Curriculum for Excellence

H

Graphic communication

Manufacturing Tolerances

Manufacturing Tolerances

When most products are manufactured, the component parts are made separately before being assembled into a product. If a component part is not made to the correct size it will not fit with the other parts in the assembly.

A manufacturing tolerance added to the dimensions set the limits of permissible manufacturing error in sizes that still allow components to be assembled. Tolerancing dimensions is the way designers and architects ensure that components can fit together during assembly.

Functional and non-functional dimensions

All dimensions are subject to tolerances. Tolerances are described as either **functiona**l or **Non-functional.**

Functional tolerances are applied to dimensions that directly affect the function of the product e.g. dimensions that enable a product to assemble or enable moving parts to work. Functional tolerances are noted beside the dimensions on the drawing.

Non-functional tolerances are applied to all other dimensions that are not critical to the functioning of a product. Non-functional tolerances are normally found in the title block.

You may be asked about functional or non-functional tolerances and dimensions in your exam. In addition to this you will be expected to add functional and non-functional tolerances to your course assignment.

Manufacturing Tolerances

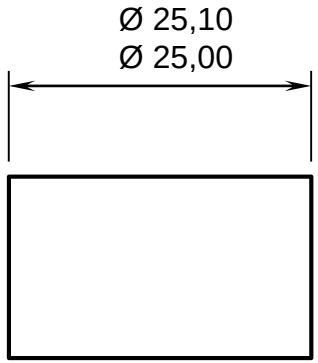
There are three main reasons for applying manufacturing tolerances:

1. To ensure that parts can assemble correctly.

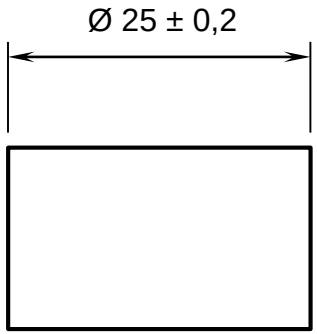
2. To give manufacturers leeway during production; it is impossible to mass produce components to exactly the correct size. The more precise the measurements the more expensive the components are to make.

3. To enable interchangeability of parts, for instance when one part wears out and needs replaced the new part should fit without modification.

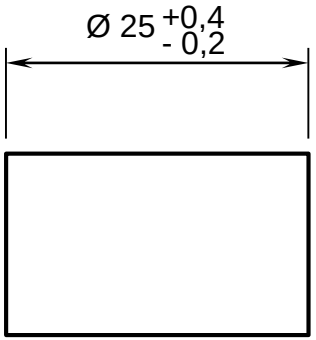
Method of Displaying a Functional Tolerance



Specific limits of size

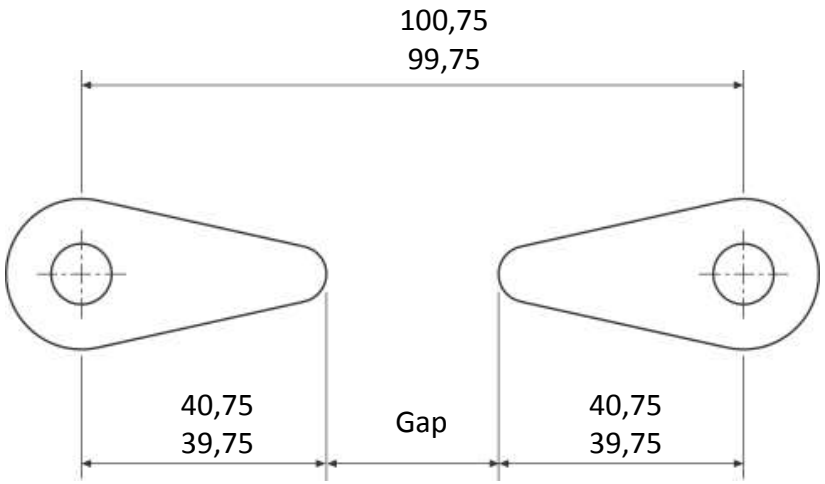


Symmetrical Tolerance



Asymmetric Tolerance

Example Question



The paddle from a pinball game are shown. The paddles are set at a nominal 100 mm apart centre to centre.
The distance between the pivot centre and the end of the paddle is 40 mm with a tolerance of +0,75 and -0,25 applied.
Calculate the minimum and maximum distance between the paddles.
(show all working)