The technique of assembly by shrink fit is increasingly used today. However, the methodology of parts sizing has not changed in 50 years. Assembled parts are assumed to have accurate dimensions and very low form defects. This has the disadvantage of increasing the cost of parts production. To reduce manufacturing costs, the study of the influence of form defects on the characteristics of assembly strength is essential. Taking default form into account assumes that the tightening (difference between the diameters of the shaft and the bore) is defined. In the case under consideration, the tightening depends locally on the radius. Two definitions of the tightening are proposed: maximum tightening and mean tightening. It is shown that the form defect is not detrimental to the assembly strength: the mean pressures are nearly equivalent to the classical case of surfaces without defects. Various finite element simulations were performed. The influence of the value and the type of defect have been studied for conventional tightening (elastic materials) and more intensive tightening (elasto-plastic behavior) in the case of axisymmetrical and non-axisymmetrical parts. The theoretical results correlate well with those obtained through experiments. However, for intensive tightening, the behavior of the roughness is not negligible