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. For this aim, a series of precision dry turning tests were conducted with different cutting parameters (V : 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. Finite element analysis shows that cutting stresses decrease with increasing depth of cut due to the increase of the tool-chip contact length/area. The low depth of cut and high feed rate lead to small chip contact region on the rake face and as a result increase the compression stresses. Finite element analysis of tool stress results gives information for selection of the optimum cutting parameters and shows that the largest compression stresses focused on the tool-chip contact region may cause the crater wear. The large tensile stress occurring under nose radius of the main cutting edge can lead to the flank and notch wear modes.