

Busbars: The Unsung Backbone of AI Data Centers and Associated Power Grids

As artificial intelligence (AI) workloads continue to expand, the infrastructure that powers them is evolving rapidly. While servers, GPUs, and AI chips often grab the spotlight, one critical component quietly supports the entire system: the busbar.

Busbars, typically made of copper or aluminum sheets or bars, are central to efficiently distributing electricity, both within AI data centers and throughout the power grids that feed them.

Busbars in AI Data Centers

AI workloads demand enormous amounts of power. Training large language models or running generative AI applications can push racks to draw hundreds of amps continuously. Traditional cabling struggles with both the current density and thermal challenges posed by these high-performance systems.

Busbars provide a solutions for:

- **High Current Capacity:** Busbars carry substantial currents with minimal voltage drop, enabling reliable power delivery to dense GPU or TPU racks.
- **Thermal Management:** Busbars dissipate heat more effectively than cables, reducing the risk of hotspots and component failure.
- **Space Efficiency:** Compact busbars fit within server racks and PDUs, avoiding the clutter and limitations of conventional cabling.
- **Monitoring Integration:** Sensors can be integrated with busbars to allow real-time tracking of energy usage, which is essential for AI clusters where efficiency is critical.

These features make busbars a cornerstone of modern AI data centers, supporting both high-density compute and energy efficiency initiatives.



Busbars in the Power Grid

Beyond the data center, busbars are crucial in substations and switchgear that supply power to AI facilities.

High-voltage busbars ensure:

- **Efficient Energy Delivery:** They minimize resistive losses from the grid to the data center.
- **Load Flexibility:** Busbars allow rapid adjustment to fluctuating AI workloads, protecting both the facility and the broader grid.
- **Grid Resilience:** Busbars can handle short-circuit currents more effectively than conventional cabling, ensuring safety and reliability.

As AI data centers increasingly pair with renewable energy sources, busbars also facilitate the integration of solar arrays, energy storage, and high-voltage DC lines, streamlining the flow of electricity and reducing conversion losses.

Why Busbars Are Critical in the AI Era

- **High current loads:** Carry hundreds of amps with minimal voltage drop
- **Heat buildup:** Custom busbar designs improve thermal management
- **Space constraints:** Busbars can be designed to fit tight spaces
- **Energy efficiency:** Low resistive losses helps PUE (Power Usage Effectiveness)
- **Safety:** Handles short-circuit currents better than cabling
- **Monitoring:** Sensors can be integrated with busbars

Storm Power Components:

Addressing the Next Generation of AI Datacenter and Power Needs

Recognizing the critical role of busbars in high-demand AI data centers, Storm Power Components offers a full range of busbar design and manufacturing capabilities, including:

- **Custom Laminated Busbars**
- **Sensor Integration**
- **High-Voltage and High-Current Designs**
- **Comprehensive Prototyping and Production**

By addressing both internal datacenter needs and grid-level power delivery challenges, Storm Power Components helps datacenter operators meet the evolving demands of AI workloads with reliability, efficiency, and scalability.

