1. Carbon fibers have high specific moduli and specific strengths.
2. They retain their high tensile modulus and high strength at elevated temperatures; high-temperature oxidation, however, may be a problem.
3. At room temperature, carbon fibers are not affected by moisture or a wide variety of solvents, acids, and bases.
4. These fibers exhibit a diversity of physical and mechanical characteristics, allowing composites incorporating these fibers to have specific engineered properties.
5. Fiber- and composite-manufacturing processes have been developed that are relatively inexpensive and cost effective
6. Carbon fiber consists of extremely thin fibers ranging from 0.005 – 0.010 mm diameter. To form the yarn thousands of carbon fibers are twisted together.
7. Carbon fiber has many different weave patterns and when combined with a resin it can be molded to form a high strength-to-weight ratio material.
8. Carbon fiber is very lightweight and has considerably lower density than steel, making it ideal for aerospace, military, and motorsports racing.

9. [Carbon fiber](http://www.ornl.gov/sci/manufacturing/research/carbon_fiber.shtml) -- sometimes known as graphite fiber -- is a strong, stiff, lightweight material that has the potential to replace steel and is popularly used in specialized, high-performance products like aircrafts, racecars and sporting equipment.

8. Carbon fiber was first invented near Cleveland, Ohio, in 1958. It wasn’t until a new [manufacturing](https://energy.gov/energy-economy/manufacturing)process was developed at a British research center in 1963 that carbon fiber’s strength potential was realized.

7. Current methods for manufacturing carbon fiber tend to be slow and energy intensive, making it costly for use in mass-produced applications. With a goal of reducing carbon fiber production costs by 50 percent, the Energy Department’s new [Carbon Fiber Technology Facility](https://energy.gov/articles/energy-department-launches-new-clean-energy-manufacturing-initiative) at Oak Ridge National Laboratory is working with manufacturers and researchers to develop better and cheaper processes for producing carbon fibers. Lowering the cost of carbon fibers make it a viable solution for vehicles and a wide variety of clean energy applications.

6. The 42,000-square foot facility features a 390-foot-long processing line that is capable of producing up to 25 tons of carbon fiber a year -- that is enough carbon fiber to cover the length of almost 138,889 football fields.

5. The most common carbon fiber precursor -- the raw material used to make carbon fibers -- is polyacrylonitrile (or PAN), accounting for more than 90 percent of all carbon fiber production. Other precursors options include a common plastic and a wood byproduct.

4. As part of [conventional carbon fiber production](http://www.youtube.com/watch?feature=player_embedded&v=c3SZiRYJzH8), precursors go through several processes that include stretching, oxidation (to raise the melting temperature) and carbonization in high-temperature furnaces that vaporize about 50 percent of the material, making it nearly 100 percent carbon.

3. Carbon fiber can be woven into a fabric that is suitable for use in defense applications or added to a resin and molded into preformed pieces, such as vehicle components or wind turbine blades.

2. The next generation of carbon-fiber composites could reduce passenger car weight by 50 percent and improve fuel efficiency by about 35 percent without compromising performance or safety -- an advancement that would save more than $5,000 in fuel over the life of the car at today’s gasoline prices.

1. In addition to its uses in manufacturing of cars and trucks, advances in carbon fiber will help American manufacturers lower the cost and improve the performance of wind turbine blades and towers, electronics, energy storage components and power transmission lines.