

Different types of crankshafts

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The crankshaft consists of the shaft parts which revolve in the main bearings, the crankpins to which the big ends of the connecting rod are connected, the crank arms or webs (also called cheeks) which connect the crankpins and the shaft parts. The crankshaft, depending upon the position of the crank, may be divided into the following two types :

The crankshaft, depending upon the number of cranks in the shaft, may also be classified as a single throw or multi-throw crankshafts. A crankshaft with only one side crank or the center crank is called a single-throw crankshaft whereas the crankshaft with two side cranks, one on each end or with two or more centers cranks is known as the multi-throw crankshaft.

The bearing pressures are very important in the design of crankshafts. The maximum permissible bearing pressure depends upon the maximum gas pressure, journal velocity, amount, and method of lubrication and change of direction of bearing pressure.

Most crankshaft failures are caused by a progressive fracture due to repeated bending or reversed torsional stresses. Thus the crankshaft is under fatigue loading and, therefore, its design should be based upon endurance limit. Since the failure of a crankshaft is likely to cause serious engine destruction and neither all the forces nor all the stresses acting on the crankshaft can be determined accurately, therefore a high factor of safety from 3 to 4, based on the endurance limit, is used.

The crankshaft must be designed or checked for at least two crank positions. Firstly, when the crankshaft is subjected to maximum bending moment and secondly when the crankshaft is subjected to maximum twisting moment or torque.

3. For the sake of simplicity and also for safety, the shaft is considered to be supported at the centers of the bearings and all the forces and reactions to be acting at these points. The distances between the supports depend on the length of the bearings, which in turn depend on the diameter of the shaft because of the allowable bearing pressures.

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