

Design and optimization of the housing of spray unit of a linear motor operated spray gun

ABSTRACT

Pneumatic system is normally used to trigger the automatic spray gun for conventional spray operations. Highly skilled labors and a number of adjustable knobs are required to produce the high quality coating works using the conventional automatic spray gun which is cost intensive. Therefore, linear motor operated multiple spray operations spray gun has been developed. This spray gun consists of two spray units, an air control and supply unit and a triggering unit to carry out the multiple spray operations. This paper focuses on the design optimization and fabrication of the housing of the spray units which hold fluid nozzles, air nozzles, an assembly cap, a needle valve or a ball valve. In the air less and air assisted airless spray systems, high pressurized liquid is passed through the nozzle which is held by the housing of the spray unit. Before entering into the nozzle, the high pressurized liquid is passed through the housing. For the simplicity of the analysis, it is assumed that the housing is an open-ended pressure vessel. From the analysis, dimensions and material selection have been optimized and finally the spray units have been fabricated and tested. During the performance test it is seen that satisfactory transfer efficiency of spray operation has been achieved by using newly developed spray housing of the spray units, which proves the stability of the spray housing during high pressure operation.

Keyword: Spray gun; Spray process; Design; Pressure vessel; Failure analysis; Deflection analysis