

# LOCOMOTIVE

A locomotive (from lat. loco motivus) is a railway [[1]] vehicle that provides the motive power for a train, and has no payload capacity of its own; its sole purpose is to move the train along the tracks.

## Others

In contrast, many trains feature self-propelled payload-carrying vehicles; these are not normally considered locomotives, and may be referred to as multiple units or railcars; the use of these self-propelled vehicles is increasingly common for passenger trains, but very rare for freight (see however CargoSprinter [[2]]). Vehicles which provide the motive power to haul an unpowered train, but are not generally considered locomotives because they have payload space or are rarely detached from their trains, are known as power cars.

## Use

Traditionally, locomotives haul (pull) their trains. Increasingly common these days in local passenger service is push-pull operation, where a locomotive pulls the train in one direction and pushes it in the other, and is therefore optionally controlled from a control cab at the opposite end of the train. This is especially true of "High Speed Rail lines [[3]]", such as the Japan's [[4]] Shinkansen [[5]] and France's [[6]] TGV [[7]] trains.



Great Western Railway No. 6833 Calcot Grange, a 4-6-0 Grange class steam locomotive, at Bristol Temple Meads station, Bristol, England

## Benefits of locomotives

There are many reasons why the motive power for trains has been traditionally isolated in a locomotive, rather than in self-propelled vehicles. These include:

Ease of maintenance - it is easier to maintain one locomotive than many self-propelled cars.

Safety - it is often safer to locate the train's power systems away from passengers. This was particularly the case for steam locomotives, but still has some relevance for other power sources.

Easy replacement of motive power - should the locomotive break down, it is easy to replace it with a new one. Failure of the motive power unit does not require taking the whole train out of service.

Efficiency - idle trains do not waste expensive motive power resources. Separate locomotives mean that the costly motive power assets can be moved around as needed.

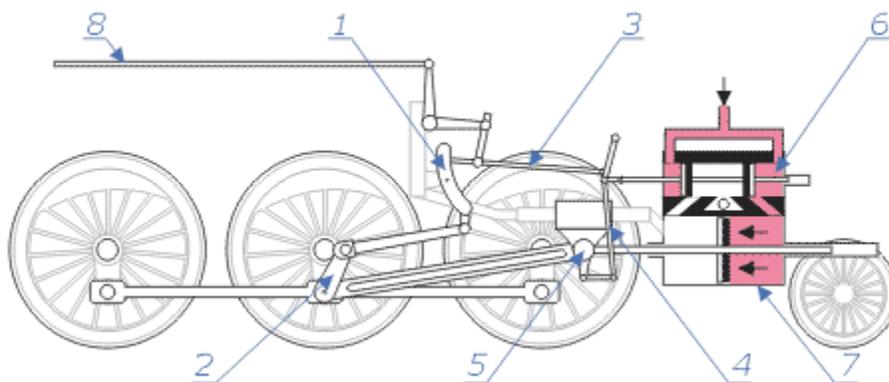
Flexibility - large locomotives can be substituted for small locomotives where the gradients of the route become steeper and more power is needed.

Obsolescence cycles - separating the motive power from the payload-hauling cars means that either can be replaced without affecting the other. At some times, locomotives have become obsolete when their cars are not, or vice versa.

### Classification by motive power

Locomotives may generate mechanical work from fuel, or they may take power from an outside source. It is common to classify locomotives by their means of providing motive work - the common ones include:

### Steam



The main moving parts of a steam locomotive with Walschaerts valve gear: 1 - Link, 2 - Eccentric crank, 3 - Radius rod, 4 - Lap/lead lever, 5 - Crosshead, 6 - Valve, 7 - Cylinder, 8 - Reach rod

The first railway locomotives (19th century) were powered by steam, first by burning wood, later coke and coal or petroleum. Because of the steam engine, some people took to calling the steam locomotives themselves "steam engines". The steam locomotive remained by far the most common type of locomotive until after World War II. The age of steam correlates highly to the coal era.

Source : <http://engineering.wikia.com/wiki/Locomotive>