



Counter Balance Design

You may find it interesting that majority of ATVs have entirely different engines than their two wheel counterparts. They often have been designed to have a different power curve and their transmission ratios are different. Perhaps the most noticeable design difference is the presence of a "counterbalance shaft". A counterbalance shaft is used to reduce the vibrations caused by the inherent imbalance of the crankshaft.

Likewise, on personal water craft that use larger engine displacements, most manufacturers have chosen to use a counter balance shaft to keep parasitic engine vibrations from causing stress damage to the hull and other components.

In any reciprocating engine, as the piston moves from TDC (top dead center) to BDC (bottom dead center) the inertia of the moving piston and other reciprocating parts creates vibration. On a typical small engine's crankshaft, there exists some added material (indicated by "A" in the illustration to the right) whose mass opposes the mass of the reciprocating parts. For example, on a typical ATV engine where the cylinder stands vertical, as the piston reaches the top of the cylinder, the mass added to the crankshaft has moved away from the piston and moves all the way to the bottom position. The same basic principle is applied as the piston reaches the bottom of the cylinder. These two forces act against each other in an effort to cancel each other out (and the vibration associated with it).