Dead time is used to avoid the short circuit of a DC link for the three phase pulse width modulation (PWM) voltage source inverters (VSI).But adding the dead time into the control signals causes severe distortion in phase currents and in output voltage waveforms which in turn creates iron and core losses and increases torque ripples. Especially in low speed applications the control performance and stability of the system will be degraded substantially. The effect of the dead time will be analyzed and investigated for both mosfet and igbt based VSI and for various PMSMs. The proposed dead-time compensation method will be software based hence will not require any additional hardware and will not need precise current sampling especially in the zero crossing regions. The method will be integrated to the PMSM drive which is controlled by FOC algorithm. The effectiveness of the proposed method will be verified by experimental results and spectrum analysis. The waveforms of the phase, id and iq currents will be compared with and without compensation in the steady state and also during the dynamic process.