

Start of Combustion

The screenshot shows the 'CYLPR1 Properties' dialog box with the 'Start of Combustion' tab selected. The 'Name' field is 'CYLPR1' and 'Units' is 'bar'. The 'Description' is 'Cylinder Pressure for Cylinder 1'. 'TDC Offset' is '0.0', 'Type' is 'Cylinder Pressure', and 'Cylinder' is '1'. The 'Start of Combustion' sub-tab is active, showing 'Type' as 'Channel Rising Edge', 'Channel' as 'INJ1', 'Start Window' as '-60.0 deg', and 'Finish Window' as '60.0 deg'. There are checkboxes for 'Align with cylinder TDC offset' (checked) and 'Invert value' (unchecked). 'Cancel' and 'OK' buttons are at the bottom right.

Figure 1: Channel Properties

Note that the start of combustion is specified in degrees after TDC. Most engine control systems work in reference to degrees before TDC. Depending on where you obtain the start of combustion value from you may need to invert the sign.

None

No start of combustion method is specified. This is equivalent of a fixed SOC value of zero degrees.

Fixed Value

Start of combustion is at a fixed value.

Channel Rising/Falling Edge

The start of combustion is determined by the first rising or falling edge found within a window of a specified reference channel.

If the channel includes information about many cylinders, i.e. a current clamps for each cylinders injector or coil wired in parallel, then you can use the “Align with cylinder TDC offset” option. This ensured the window is in reference to the configured channel.

Channel Average

This takes the start of combustion as the average value of another channel during the window specified. This can be used if the voltage output from an ignition angle meter is proportional to spark advance. The signal can be inverted if necessary and aligned to the current TDC offset.

Channel Value

This takes a value from another results channel. This may also include channels that have been acquired using ATI VISION. The value may also be inverted.

Align with cylinder TDC offset

When this option is selected the specified window is adjusted such that the channel and reference channel values are coincident at the same time.

Consider these usage scenarios for a four cylinder engine:

Four cylinder pressures and cylinder one injector (or coil) signal

	TDC Offset	Channel	Align
CYLPR1	0	INJ1	Y*
CYLPR2	540	INJ1	N
CYLPR3	180	INJ1	N
CYLPR4	360	INJ1	N
INJ1	0	-	-

*actually doesn't matter as CYLPR1 and INJ1 have the same TDC offset

Obviously in this scenario all cylinders are assuming the same start of combustion as cylinder one. You could achieve the same result by setting the start of combustion type to "Channel Value" for CYLPR2-4 and selecting channel "INJ1.INJTM1".

Four cylinder pressures and four individual injector (or coil) signals

	TDC Offset	Channel	Align
CYLPR1	0	INJ1	Y*
CYLPR2	540	INJ2	Y*
CYLPR3	180	INJ3	Y*
CYLPR4	360	INJ4	Y*
INJ1	0	-	-
INJ2	540	-	-
INJ3	180	-	-
INJ4	360	-	-

*actually doesn't matter as cylinder pressure and referenced injector channels have the same TDC offset

Four cylinder pressures and four injector (or coil) signals superimposed on single channel

	TDC Offset	Channel	Align
CYLPR1	0	INJ1	Y*
CYLPR2	540	INJ1	Y
CYLPR3	180	INJ1	Y
CYLPR4	360	INJ1	Y
INJ	0	-	-

*actually doesn't matter as CYLPR1 and INJ have the same TDC offset