ABSTRACT

In the current scenario, new model introduction in the automobile industry is becoming complicated. Shorter life span of products and high customer expectations on product ranges demand automobile manufacturers to launch a wider product range with shorter development times and lower investments. It is paramount to minimize the investment for a product’s development and manufacturing facility creation. Multi model flexible production body shop is one of the appropriate solutions to meet this demand of various model production in one shop; particularly for low volume models. However, introduction of a new model in a multi-model shop is very complex due to floor-space constraints and commonization issues. Optimization of equipment is necessary to utilize the existing vacant spaces in the body shop. This subject is discussed in detail, by studying the effects connected with reduction of geometry stations in a body shop on the space constraint issues for a new model introduction.

To optimize geometry stations, it is necessary to calculate the optimal spot quantity to set the geometry of an assembly. To identify the optimal spot quantity, an industrial experiment was conducted with L27 Taguchi method. Dimensional variations of the samples were recorded in two stages, Post geometry spot welding and Post Re-spot welding. The measured data was analyzed using statistical method and concluded the minimum spots required to establish geometry of welded parts. A geometry spot distribution model was developed based on the outcome of the experimental study to calculate the number of Geometry and Re-spot stations for a body shop. The results are presented with industrial case studies. A spot weld assignment software program was developed using CATIA V5 in product design environment. The developed methodology for appropriate spot weld distribution among the welding stations for body shop is simple to use for the product and process designers during any new product planning, and this can also be used for optimization of any existing cells of the body shops. The geometry station optimization also resulted in improved quality, lower capital investment and higher productivity.