



### Who to Contact

Metallurgical Engineering  
Dick Emmerich  
[Dick.Emmerich@MetalTek.com](mailto:Dick.Emmerich@MetalTek.com)  
Ph: +1 (262) 544-7819

Metallurgical Engineering  
Jim Myers  
[Jim.Myers@MetalTek.com](mailto:Jim.Myers@MetalTek.com)  
Ph: +1 (262) 544-7185

National Sales Manager - N.A.  
Rod Anderson  
[Rod.Anderson@MetalTek.com](mailto:Rod.Anderson@MetalTek.com)  
Ph: +1 (262) 544-7737

MetalTek Europe  
Andrew Waters  
[Andrew.Waters@MetalTek.com](mailto:Andrew.Waters@MetalTek.com)  
Ph:+44 (0) 1782 418411

Marketing  
Kevin Schumacher  
[Kevin.Schumacher@MetalTek.com](mailto:Kevin.Schumacher@MetalTek.com)  
Ph: +1 (262) 544-7706

### Metals Trivia:

- In excess of 40% of the world's copper is mined in the Andes Mountains of Chile and Peru.
- Gallium, a metal with Atomic Number #31 does not occur in pure form in nature. If you do happen to find some, though, know that it has a melting point of about 86°F (30°C). So, unlike M&M's, if you did hold it in your hand, it would melt.
- An estimated 80% of the world's gold is still in the ground.

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## The History of Metals: Copper

The "Metals of Antiquity" were the only known metals until the 13th century – and there were seven of them (gold, copper, silver, lead, tin, iron, and mercury). That number has since exploded to a current count of 91.

Copper is one of the earliest identified metals. Evidence of smelting of copper can be traced back to around 4000 B.C., but the metal may have been discovered some 5,000 years before that. About ten years ago, UC-San Diego archeologists uncovered a copper foundry at Khirbat Hamra Ifdan near the Dead Sea, a 70-room operation that dates back to about 2700 B.C. – one of the earliest confirmed formal metals factories.

Copper may be used in its (near) pure form, but is often alloyed to produce brasses and bronzes that deliver properties demanded by a specific application. There were significant early pockets of copper development, most notably from 2,000+ years ago in China and in Egypt where copper piping installed then is still intact today. But an expansion in copper's use is evident in the late middle ages.

It is hard to trace a geographic progression from the very advanced copper regions of

Asia, the Middle East, and, to a lesser extent, Europe to the far reaches of the globe. But that advancement in "less developed" areas in smelting and alloying processes appears to have happened in parallel around the world some thousand years ago. Its use and progress did not occur at the same rate. But the Incas in Peru were known to be alloying copper about 1100 A.D., artifacts of copper have been found in western Canada, and Repousse (a form of embossing) ornaments were discovered at Cahokia Mounds outside St. Louis from around that same time.

While important for millennia as a material in currency, jewelry and ornamentation, the real growth in the use of copper corresponds with the Industrial Revolution. Processes to mine and refine on a grand scale were devised to support increased demand for the industrial properties in forming, corrosion resistance, and conductivity that the versatile metal and its alloy families could deliver. Construction, power generation and transmission, transportation (there are 50+ pounds of copper in your car) and electronics markets have relied in no small part on copper for their continued growth.

The Metropolitan Museum of Art displays numerous examples of oil paintings created on copper. Honesty compels us to report that the paintings are normally displayed with the oil side facing out, although the copper side is also quite interesting, at least to our metallurgical staff



We are still pretty early in our "Our History of Metals" series and it is reassuring to know that we still have 80-some more metals to write about, but few will offer as storied a history as copper. We have barely scratched the surface of copper's rich history; that is not surprising, as copper alloys are well known for their long life and resistance to scratching and wear.