Researchpaper design and analysis of connecting

Design

USER Keywords: connecting Rod, Analysis of connecting rod, four stroke engine connecting rod, forged steel connecting rod, design and analysis of connecting rod. Nomenclature A = cross sectional area of the connecting rod. L length of the connecting rod. WAC = crippling or buckling load. Lax = moment of inertia of the section about x-axis lay = moment of inertia of the section about y-axis respectively. Xx = radius of gyration of the section about x-axis Sky = radius of gyration of the section about y- axis D = Diameter of piston r = Radius of crank 1.

INTRODUCTION In a reciprocating piston engine, the connecting rod connects the piston to the crank or crankshaft. In modern automotive internal combustion engines, the connecting rods are most usually made of steel for production engines, but can be made of aluminum (for eighties and the ability to absorb high impact at the expense of durability) or titanium (for a combination of strength and lightness at the expense of affordability) for high performance engines, or of cast iron for applications such as motor scooters.

The small end attaches to the piston pin, gudgeon pin (the usual British term) or wrist pin, which is currently most often press fit into the con rod but can swivel in the piston, a " floating wrist pin" design. The connecting rod is under tremendous stress from the reciprocating load represented by the piston, actually stretching and being impressed with every rotation, and the load increases to the third power with increasing engine speed.

Failure of a connecting rod, usually called " throwing a rod" is one of the most common causes of catastrophic engine failure in cars, frequently

putting the broken rod through the side of the crankcase and thereby rendering the engine irreparable; it can result from fatigue near a physical defect in the rod, lubrication failure in a bearing due to faulty maintenance or from failure of the rod bolts from a defect, improper tightening, or re-use of already used (stressed) bolts here not recommended.

Despite their frequent occurrence on televised competitive automobile events, such failures are quite rare on production cars during normal daily driving. This is because production auto parts have a much larger factor of safety, and often http://www. I]seer. Org more systematic quality control.

When building a high performance engine, great attention is paid to the connecting rods, eliminating stress risers by such techniques as grinding the edges of the rod to a smooth radius, shot peeping to induce compressive surface stresses (to prevent crack initiation), balancing all injecting rod/piston assemblies to the same weight and Misaligning to reveal otherwise invisible small cracks which would cause the rod to fail under stress. In addition, great care is taken to torque the con rod bolts to the exact value specified; often these bolts must be replaced rather than reused.

The big end of the rod is fabricated as a unit and cut or cracked in two to establish precision fit around the big end bearing shell. Recent engines such as the Ford 4. 6 liter engine and the Chrysler 2. 0 liter engine have connecting rods made using powder metallurgy, which allows more precise intro of size and weight with less machining and less excess mass to be machined off for balancing. The cap is then separated from the rod by a

fracturing process, which results in an uneven mating surface due to the grain of the powdered metal.

This ensures that upon reassembly, the cap will be perfectly positioned with respect to the rod, compared to the minor misalignments which can occur if the mating surfaces are both flat. A major source of engine wear is the sideways force exerted on the piston through the con rod by the crankshaft, which typically wears the yielder into an oval cross-section rather than circular, making it impossible for piston rings to correctly seal against the cylinder walls. Geometrically, it can be seen that longer connection rods will reduce the amount of this sideways force, and therefore lead to longer engine life.

However, for a given engine block, the sum of the length of the con rod plus the piston stroke is a fixed number, determined by the fixed distance between the crankshaft axis and the top of the cylinder block where the cylinder head fastens; thus, for a given cylinder and power, requires a shorter connecting rod (or a sites with smaller compression height), resulting in accelerated cylinder wear. 2082 analysis. After analysis a comparison is made between existing steel connecting rod biz. , Forged steel in terms of weight, factor of safety, stiffens, deformation and stress.