The unit of power in the British engineering system, = 550 foot-pounds of work per second = 33,000 foot-pounds per minute, approximately 745.6999 watts. Abbr. hp. and abbr. B.H.P.

Origin of the British horsepower

Having invented a practical steam engine that turned a shaft, James Watt needed a way of rating the power of engines so that customers would know what size to buy. (The earlier reciprocating steam engines were only used to drive pumps, and their output was satisfactorily described in millions, which was the number of millions of pounds of water the engine could lift 1 foot through the burning of 120 pounds of coal – a unit of "duty," i.e., energy efficiency.) The most natural way of rating the new engines was to compare them to the horse, since most potential customers were currently getting their shaft power from horses, and certainly knew how many horses were needed to do the job. Smeaton and others had already used such a comparison.

The horsepower was first defined in print in the *Edinburgh Review* (*January 1809*), in an article that suggests that the value of the unit was set through experiments Watt conducted with dray horses. In *James Watt and the Steam Engine* (Oxford, 1927), H. W. Dickinson and Rhys Jenkins point out that this is probably not so. Among Watt's surviving papers are his "Blotting and Calculation Book 1782 & 1783." In an entry made in *August 1782* he calculates how large an engine would be needed to power a paper mill currently powered by 12 horses.

"Mr. Wriggley, [the owner's] millwright, says a mill-horse walks in 24 feet diar and makes 2½ turns per minute....say at the rate of 180lb p. horse."

The 180 pounds is an estimate of the force exerted by the horse. From these figures, using a value of pi = 3, Watt calculated the power of 1 horse at 24 × 3 × 2½ × 180 = 32,400 foot-pounds per minute.

So the figures on which the definition relied appear to have come not from experiment but from Mr. Wriggley and perhaps other millwrights, men whose profession was designing and building factories. The job required a very good idea of the power output of horses; without it the millwright's factories would not work and he would not obtain new commissions.

Watt used the same value later in the notebook, but under *September 1783*, the value is changed to 33,000. A number of considerations may have led to the new value. Using the same figures as in August but with two more decimal places for pi would have given 33,912 instead of 32,400, but Watt would want a number easily used in calculations. A multiple of 60 (minutes) would be especially attractive. Further, by choosing a value that was larger than a real horse's actual output, Watt was following the old engineering principle that it is better to be too big than to fail. Steam power was new, potential purchasers were skeptical and installations that failed were more likely to be noticed than those that performed as planned. All of which suggests that the choice of the value of the horsepower was essentially a back-of-the-envelope estimation.

In Watt and Boulton's factory the word "horse," not "horsepower" was used, e.g., a "10-horse engine."

Modern measurements show that the average horse can put out about 0.6 horsepower through an 8-hour workday. This is consistent with Watt's desire to rate his engines conservatively.