in the form of two-halves equaling a square. These two pieces are “shelled” together (U-shaped) with enormous amount of supporting hardware. Bolts, nuts, fasteners and support blocks must be utilized and through-holes must be placed in the copper bars throughout the bus duct to support the excessive weight of copper. As a result, potential short-circuit locations are made unnecessarily; and, dissimilar hardware (such as copper and stainless steel) causes corrosion on the copper as the stainless steel acts like a Catha and the copper as an Anode causing premature wear on both metals in the form of corrosion resulting from transient currents. On the other hand, the aluminum conductor requires no through-holes but instead is supported by an aluminum block and porcelain or epoxy insulator. The aluminum block wedges the extruded conductor holding it in place. Additionally, the cylindrical design of the aluminum helps eliminate skin effects and passes higher current with less electromagnetic forces which results in reduced heat.

When the inventors of Isolated Phase Bus designed the product in the 1950’s, they were limited by the lack of industrial production of extruded aluminum. As a result, they were limited to using copper which was readily available to build the early designs. Very few of the original copper designs are still in service today. Constant maintenance is required to assure supporting hardware, corrosion, clean and dry conditions exist within the older copper conductive units. On the other hand, early units utilizing aluminum design can be found globally still in service. The availability of extruded aluminum and higher-electrical grade aluminum has created a more efficient, lighter (which reduces support steel by a one-third), lower maintenance and replacement costs, and an overall reliable product.

It is important that our phase bus can withstand the heat as well as the cold. Aluminum will provide that, in which copper may fail. In colder temperatures, the aluminum actually becomes stronger. In such weather conditions, moisture would usually seep through other materials and the structure becomes corrosive. However since aluminum does not rust due to its oxide film covering (which can be strengthened through anodizing techniques), the material is an excellent corrosion resistance, allowing for it to be durable. The complete IPBD structure requires strength, resilience reflectiveness and aluminum has been proven to be a better choice than the use of copper. Why? In the long-run, aluminum surpasses copper. Because copper conducts more heat and weighs more, it does not last longer and requires replacement. The expense of copper alone along with the replacement cost Aluminum handles heat more efficiently than copper too. Efficiency and Durability are a must in constructing the IPB.