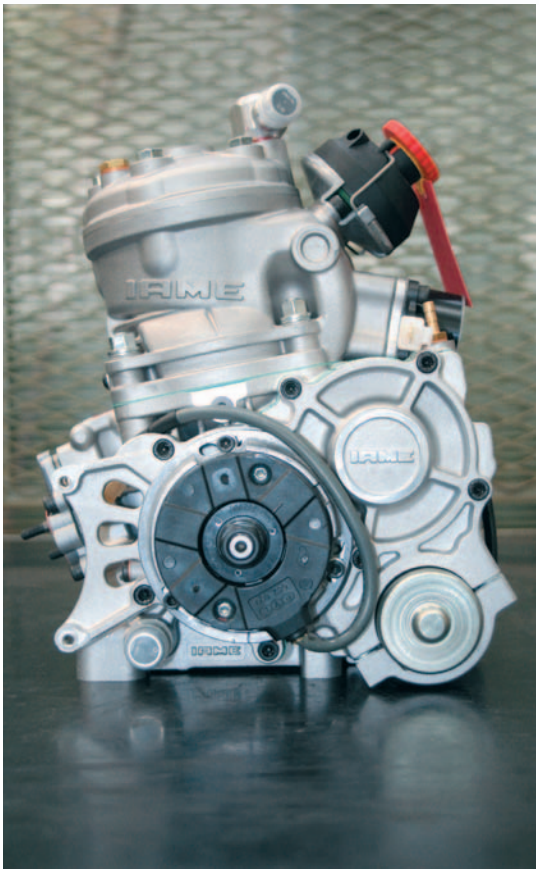
PARILLA REEDSTER

Inside IAME's CIK TAG Engine

The first company to officially homologate a TAG type engine with the CIK for the new 125cc KF classes was the one with the greatest history, IAME. The Italian firm has always built competition kart engines but in recent years has also produced some models for the recreational market under the Parilla brand. The new CIK approved engine is the Parilla Reedster and, as with all IAME engines, is superbly finished.

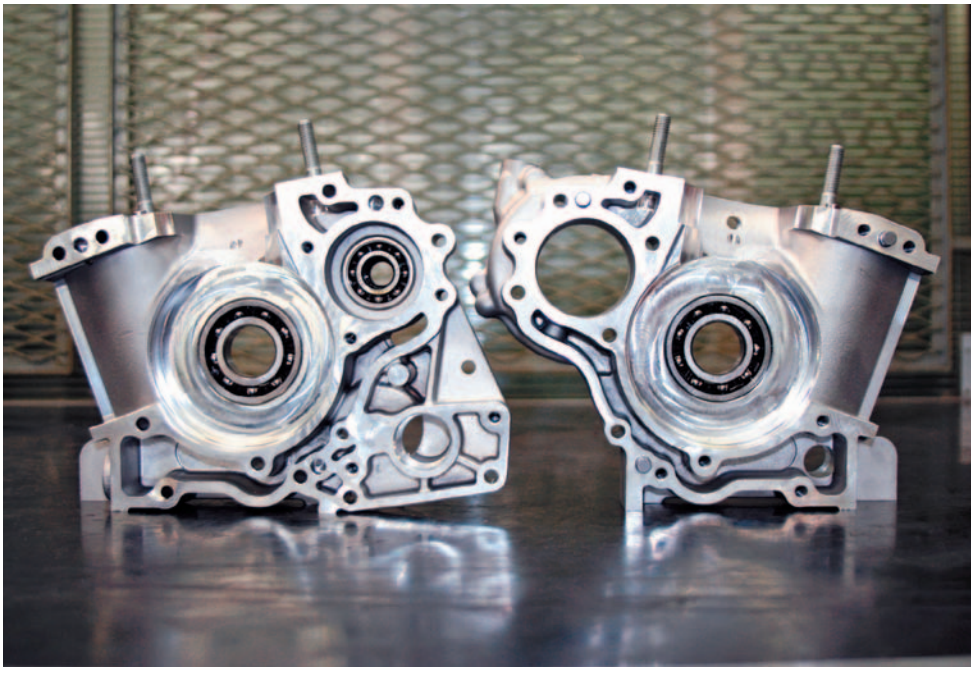


The Parilla has been talked up over the winter but will have to deliver where it matters, on the track

Homologation form and categories

The first thing that strikes one is how detailed the homologation form for TAG engines is. Compared with the old 100cc engine homologation form we find the height of the cylinder block, the volume of the combustion chamber, crankshaft weight, number of crankshaft bearings, weight of the piston plus the weight of all the components of the engine. Many interesting component drawings are included such as the ports arrangement, all with measurements. Detailed exploded drawings of the piston with crankshaft, connecting rod and crankcase unit are also included. Even the ignition system is presented with an illustration of the ignition advance in degrees with the corresponding engine revs.

The homologation form is defined for the base class, KF4. The other classes then have their technical rules defined with the same components but with certain restrictions and rev limits. KF4 and KF3 (JICA replacement) are limited to a maximum of 14,000rpm while KF2 (ICA) is allowed 15,000rpm and KF1 (Formula A) 16,000rpm. IAME indicate a maximum power figure of around 40hp for their KF4 version.



The coolant passages can be seen clearly on this internal view of the two crankcase halves

Dimensions and ports

The main technical dimensions of the Parilla Reedster are a 53.89mm bore, 54.4mm stroke, 9cc combustion chamber volume and a connecting rod length of 104mm. Dimensions not included on the homologation form but released are the total weight of the engine at 13.8kg and a squish height of between 1 and 1.1mm. The compression ratio will be different for all the variants as the combustion chamber volumes are different, KF4 and KF3 (14cc), KF2 (11cc) and KF1 (not limited but indicated by IAME to be 10.5cc). The reed valve block meanwhile is very similar to the 100cc unit although with slightly larger dimensions.

Scavenging works with an opening of the main transfer ports at 127.5° and the secondary transfer ports at 125°. The exhaust port opens at 190.5° and the lateral exhaust booster ports at 187.5°. IAME have chosen the five transfer port solution, motivated by the fact that even though the three transfer port solution gives better performance at low revs, an engine with limited maximum revs needs good maximum power. The five ports give a narrow but very high power curve that drops off suddenly at around 15,000rpm. Since the regulations restrict the permitted revs the engine must perform at its peak before the limit is reached. This solution is used in gearbox engines that make use of only a part of the power curve.

Technical solutions

The Reedster has five transfer ports and three exhaust ports (a central port plus two lateral boosters). Apart from that the cylinder is similar to that of the 100cc engine. The cylinder head is larger and is circular with a spherical combustion chamber and squish band. The really new solution is the power valve on the exhaust port, featuring a 'tooth' positioned in a rectangular hole in the cylinder on the exhaust side. At low revs the valve does not move and partially covers the exhaust duct, allowing a better fill of

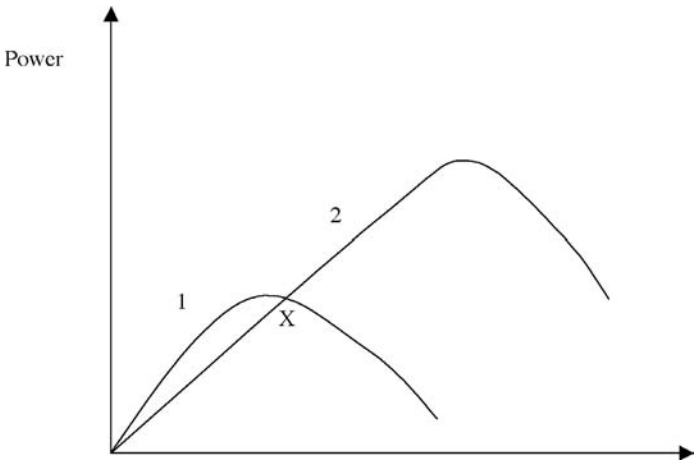
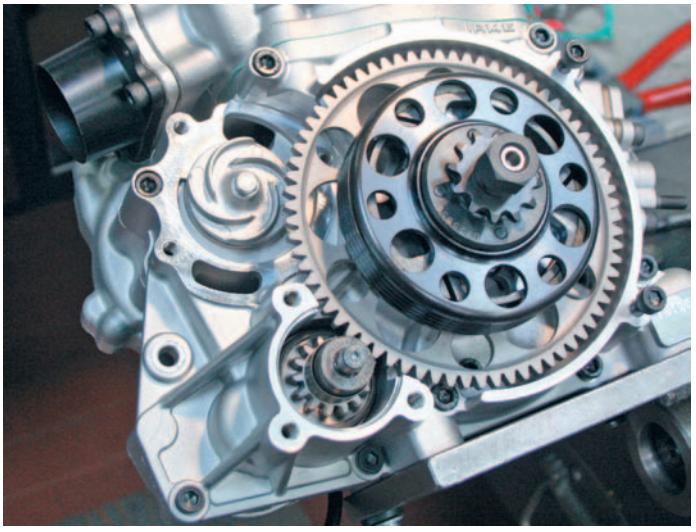


Figure 1. The power valve allows the power curve to be the sum of the best high (2) and low (1) rev set-ups

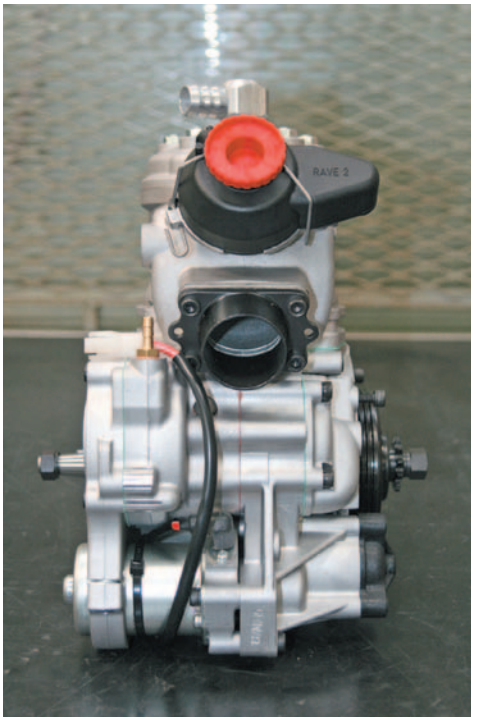
the combustion chamber, and is equivalent to having a longer exhaust duct (better performance at low revs). At higher revs the valve moves upwards because of the pressure of the burnt gases and uncovers the exhaust duct, permitting better passage of the exhaust gases. This helps the power curve to be the sum of the best high and low rev set-ups as shown in Figure 1.

The valve is adjusted by rotating the red plastic valve cap that adjusts the spring inside the valve to regulate its resistance to up and down movement. IAME preset the valve before selling the engine. The perfect set-up is the one that allows a change (valve shifting upwards) from the low rev curve (1) to the high rev one (2) exactly at the intersection point (X) shown in Figure 1.

The engine features a clutch and an electric start. The electric motor is integrated in the crankcase and connected to the clutch through a toothed wheel. On the opposite side the crankshaft turns the water pump, also integrated in the crankcase unit, through a toothed wheel with a transmission ratio of 1 to 1, avoiding complicated reductions between crankshaft and water pump rotations. The water pump impeller is metallic with a metallic cover positioned very close to the rotating element so as to create a vacuum that pushes water along the cooling system which not only cools the cylinder but also the crankcase. The crankshaft is required to have a homologated balance system so a balance shaft is used, the same one that rotates the pump impeller.



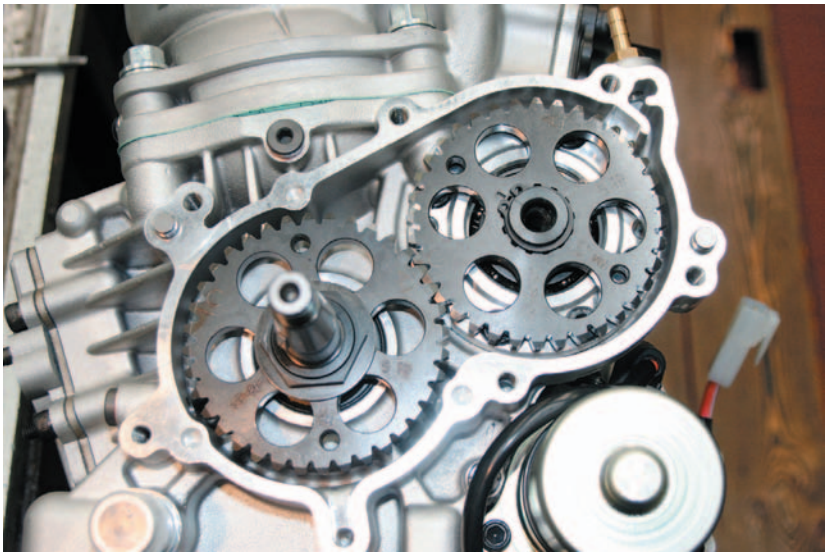
Clutch and starter gears and the water pump impeller without its cover



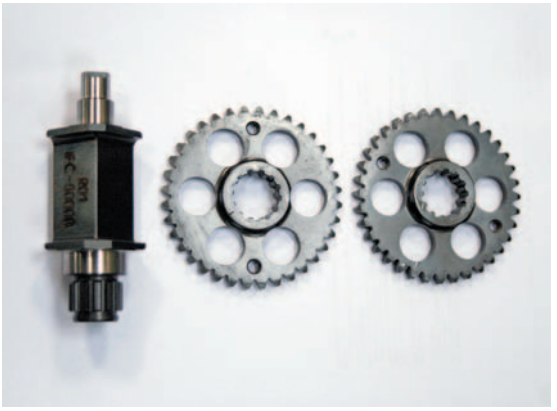
Timing of the power valve's opening can be adjusted by turning the red cap

The ignition system is digital meaning it can be programmed to change its advance curve, permitting electric ignition and helping to start the engine at very low revs. The CIK's technical regulations do not allow changes to this advance curve. IAME has decided to use PVL and Selettra ignitions. Vering and Tecno have also homologated ignitions. The ignition system's graphic on the homologation form indicates an advance of -17° at 2,000rpm, 0° from 3000 to 11,000rpm, a decrease from -7° at 12,000rpm to -11° at 13,000rpm and then on a rev limited engine a sudden fall to -28° at 14,000rpm.

Carlo Forni



A toothed wheel on the crankshaft turns another wheel attached to the water pump



The Parilla differs from the PCR featured last month in the manner of its balance system. On the PCR the balance weight is mounted on one of the toothed wheels while IAME have located it on the shaft