This paper discusses alteration of microstructure and mechanical properties of low carbon steel after severe shot peening process. An ultra fine grained surface layer was formed on AISI 1017 mild steel by means of severe shot peening process. Surface characteristics were affirmed using optical microscopy, scanning electron microscopy (SEM) and high resolution transmission electron microscopy (HRTEM). Nano hardness measurements were taken along the depth from shot peened surface using nanoindentation methods. The results showed that severe (unconventional) air blast shot peening process is an effective way to obtain ultra fine grained surface layer and to obtain superior mechanical properties.