This investigation has thrown light into the improvement of quality and productivity of surface hardened components with optimizing the process parameters by employing the Taguchi’s Design of Experiment in Gas Carburizing and Factorial Design of Experiment in Induction Hardening Processes. Further, this study shows the possibility of decreasing the shape and size distortion of the components. It also shows the possibility of inducing beneficial compressive residual stress at the surface and beneath the surface under optimum parameters combination in both Gas Carburizing and Induction Hardening Processes.

This optimization study can be implemented to various heat treatment processes to achieve maximum productivity and required quality. Further, the Modeling approach for predicting the volume fraction of martensite can be attempted to any material/component of any shape, size, and any configuration by varying the process variables in Induction Hardening process to obtain the required hardness.

Considerable work can be done in this area to attain a unique/optimal solution to achieve a better surface integrity with more production rate.