HOFSTRAgroup

PECOS
BUSBAR CONNECTORS

PECOS is a flexible means for connecting circuits. Performance of pulsed power circuits is often limited by the inductance of the interconnects between components because interconnect inductance exceeds component inductance. Low impedance transmission lines minimize total system inductance but limit system flexibility when constructed from custom components. Hypotheses may be tested more quickly with flexible experimental setups constructed from interchangeable components that afford modifying circuits to achieve the scientific objective. When a specific waveform is needed, the ability to readily change circuit parameters allows wave shape to be tuned.

COMPATIBILE BUSBAR

Width	3 inches with fully radiused edges
Thickness	¼ inch
Standards	ASTM B187 ASTM B317
Vendors	McMaster-Carr 9397T17 OnlineMetals 18146

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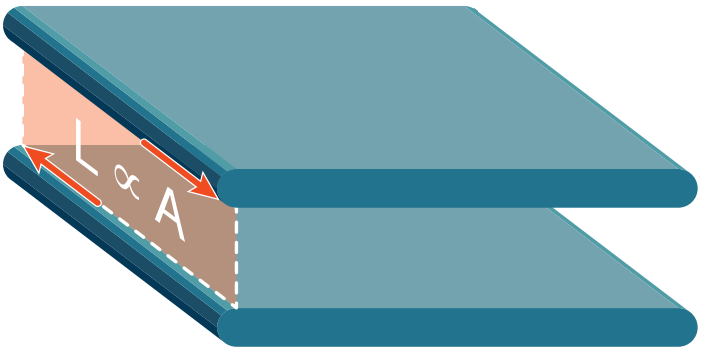
WHAT PECOS WILL DO FOR YOU

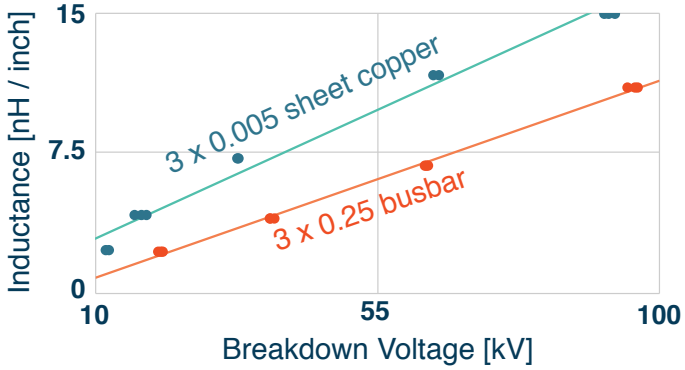
Maximize Peak Power

Delivering high peak power to a load is only possible when high voltage capability and low impedance are achieved simultaneously. Transmission line conductors must be spaced far apart to keep the electric field around them below the magnitude that causes dielectric breakdown. But, since the inductance of a current loop increases with the enclosed area, conductors must be spaced as close as possible to keep inductance low. This is because inductance is the primary contribution to the impedance of interconnects between pulsed power components.



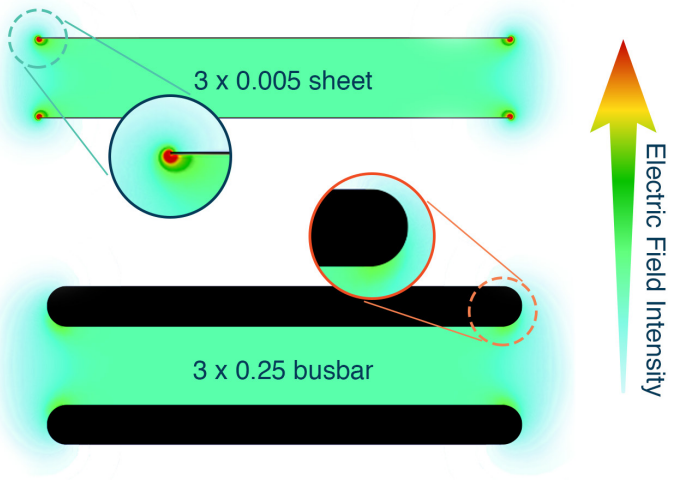
Inductance L is proportional to the loop area A

Triggered spark gaps and pulse capacitors typically exhibit inductance on the order of tens of nanohenries while just a few inches of wire adds hundreds of nanohenries. Therefore, achieving high performance at the system level demands the use of low inductance transmission lines in place of wire.



Minimize Inductance

Coaxial transmission line is theoretically ideal for achieving low inductance at high voltage because the electric field between the conductors is uniform with no edges to cause field enhancement. A uniform electric field means that the conductors can be separated by minimum distance which in turn minimizes inductance. In practice, mounting components inside coax is difficult due to the closed geometry. Stripline, parallel plate, and even tri-plate transmission lines provide space for components while minimizing inductance so long as the conductors are wide and closely spaced.



Cutting conductors from sheet metal is a common expedient for making wide planar transmission line conductors, but sheet metal has inherently sharp edges that lead to electric field enhancement and breakdown unless the conductors are widely spaced. Spacing the conductors of a transmission line far apart to prevent dielectric breakdown is at odds with achieving fast rise time for a low impedance load because distance between conductors increases inductance.

Wide, planar conductors with fully radiused edges balance the competing objectives of low inductance, high voltage capability, and ease of component mounting. Fully radiused edges minimize field enhancement so that conductors may be spaced closely for low inductance. Width also serves to minimize inductance. Planar geometry is suitable for constructing stripline, parallel plate, or tri-plate interconnects which all provide the space and flexibility needed to mount components.

Test Hypotheses

Achieving scientific objectives is made possible by flexible experimental setups that support hypothesis testing. Custom designed and machined interconnects are ideal for systems that have been thoroughly tested and optimized because custom interconnects can be made to the exact geometry demanded by a particular situation. Experimental setups, on the other hand, must constantly evolve as knowledge is gained about the underlying physical mechanisms being studied. When an experimental setup involving custom interconnects needs to be tweaked to meet scientific objectives, mechanical engineers and machinists must once again become involved in the project. This engineering effort delays collection of data.

Tune Waveforms

Testing systems by applying a specified waveform requires a pulse generation circuit that can be easily tuned to generate the specified waveform within tolerance. Tuning is difficult in pulsed power circuits given the lack of variable components. Instead, fixed value components must exchanged or the connections between components modified. If the interconnects are fabricated to make a low-inductance connection between particular components in a particular geometry, then changing components or the way in which they are arranged involves also fabricating new interconnects. Fabricating specialized interconnects hinders the rapid modifications that are the basis of tuning.