If the copper is drawn into wire whose diameter is 8.00mm , how many feet of copper can be obtained from the ingot? The density of copper is 8.94 g/cm^3. (Assume that the wire is a cylinder whose volume is V=πr^{2}h, where r is its radius and h is its height or length.)

Solution:

$V = \pi r^2 h$ and $V = \frac{m}{\rho}$; where r is radius, h is length, m is mass of copper and ρ is density of copper.

Then

$$V = \pi r^2 h = \frac{m}{\rho} \text{ and } h = \frac{m}{\pi r^2 \rho}$$

Let m is 1 kg; r is radius and it is a half of diameter(4.00mm or 0.004 m); π is a constant and is 3.14; and ρ is density(8.94 g/cm^3 or 8940 kg/m^3).

$$h = \frac{1}{3.14 \cdot 0.004^2 \cdot 8940} \approx 2.23\, m$$

1 meter≈3.28 feet

so $h \approx 2.23$m or $h \approx 2.23 \cdot 3.28 \approx 7.31\, feet$.

Thus of 1 kg of copper we can get a wire length of 7.31 feet.

Copper based alloy ingots weighed approximately 20 pounds (9.1 kg)// http://en.wikipedia.org/wiki/Ingot

Also if you have one copper of ingot you can get a wire length of 66.52 feet (7.31·9.1≈66.52 feet).