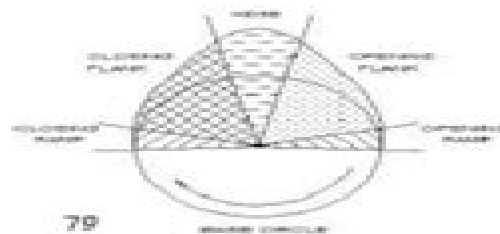


CHAPTER 5: THE CAMSHAFT

CAMSHAFT CHOICE.

The camshaft is undoubtedly the most important single component to be selected when tuning the four-stroke engine.

The correct choice is often difficult to make and this chapter is principally concerned in setting out the problems and facts, in order that the correct decision can be made for an individual application.



Recognition of the profile.

The cam lobe is made up of four essential elements (Fig 79). The base circle or clearance circle, often called the heel, together with the ramp - the flank - and the nose.

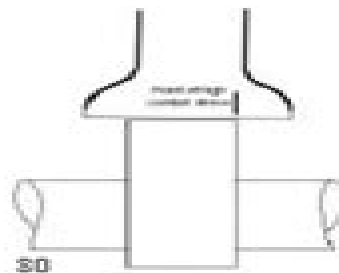
The **BASE CIRCLE** is the area of the cam in which little or no contact takes place with the cam follower.

The centre of the base circle duration lies at approximately 180 degrees from the nose centre line and is the point at which valve clearances are normally set.

The **RAMP** is the area joining the base circle to flank, and is designed to take up valve clearance in a controlled manner, immediately prior to the start of valve lift.

The **FLANK** lifts the valve train with the spring in compression and accelerates to its maximum speed.

The **NOSE** takes over at this point and controls the valve train deceleration until it momentarily comes to rest at full lift, when the process reverses itself to the lower valve back to its seat, where the ramp will re-open the clearance.



The whole procedure exerts an enormous strain on the components involved, sometimes 'stacking-up' contact stresses over the cam nose as high as 1300 Meganewtons/sq.m. (200 lbs/sq.in.), calling for a high degree of accuracy in design and manufacture, together with the need for great care and attention when fitting.

The cam nose stress stack-up is the result of a number of unavoidable design constrictions. No matter how tight the engine manufacturing tolerances, there will always be a small amount of mis-alignment or 'out-of-square' mating between components, sometimes causing hairline or pressure point contact. (Fig. 80)

In order to minimise the effects of this possibility, cam lobes are often purposely machined with a taper to mate with a spherically ground tappet face (Fig. 81), creating an intentional but calculable high pressure footprint, slightly offset from the tappet centre-line to promote rotation of the tappet, thus improving overall service life.

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