

ABSTRACT

At the present dissertation study, the initial report will concentrate on the several types of air-guns as well as their working principles. Subsequently, a suitable air-gun will be designed which (in the future) may be manufactured and installed in the Mechanical Engineering lab of the university, to be used for experimental purposes. An illustration will follow, on the principle of operation of the air-gun, with the aid of various diagrams, as well as an outline on its various applications. Furthermore, a 3D design of the air-gun will be carried out, using Solidworks software, including a parts list. Another significant aspect of the project is to carry out stress analysis and design calculations in order to estimate the necessary pressure to achieve suitable projectile velocities. Moreover, the behavior of the sheet metal under normal and shear stress will be examined in relation to different parameters that affect the impact force exerted by the projectile on the metal sheet. Additionally, a simulation of the plastic behavior of the metal sheet will be performed, using Solidworks software, to ascertain the fractural strength of the metal sheet under maximum displacement. Finally, the concluding remarks will include analysis of the calculated stresses and the design parameters of the electro-pneumatic system of the air-gun.