In order to comply with Electro-Magnetic compatibility (EMC) standards for conducted Electro-Magnetic Interferences (EMI) at low frequencies and to reduce audible noise annoyances in electric machines, we propose an Optimal Random Pulse Width Modulation (ORPWM) for the control of the three-phase inverter in a Variable Speed Drive (VSD). After giving the modulating principle, a spectral analysis of output voltage shows the EMC advantage of the proposed ORPWM compared to the classical Deterministic PWM (DPWM). An application to a VSD using induction motor allows affirming that the proposed technique doesn't affect the control performances, in the other side the randomization effect is confirmed and analyzed in steady state characteristics of the motor in closed loop, which is advantageous in reducing acoustic noise