Abstract

The assembly technique by shrink fit is increasingly used today because it allows for the assembly of two pieces without any intermediary part simply by the tightening effect given by the difference in diameters of the two parts assembled. The definition of assemblies depends on calculation models available in the standard. They make very restrictive assumptions that limit the geometrical defects and the surface finish. It is increasingly common to use a finite element method to better adapt the model to the complex forms of industrial parts. However, the standard is limited with regard to the consideration of roughness which results in a loss of tightening. An easy way to integrate the behaviour of the asperities in the process of shrinking industrial parts is to use a homogenized finite macro-element. Not having a simple analytical model of behaviour of asperities, the identification of this at the microscopic level is performed by numerical modelling. For conventional tightening, an elastic law with transverse isotropy is adequate to describe the behaviour of asperities under shrink pressure. The thickness of the element is a key parameter. In comparison with axisymmetric modelling, the mesh describing the shape of the asperities, it is established that the ratio of average roughness height on thickness of the element must be of the order of ten times the mean roughness height. This homogenization technique is finally used to simulate the loss of tightening in experimental cases. The results are globally adequate