

From the time humans began roaming the earth, people have used engineering to create technology and innovations that help in survival and conquering of uncharted territory. From the wheel to the sail to the airplane, engineering has led us to discover and map nearly every inch of land on the planet. However, there is much more to discovery than what lies on earth. The telescope has provided people the ability to look beyond the miniscule scope of this world and see into the light years of space.

Around 400 BC, Aristophanes cited use of a "burning-glass" in his play, *The Clouds*. This burning-glass is a convex lens used to focus the sun's rays in order to ignite some material, and is the first known use of such a device. Modern telescopes evolved from this prototype, bringing giant images of extra-terrestrial bodies into the small focus of an eyepiece.

A recent archeological discovery in Visby, on an island of Sweden, found a group of lenses initially thought to be pendants or jewelry. However, they are flat on one side and nearly perfectly round on the other, making them excellent for magnification. Some think that these lenses may have been used for magnification by craftsmen, or as a burning-glass, or possibly be part of the first ever telescope.

First, Webster defines a telescope as "an optical instrument for making distant objects appear larger and therefore nearer." The first working telescope is officially credited to Hans Lippershey, Zacharias Janssen, and Jacob Metius, three men working together in the Netherlands in 1608. This telescope made use of a convex lens on one end of a tube, and a concave lens on the other. The Netherlands began producing these in large quantities, and they were soon found all over Europe.

The first basic telescopes could not magnify much, and were limited to objects within a few miles, but were still helpful on many exploration voyages, spotting land masses not visible with the naked eye. After improvements by scientists such as Galileo and Johannes Kepler, people first began to see the features of outer space. Niccolo Zucchi spotted the belts of Jupiter in 1630 using a reflecting telescope, which makes use of curved and specially placed mirrors to amplify an image. In 1655, Christiaan Huygens spotted Titan, Saturn's brightest satellite, with a twelve-foot refracting telescope. By 1722, people were using 212-foot telescopes to venture into space.

For the most part, the size of modern telescopes has decreased drastically, but they can see much farther. The Hubble Space Telescope still has a focal length of 189 feet, but the largest ground telescope, the Keck Observatory in Hawaii, is only 32 feet. Proper use of the lenses and mirrors allows the telescope's size to be minimized. Astronomers have now been able to map much of the known universe, but there is always much more to be seen. They have recently spotted the farthest supernova, a mere 12.8 billion light years away.

The evolution of telescopes has helped humans conquer this planet, as well as contributing to the continuing research of outer space. From the geocentric theory to the galaxies billions of light years away, Joseph Franklin Rutherford puts it best: "The development of the telescope, together with increased knowledge of things, brought men to see that the earth is not what man had once thought it to be." With so much of the universe still a mystery, we can be sure that the telescope will continue to be an integral engineering tool that brings us closer to new discoveries.