4-STROKE TOP END PERFORMANCE UPGRADE COMPONENTS

Following are some helpful tips for trouble free installation of the more popular 4-stroke hi performance upgrade components for your 4-Stroke ATV. Engine component manufacturers engineer their products to be as bolt-in as possible, but it is impossible for all components to be modification free. It is the job and responsibility of the person doing final assembly of the engine to perform final check that tolerances are correct and with in specification. Failure to check the necessary tolerance can cause engine damage and or engine failure.
If you do not feel qualified to perform these tasks, you are advised to consult a trained professional.
These tips are recommended to be used in conjunction with all manufacturers' instructions.

PISTONS:

Piston Cylinder Wall Clearance: Piston to cylinder wall clearance must always be checked. By checking we recommend that tolerance is measured using a micrometer and dial bore gauge. Consult piston manufacture or trained professional for specific tolerances.
Even when same size or STD size pistons are being installed. Clearances below minimum can cause an engine seizure, excessive clearance can cause power loss premature cylinder wear etc.
It is also imperative that the cylinder bore surface (nikasil or steel sleeve) be checked that it is in good condition free from scratches, machine marks, grooves etc.
If new piston is being installed in *steel sleeve* type cylinder one of the following options will be required:
A) Oversized piston require-Cylinder bore and hone (sizing hone)
B) Same size piston require-deglazing type hone (ball hone 120-180 grit)
If new piston is being installed in *nikasil* type cylinder one of the following options will be required:
A) Oversized pistons require-Cylinder Strip/Bore/Replate
B) Same size piston require-deglazing type hone (ball hone 220-280 grit)

Piston to Valve Clearance: Whenever any of the following components **piston, camshaft** or **valves** are changed from original stock OEM parts. It is imperative that proper clearance is maintained between valve and piston. A minimum of .060" valve to piston is recommended. Piston pocket location and diameter should also be checked. Minimum pocket clearance to outside surface of valve should be .020".
For expanded instruction on checking these tolerances consult a trained engine professional and/or consult DRI TECH document "How to Check Valve to Piston Tolerances"

Piston Deck Height: Whenever aftermarket piston or aftermarket gaskets are installed piston to head clearance should be checked.

A) On engines 300cc and smaller minimum .040" is recommended
B) On engines 400cc and above minimum .060" is recommended

Piston Pin Fitment: Before installing new piston assembly a number of things should be checked regarding the piston pin.

A) Pin to Piston fitment should be .0005" as a general rule. Should never exceed .001". Check manufactures specific tolerances. Tolerances will vary depending on model.
B) Pin to Connecting Rod fitment. Should be .0005" as a general rule. Tolerance should never exceed .001". Check OEM service manual for specific tolerances. Tolerances will vary depending on model and manufacture.
C) Pin length should always be checked prior to install. Make sure pin is not too long or short. Pin should fit .005" to .020" inside circlip grooves.
   NOTE: Always use new piston circlips. During install be careful not to squeeze piston-retaining circlip too far or clip will loose its metal memory.

RINGS:

Ring End Gap: Rings must always have their end gap checked. As a general rule of thumb allow .004" per 1 inch of bore diameter.

Rings Up or Down: The top and 2nd rings are marked with a trademark, number or distinguishing mark. These marks ALWAYS face up when rings are installed on to piston.

3 Piece Oil Ring: All 4-Stroke pistons have 3-piece oil rings. It is critical to proper ring function that the oil ring is installed without damage. When installing piston/ring assembly into cylinder it may be appropriate to use a ring installer to help ensure rings are not damaged.

CAMSHAFTS:

Piston to Valve Clearance: Because most high performance camshafts increase performance by increasing lift (allowing valves to go down further) and duration (allowing valves to stay open longer) it is necessary to check that there is adequate clearance between each valve and the piston. A minimum of .040" clearance is recommended. This tolerance must by checked by installing clay on to top of piston and then turning engine over, letting valves leave their indentation in the clay, which is then measured. Consult DRI TECH SHEET regarding Checking Tolerances for more information.

Valve Springs: With today's modern day 4-Stroke engines almost any camshaft that offers any type of performance gain requires the installation of a Heavy Duty set of valve springs. Consult manufactures instructions for specific instructions for your camshaft.

Valve Guides: On moderate to high lift camshafts it is often required to install a shortened valve guide. This would be necessary because increased cam lobe profile would push valve spring retainer down further where it may come into contact with stock valve guide. Consult manufacturer instructions for specific instructions for your camshaft.

Rocker Arms: On models that use a rocker arm design it may be necessary to install modified rocker arms. For example on most Honda ATV's using rocker arms the rocker pad that contacts the camshaft prematurely wears through the hard facing causing camshaft lobe damage. To correct this problem cam manufacturers weld/grind and hard face each rocker to match the camshaft. Consult manufacturer's instructions for specific instructions for your camshaft and its rocker arms

VALVE SPRINGS:

Stack Height: When installing HD Valve Spring kits it is very important to read and follow the manufacture installation instructions. Specifically the stack height. The stack height controls the spring preload affecting the springs rate which is a major factor in a valve springs performance.

Keepers: Kits vary by design. But whether your new HD Valve Spring kit uses OEM Keepers or comes with keepers it is important to evaluate keeper installation in relation to valve stem and spring retainer.

VALVES:

Valve Seats: As a general rule, when installing a new valve the valve seat should be freshly cut either by stone or valve seat cutting machine. When installing an oversized valve it will be mandatory to remachine valve seats to match oversized valve, for superior results use of a Serdi type machine is recommended.

VALVE GUIDES:

Install: Special tools are required to install valve guides properly. It is also very wise to heat up head during the valve guide removal and install process.

Sizing: After installing an after market valve guide it is mandatory that the inside of the guide be sized to match the valve stem. This is done with a reamer and or special type hone.

Valve Seats: In all cases after installing/changing a valve guide the valve seat in the head must be remachined. This is necessary because when the guide is changed the valve stem will not be in the exact same location when valve is installed in guide. These misalignments, even if extremely slight will cause power loss and reliability issues.

*NOTE: **OEM** means Original Engine Manufacturer