Multilayer Laminated Busbar Applications

Insulated-Gate Bipolar Transistor (IGBT) - Capicitor Banks
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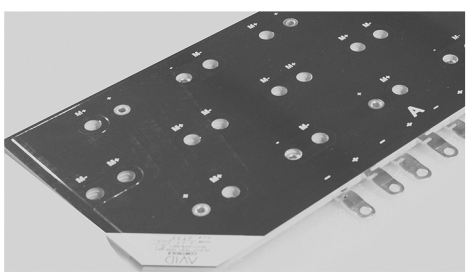
Laminated Busbar differs from traditional single-layer busbar in its ability to deliver low inductance power with minimal "noise" and its compact size Advantages of Laminated Busbar. Therefore, laminated busbar is often paired with sensitive power electronics and utilized in high-efficiency power distribution applications. There are many specific components that partner well with laminated busbar, either directly connected to the busbar or laminated into the structure itself. The list below gives an overview of some common components that are used in conjunction with laminated busbar.

Insulated-Gate Bipolar Transistor (IGBT)
Raw power e.g. that from a wind farm or hydroelectric power plant, usually comes in DC (direct current). However, most modern electronics and machines require variable AC (alternating current) power (aka "Smart Power"). I n order to change raw DC power to smart AC, IGBTs are used as an inverter. The IGBT works by "switching" the power. In other words, by rapidly turning multiple phases of the power on and off. The result is a computer variable AC power supply.

Capacitor Banks / The DC Power Link
Capacitors are essentially a type of battery that can store or absorb excess energy. Capacitors are commonly used in conjunction with IGBTs. The rapid switching creates offshoots of voltage as the sine wave of current is forcibly and rapidly halted by the IGBT. A good analogy is turning the faucet of a sink on and off very quickly. This causes stress in the pipes as the water pressure slams against the faucet. A conceptually similar consequence occurs electrically. Capacitors serve to absorb that excess energy and reduces the stress on the entire system. The naturally low inductance of laminated busbar contributes greatly to the power system efficiency.

Snubber Capacitors
A snubber capacitor is a specific type of capacitor. While a standard capacitor absorbs the full spectrum of excess energy, a snubber capacitor only absorbs, or "snubs," specific frequencies at the point of the IGBT connection. This function serves to reduce "electrical ringing" in radar, radio transmission equipment, etc. and further purify power for sensitive electronics.



LINK TO BUSBAR AMPACITY TABLES >

A Storm Power Whitepaper
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STORM POWER COMPONENTS

Multilayer Laminated Busbar Applications

Balancing Resistors
Resistor networks are used at the connection points of the capacitor bank; whether in a series, or a series-parallel configuration. The purpose of balancing resistors is to keep the voltage distribution even. Whenever the charge of energy in a system tips too far to either the positive or negative, heat is created as a byproduct and could cascade into critical system failure.

Diodes
A diode is essentially the opposite of an inverter. While an inverter changes DC to AC, a diode takes AC power from an outside source and rectifies it into pure DC power. A diode does not benefit from a partnership with laminated busbar in the same way as the previously mentioned components. Laminated busbar shines in its ability to provide "clean", low inductance power, but the diode does not need especially clean energy in order to do its job. However, a laminated busbar could still include a diode component and the system overall would benefit from the compact, cohesive packaging of laminated busbar construction.

Circuit Breakers
Most of us are familiar with circuit breakers, such as the breakers in our homes which protect household electronics from energy surge. The type of circuit breakers installed within laminated busbar serve pretty much the same purpose. For example, laminated busbar can be found at the input section of cellular base stations, powering amplifiers for the telecommunications industry. These base stations are equipped with huge signal towers, which are basically huge lightning rods. In the case of a major power surge (lightning strike), the circuit breakers installed in the laminated busbar serve to protect these sensitive electronics from damage.

Fuses
Much like circuit breakers, fuses protect sensitive electronics from energy surge. However, fuses engage significantly faster than circuit breakers, so fuses are found paired with the most sensitive of electronics where a sense of urgency is paramount. Furthermore, fuses can be designed to shut off spikes in voltage specifically (magnitude of charge), where circuit breakers are usually only paying attention to the current (the rate at which the charge is flowing). When considered at the beginning of the design phase, fuses and circuit breakers can easily be designed into the laminated busbar and provide greater packaging efficiency.

Inductors
While the laminated busbar is known and used for its extremely low inductance, which results in low "noise" in the power system, inductance may be a positive quality later downstream in the system. Inductors, also called "chokes," are components that can increase the inductance (the magnetic field of the system). Increased inductance can filter out unwanted frequencies and prevent interference or static in radio systems, for example. Ever been listening to music on your phone, plugged it into a cheap, third party charger from the local gas station, and suddenly you hear static in your headphones? If that charger had been designed with the usual ferrite core inductor to filter out certain frequencies, the static could have been filtered out.

This list is not exhaustive by any means, but it goes to show the variety of components that can be paired with and designed directly into a laminated busbar assembly. These components are always evolving and changing as demands of modern electronics shift. Laminated busbar continues to be one of the best solutions for incorporating advanced components into a compact and cohesive critical system.

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