

# CRAFTSMAN CRIBSHEET

## Iron

Carbon may be the most important determinant of a steel's properties. But without iron there is no steel. No humans, either. Iron is the decay product of Nickel 56 which is the last element produced by nuclear fusion as a star collapses. So, what else should be known about this essential to human life, essential to the precision machining industry, forged in the heart of dying stars chemical element?

### Iron is Readily Available

- Accounts for about 80 percent of the Earth's core.
- Iron is the fourth most common element in the earth's crust — sixth most common in the universe.
- Iron accounts for 95% of the world's metal production annually.
- Iron is the second largest commodity market after oil.
- If the iron industry was a country, it would have the 24th largest GDP in the world.
- Apparent use per capita in 2019 was just over 504 pounds.
- In-use stocks of steel per capita for developed countries range from 11 – 16 tons.  
10.2 tons for construction; 1.3 tons for machinery; 1.5 tons for transportation, and 0.6 tons for appliances and containers
- The USGS reported that for 2019, 2,500 million metric tons of iron ore were mined, that same year, 3,200 million metric tons of iron and steel were produced. It is mined in roughly 50 countries.
- Steel (containing iron) comprised 7.2% of all materials land filled in 2018, a quantity of ~10.5 million tons according to USEPA.



Iron can be used in the cast form without alloying to make beautiful and functional objects for our civil infrastructure. (Photo credit: Miles Free III)

- Recycled iron and steel made up 47% of new production through recycling in 2017 according to Statista.

### Iron Has Useful Properties

- Iron itself is the fifth strongest metal on Earth, behind tungsten (#1). It is the major constituent of the next strongest metal on Earth — steel (#2)— and comes in just behind chromium (#3) and titanium (#4)
- When alloyed with carbon and other elements, it can develop a range of mechanical properties which are useful for structural and mechanical properties.
- Ferromagnetism is an important aspect of current technology and is estimated to be responsible for about 1% of Gross National Product. (Data recording such as audio tapes and hard disk drives are typical applications that rely on the magnetic response of iron to magnetic fields. Solenoids are mechanical devices that use magnetism to operate.) ⊕