

4-Stroke engine to 2-Stroke: conversion benefits. Is 4-Stroke mandatory?

A traditional 2-Stroke (2S) engine is extremely polluting and so its use is limited to a very small market.

However, it has some characteristics which may lead to very interesting results. One of the reasons why a 2S is polluting is the requirement of a carter-pump mechanism in order to force fresh charge inside the cylinder. This leads to the need to have oil inside the fuel in order to adequately lubricate all the mechanical components, since an oil sump cannot be used.

At the same time, the presence of port valves (with their symmetric opening profile) in the cylinder leads to catastrophic HC emissions and low fuel-conversion-efficiency. All this could be solved just by using a traditional 4S engine layout and forcing it to work with a 2S cycle. The lack of an intake phase is compensated for by

the use of a compressor that forces air inside the cylinder. Anyway, the non-perfect scavenging leads to a high percentage of residuals inside the cylinder. This means high internal EGR effect useful for containing NOx emissions. The compressor is vital for such an engine and a certain flow rate of air (depending on the load) must be guaranteed. In order to ensure this, a turbo-compound system, electric compressor or air tank could be used. The higher specific torque-output allows the use of small engines without any sacrifice in terms of performance.

The smaller dimensions will lead to a relevant weight-saving, further contributing to a reduction in fuel consumption and pollutant emissions. Due to the required valve overlap, direct injection is almost mandatory to avoid unburned fuel in the exhaust line •

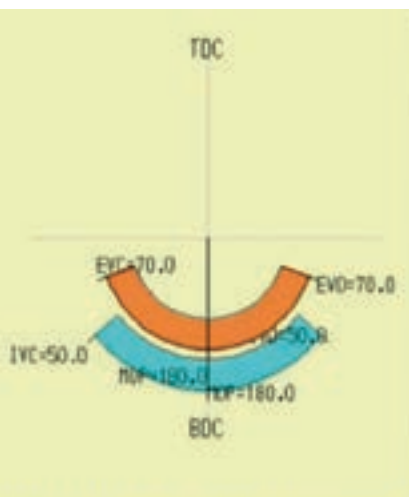


Figure 18. 2 Strokes Model Valve Timing

