Machining attributes to a major channel of manufactured goods. The machined components should be able to achieve both the geometrical and dimensional requirements. To apply the concept of design for manufacturability, the designer specifies tolerance on the parts in order to meet the functional requirements as well as for cost effective manufacturing. For cost effective manufacturing predictive models need to be developed, which in turn could be used to decide the optimum values of process parameters. These parameters in the right combination may help to achieve the desired output, i.e. to optimize geometrical error on machined components, vis-à-vis its functional requirements. In the present work the case studies considered are of dual plate check valve and nozzle check valve. Machining was carried out on vertical machining center. The range of input parameters such as cutting speed, feed and depth of cut were decided by standards and process capability along with the industry recommendations. The response parameters considered are flatness and surface roughness in the face milling operation, while cylindricity and perpendicularity in the drilling of WCB material, the most widely used valve material. The predictive models are developed for the said responses. Grey Rational Analysis was used to find out the optimum machining parameters for various responses. The fuzzy logic based models are also developed to predict the responses.

**Keywords:** GD & T, surface roughness, flatness, cylindricity, perpendicularity, ANOVA

**Application:** The developed predictive models will be useful to the practising engineers, which in turn help them to decide the process parameters to get the desired values geometrical tolerances.

**List of Publications:**


