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Advanced Motorcycle Technology
from Honda R&D

Offset, Dual-Pin Crankshaft

A crankshaft design that achieves perfect primary balance in V-twin engines with an included angle of less than 90° between cylinders, can offer substantial benefits in terms of performance and compactness.

The objective:
Design and manufacture a crankshaft which can achieve perfect primary balance in V-twin engines with an angle between cylinders of less than 90°.

The technology:
The Honda offset, dual-pin crankshaft. Developed by Honda R&D, this innovative design provides the narrow-angle V-twin engines of the 750 Shadow,™ 500 Shadow™ and VT500 Ascot™ with perfect primary balance.

V-twin engines with an included cylinder angle of less than 90° offer significant design advantages in terms of the engine's compactness and its aesthetic qualities. However, using an angle of less than 90° in V-twin engines has, until now, created an engine imbalance that could only be remedied through the use of auxiliary balancing devices. Honda R&D has met and solved that problem.

The solution is Honda's unique offset, dual-pin crankshaft.

By using two offset crankpins, instead of a more conventional single pin design, it is possible to build an engine of any included cylinder angle from 45° to 89°, while maintaining perfect primary balance. This is accomplished by calculating the precise angle between the crankpins that will compensate for the less than 90° included angle between cylinders. To make that calculation possible, Honda R&D has formulated an equation which determines the precise offset between the crankpins needed to achieve perfect primary balance in a V-twin engine of less than 90°.

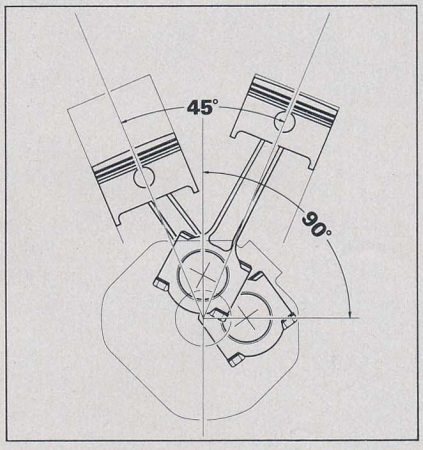
$$X = 180° - 2\Theta$$

In this equation, X is the amount of offset between crankpins necessary in an engine with an included cylinder angle of Θ degrees. In the case of the 45° 750 Shadow, $X = 180° - 2(45°)$; or, $X = 90°$. The equation proves that offsetting the crankpins 90° will result in an engine with perfect primary balance.

In its new generation of V-twin engines, Honda has proven the theory to be correct.

Honda has coupled this innovative design with advanced manufacturing techniques and forging capabilities that allow us to build an offset, dual-pin crankshaft that is both extremely strong and very narrow. As a result, our new V-twin engines realize all of the aesthetic, design and performance advantages of the "V" configuration, while eliminating primary engine imbalances and the need for cancelling them with auxiliary balancing devices.

The offset, dual-pin crankshaft represents a major breakthrough in the design of the modern V-twin motorcycle engine. It is available only through the research and manufacturing capabilities of Honda.



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