This study is performed to understand the effect of workpiece hardness and cutting parameters on cutting tool stresses in finish turning of soft (22 HRc) and hardened (52 HRc) H13 steel using low content CBN cutting tool by finite element analysis (FAE). For this aim, a series precision dry turning tests were conducted with different cutting parameters (Vc: 150, 250, 350 m/min; f: 0.05, 0.2, 0.35 mm/rev., a: 0.2, 0.5, 0.8 mm) and then the cutting forces Fc, Ff, Fp were recorded. After literature procedure about FEA, FEA was established. As a result, the cutting stresses decrease with increasing the depth of cut due to increase the tool-chip contact length/area. The low depth of cut and high feed rate leads the small chip contact region on rake face and then compression stresses increase with this phenomenon. Eventually, FEA on tool stress results give information to select the optimum cutting parameters that the largest compression stresses focusing on tool-chip contact region may cause the crater wear, the maximum tensile stress occurring under nose radius of the main cutting edge can lead the flank and notch wear modes.