

Aluminum is increasingly replacing copper in wiring, automotive, and electronics applications due to cost, weight, and supply considerations.

Market Drivers

Rising copper prices, which reached nearly \$15,000 per metric ton earlier this year, have accelerated the shift toward aluminum, which trades at roughly \$3,100 per metric ton, making it nearly four times cheaper and about 3.3 times lighter than copper. Automakers like Ferrari, BMW, Tesla, and Chinese EV manufacturers are adopting aluminum wiring to reduce vehicle weight, improve efficiency, and cut costs, with reported wiring weight reductions of 15–20%. In power distribution, utilities are gradually replacing copper with aluminum for cost-effective, durable, and lighter conductors that can span longer distances between poles.

Technical Feasibility

In electronics and aerospace, aluminum can replace copper when plated with a thin, adherent copper layer. Recent advances in **direct copper metallization** eliminate the need for costly zincate pretreatment steps, simplifying the plating process and improving adhesion on aluminum substrates.

This allows aluminum to retain its lightweight and strength advantages while maintaining electrical performance comparable to copper in many applications.

Applications

- **Automotive and EVs:** Aluminum wiring reduces vehicle weight, extending driving range and lowering production costs. Luxury and electric vehicle manufacturers are increasingly standardizing aluminum conductors.
- **Power Grids:** Aluminum is gaining share in grid projects due to lower cost and wider availability, though copper remains preferred for high-performance application.
- **Electronics:** Bus bars, switch gears, and terminal boards can use aluminum with copper plating to combine conductivity with reduced weight.
- **Aerospace:** Lightweight aluminum structures with copper plating improve manufacturability and reduce overall system weight.

Outlook

The trend toward aluminum substitution is expected to continue, driven by economic pressures, supply constraints, and the push for lighter, more efficient systems in EVs, grids, and electronics. While copper remains essential for high-performance and high-conductivity applications, aluminum's cost-effectiveness and weight advantages are expanding its adoption across multiple industries.