

Aluminium or copper?

Is aluminium a viable alternative to copper for cable and wire manufacturers?

The rising commodity price and lacking supply of copper is increasingly pushing original equipment manufacturers (OEMs) to consider alternative metals, such as aluminium, for wire and cable applications. Despite being lighter and cheaper than copper, the widespread adoption of aluminium has historically been tainted by the drawbacks of using the material. Here Neil Ballinger, head of EMEA

sales at industrial parts supplier EU Automation, compares the two metals and explores whether aluminium may now offer a viable alternative.

Concern about the available supply of copper is not new. In 1924, Ira B. Joralemon, a geologist and copper-mining expert, returned from his worldwide consulting work, with a warning. "The age of copper will be short. At the intense

rate of production that must come, the copper supply of the world will hardly last a score of years... our civilisation based on electrical power will dwindle and die".

Ira's prediction may not have come true, but he was right to be concerned. Copper has the highest electrical conductivity rating of all non-precious metals and, as a result, we've seen a continuous growth in demand for it over the last 50 years.

ALUMINIUM VS. COPPER

In industrial environments, copper is commonly used in high voltage and extra high voltage cables, building wire, telecom wiring and transformers. On the other hand, aluminium is used predominantly on high voltage overhead wiring, rotors on induction motors and low voltage underground cables.

Some applications require a certain metal, so there is no opportunity to seek an alternative. However, in some products, aluminium can be used as a direct replacement. The most straightforward example is on the winding material used

in inductors, or chokes. However, before switching material, there are a few key points to consider.

Firstly, aluminium is not available in as many winding cross-sections. Often a larger cross-section than is required must be used, increasing both the winding mass and volume.

Aluminium also has a lower melting point than copper. Because it melts at 660 degrees Celsius compared to copper's 1085 degrees, aluminium cannot be used in applications where high overloads may be experienced, as this energy will not be absorbed fast enough.

Historically, connection and terminal technology has been another barrier in the use of aluminium cables and wires. Terminal connections between aluminium and copper can result in contact corrosion, causing an increase in electrical resistivity and a reduction in conductivity, raising losses and resulting in unit failure.

The copper supply may not have dwindled in the way that Joralemon predicted 100 years ago, but to stay competitive, manufacturers should weigh up the pros and cons of alternative materials.

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