Conrods

Atomic billet steel conrods were designed from scratch with one principle in mind; use aerospace quality materials and sophisticated manufacturing processes to produce an extremely strong, light and durable connecting rod for the popular inline 6 cylinder Ford SOHC/DOHC engines, at an affordable price.

The Design and Evaluation Process
The Atomic engineering team set out to address these parameters by designing what many performance engine builders are now calling the finest conrod on the market for the Ford DOHC 6 cylinder engine.

Extensive CAD/CAM computer modelling was employed and produced a H-Beam design, which has an extremely high stiffness-to-mass ratio. The next step was to pick the correct materials, heat treatment and surface treatment processes to ensure durability under rigorous performance applications.

Next came FEA modelling (Finite element analysis) to simulate stresses on the conrods. This also entailed weighing every piston, gudgeon pin and ring set on the market and loading this information, plus stroke, rotating and reciprocating conrod values into our computer modelling software to calculate the stresses.

The greatest load exerted on a conrod in an engine producing 600 comes not from the force of normal combustion but from the tensile force exerted by the piston at top dead centre (TDC). At 5250 RPM the piston exerts a tensile load on the conrod of 1908 g's (-1693 kgs) at split overlap TDC reversal. If you increase maximum engine speed by only 1000 RPM to 6250 RPM, the TDC tensile load rises by 50.4% to 2870 g's. At 7500 RPM the tensile loading increases to 4132 g's, clearly demonstrating the Atomic's design strength of 8000 g's means it has plenty in reserve.
Excessive loads at TDC are brought about by a high reciprocating mass and/or by increasing engine RPM, so it is essential to design reciprocating engine components with the lowest mass possible to minimize premature lower bearing shell bearing failure. This is particularly relevant to our customers who are turning their engines to 7500RPM+.

What about the Bolts?
Finally, we needed to hold the whole lot together and the only choice of fastener that exceeded our requirements is supplied by Automotive Racing Products (ARP) in the USA. They carried out reciprocating load calculations for us before recommending the use of a 3/8" 12 point 8740 chrome moly capscrew bolt from their range. Just to be sure we went beyond ARP's recommendation and fitted bolts made from ARP2000 material, which is stronger and more durable than 8740 chrome moly. We source these bolts directly from the authorised Australian distributor of ARP to ensure we are getting the real thing. We have heard of "copy" ARP bolts being available and will not take any risks with critical components such as bolts.

Accuracy of Machining
Finally, sophisticated computer controlled manufacturing techniques were employed to finish the critical dimensions such as big end bore, pin bore and centre to centre length on our CNC machining centre.

Even Stronger Conrods - the "FatRod" was born

Having great success with the 600kW rated (now 698) Superleggera conrod was rewarding but we weren't going to rest on our laurels. We believed power levels of the Turbo Ford were going to be pushed beyond the 100kW per cylinder design parameter of our original design, so we had only one alternative - go back to the drawing board and come up with another design that could handle 200 per cylinder. Some people told us we were mad - who needs a conrod that strong? But we believed there would be a need so after 7 months of blood, sweat and tears the FatRod was born.

As the Pom's like to say "This is a serious bit of kit". The design brief was to ensure it could cope with the enormous combustion shock loads associated with 1300HP+ flywheel figures, so the tough H-Beam construction was retained, as it has a higher stiffness-to-mass ratio than an I-Beam design. We gave it the biggest beam we could fit inside the piston and coupled it to the largest size bearing tunnel that could physically fit inside the Ford crankcase. The minimum cross section has been increased by a whopping 34%, the beam is 13% wider, 14% thicker and the small end of the rod can accommodate a .927" Chev diameter gudgeon pin, if required. Serious conrods for serious power.

Upgrades
We don't stand still at Atomic and for 2008 we developed some innovative features to our range of conrods. Firstly, we beefed up the Superleggera conrod by increasing the cross section of the beam, bumping up the power rating to 698. Secondly we added pressure oil feed to the gudgeon pins on both Superleggera and the FatRod and thirdly, we engineered piston crown cooling as part of the conrod design.

Pressure fed gudgeon pins is an Atomic innovation, borrowed from diesel engine technology. We redesigned our conrods to provide a direct pressure feed of engine oil to the load side of the gudgeon pin bush, thereby providing oil directly to the gudgeon pins and bushes. As turbo/supercharged engines make more power than their normally aspirated cousins, the forces of combustion are far greater which in turn place much greater loads on gudgeon pins, leading to excessive pin/bush wear. Providing pressurised oil feed to the pins increases life of the engine considerably.

Piston crown cooling is not new either, but has not been available for the Ford 6 cyl engine previously. This feature helps remove heat from the piston by spraying oil onto the underside. It is common practice in many high performance engines, such as the Nissan "Godzilla" 2.6Ltr engine, Sierra Cosworth, Turbo Porsches, etc who employ this method of internal thermal management. This feature will help to "detonation proof" our engines by drawing heat from the piston in much the same way a rich air/fuel mixture is cooler than stoichiometric.

We are the first manufacturer to offer this features in Ford DOHC engines/components and since 2009 both features have been integrated into our conrods.

Atomic conrods are the most technologically advanced conrod on the market... accept no substitutes!

#306200 - Atomic "Superleggera" Conrods
6.060" C/Centre length, to suit 22.0mm (.866") diameter gudgeon pins. Features dowelled caps, pressurized oil feed to gudgeon pins and fitted with ARP2000 bolts. Weight - 635 grams.

#306201 - Atomic "FatRods"
6.060" C/Centre length, to suit 22.0mm (.866") diameter gudgeon pins. Features dowelled caps, pressurized oil feed to gudgeon pins and fitted with ARP2000 bolts. Weight - 710 grams.

#306202 - Atomic "StreeTorquer" Conrods
6.060" C/Centre length, to suit 22.0mm (.866") diameter gudgeon pins. Features dowelled caps and fitted with ARP2000 bolts. Weight - 560 grams.

Please note: Big end tunnels are finished to 2.239" (bottom size) and the small ends are left at .866" so final clearancing can be done by the engine builder to provide the correct clearance to suit the gudgeon pins. We do this as we have found some gudgeon pins come as a finished (Metric) size of 22.00mm (.8665") whereas other pins (predominately US made) are finished to an Imperial measurement of .866".