History of the traction trebuchet

Business, Industries

The traction Trebuchet is believed to be an ancient war engine which was invented in China in 300BC. In the traction Trebuchet a large troop of men pulled down on ropes to propel the missile. The Trebuchet reached Europe during the early Middle Ages, or Dark Ages, in 500 AD and was used extensively by the French. The Trebuchet was revised so that the troop of men used to pull down the ropes was replaced with a large fixed, or pivoting, counterbalance weight. The Traction Trebuchet was used by people as a power source. The Counterpoise Trebuchet replaced the people power with a weight on the short end.

The Trebuchet consists of a long beam that pivots around an axle positioned above ground on a wooden structure. The axle divides the beam into a long and short arm. The projectile is placed at the terminal end of the long arm and pulling ropes or a counterweight is positioned at the terminal end of the short arm. Historically, there were three basic forms of trebuchets: traction machines, powered by crews pulling on ropes; counterweight machines, activated by the fall of large masses; and hybrid machines employing both pulling ropes and falling large masses.

Counterweight trebuchets were the most powerful weapons of their day. Large counterweight trebuchets could throw 300 kg rocks over 200 yards. The most massive trebuchets were reported to throw rocks in excess of 1000 kg. The length of the beam is the most crucial aspect of Trebuchet design. The longer the arm, the greater the maximum possible power developed by the machine. However, there are practical limits to beam lengths. As a result, most of the design innovations centered around three components: the projectile holder; the horizontal motion of the Trebuchet; and the

counterweight. Medieval engineers increased the effective length of the beam by adding a long sling at the terminal end of the long arm, dramatically increasing performance. A long sling also separated the launch angle of the projectile from the angle of the beam. Varying the sling length lead to different launch angles and thus trebuchet crews could fine-tune their launches quickly and accurately. Additionally, the long sling allowed the projectile to be launched when the beam was vertical, giving the projectile the full force of the falling counterweight.

Counterweights were of two types: fixed or hinged. Fixed counterweights were easier to design and build. However, in an effort to harness the full energy of the falling mass, hinged counterweight trebuchets were built. The hinged counterweight improves the efficiency with which the Trebuchet converted the gravitational energy of the falling counterweight to projectile motion. In fixed counterweights, the center of gravity of the falling mass travels along a curved path. The center of gravity of a hinged counterweight, however, travels nearly in a straight line. This straight fall utilizes the gravitational energy of the falling mass more efficiently. In addition, the rotation of the hinged counterweight around the falling center of mass adds energy to the rotating beam. The result is a longer, smoother throw.