Techniques et avantages de l'AWG et comment ne pas se tromper AFG AWG DDS

First of all, it is important to understand the difference between the different types of waveform generators that are based on different technologies and thus have different capabilities.

Traditional Function Generators

These are analog generators based on Voltage Controlled Oscillators (VCO) capable of delivering limited standard waveforms. They are usually inexpensive units and have no arbitrary capabilities.

Arbitrary Function Generators

Arbitrary Function Generators (AFG) use Direct Digital Synthesis (DDS) technology. This technology uses a stored waveform with a fixed sampling clock. The DDS technology offers a solution where a phase accumulator determines the phase increments in which the waveform is sampled. A high frequency results in large phase increments so as to skip points in the stored waveform. Low frequency leads to small increments and even at times the same points are repeated in order to complete a full cycle. In this type of addressing scheme it is not always the same points that are sampled in each waveform cycle. This can compromise the fidelity of the output waveform and also result in amplitude modulation effects as well as jitter and phase noise. Furthermore, given this architecture the AFG will always have a small memory and no sequencing ability.

Arbitrary Waveform Generators

Arbitrary Waveform Generators (AWG) also use stored waveforms but have a variable Sample Clock and address generator both of which can be user defined. As such, the AWG can generate any waveform shape. Higher frequency can be achieved by either increasing the sampling rate or by shortening the waveform length. Low frequency can be done by decreasing the sampling rate or increasing the waveform length. The frequency is determined by the following logic :

$$Frequency = \frac{Sampling\,Rate}{Number\,of\,Points}$$

Being Memory based, the AWG enables the user to program its memory by dividing its memory into segments of data and use any segment individually. Furthermore, a true AWG is usually equipped with a sequencer allowing it to link and loop the segments in any manner the user chooses.