Independency Principle

The independency principle specifies a requirement for the relationship between linear dimensional tolerances and geometrical tolerances on a drawing.

Where ISO 8015:1985 is specified on a drawing, the independency principle is the default condition. The ***independency principle*** states that each specified dimensional or geometrical requirement on a drawing shall be met independently, unless a particular relationship is specified (i.e. MMR, LMR, or envelope requirement).[10]

Where no relationship is specified on a drawing, a geometrical tolerance applies regardless of feature size, and the two requirements (size and geometrical) are independent.[11] This means size and form, size and orientation, or size and location are independent requirements and affect (or define) the extreme boundary of the feature of size.

For a cylindrical feature of size, the linear size tolerance controls the actual local size only (two-point measurement) and does not control the form (i.e. circularity, cylindricity, or straightness).

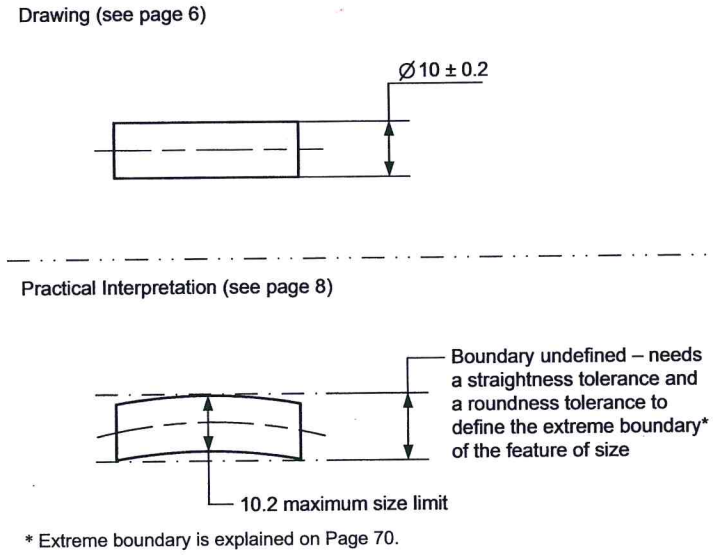


Figure 3.7 ***Independency Principle Example***

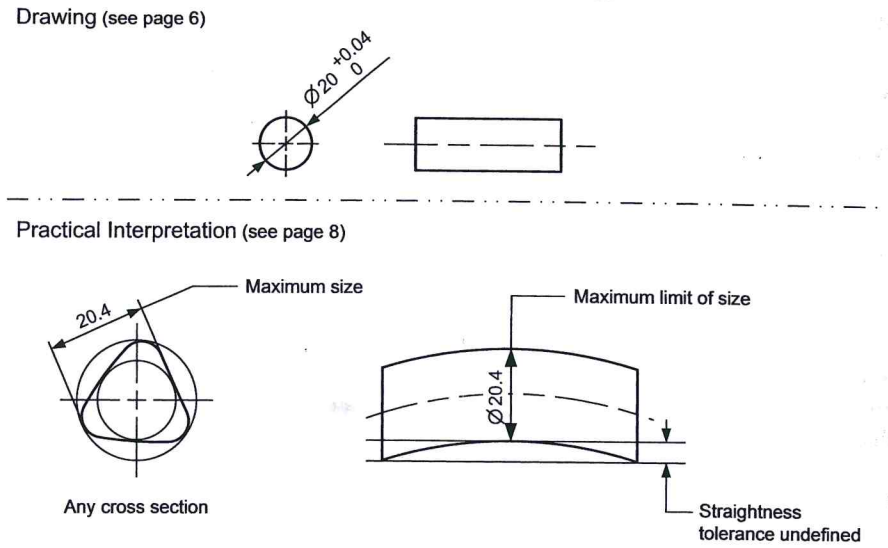


Figure 3.8 ***Effects of the Independency Principle on Form***

The form deviations that are not controlled by the size dimension must be controlled somewhere on the drawing or the workpiece definition will be incomplete. The form deviations may be defined using one of the following methods:

- Directly indicated form tolerances
- General geometrical tolerances (i.e. ISO 2768)
- The envelope requirement

Linear size tolerances do not impose any geometrical interrelationship between features (i.e. perpendicularity between sides of a cube); therefore, in order to completely define a part, the orientation and location of all features must be defined. These characteristics may be defined using one of the following methods:

- Orientation tolerances
- Location tolerances
- General geometrical tolerances
- Run-out tolerances

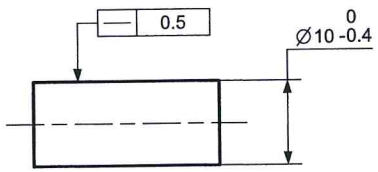
Consequently, where the independency principle applies, the drawing requires an indication for each characteristic (size, form, orientation, location). If any of these relationships are not specified, the drawing is incomplete. This is why the ISO standards system requires the specification of general geometrical tolerances (i.e. ISO 2768) on every drawing that uses the independency principle (ISO 8015) as the default.[12] A general geometrical tolerance standard invokes geometrical relationships where the drawing does not explicitly state one.

Straightness of an Integral Feature (Surface Element) With Independency Principle

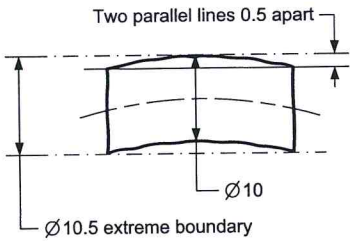
Where a drawing uses the independency principle (ISO 8015 stated on the drawing), the part functional requirements may require a straightness tolerance to be added to the drawing. The straightness tolerance frame is commonly applied to a surface element using a directed leader line applied either to the integral feature or to the feature's extension line.

Figure 6.14 shows a straightness tolerance application on a drawing where the independency principle applies. In this application, the straightness tolerance defines a tolerance zone as the space between two parallel lines 0.5 apart within which the real surface must be. The straightness tolerance is added to the size dimension to establish the extreme boundary.

Drawing (see page 6)



Practical Interpretation (see page 8)



Comments

- The straightness tolerance zone applies to each line element individually
- For the extreme boundary is equal to the straightness tolerance plus to the size dimension
- The straightness tolerance value may be larger than the size dimension tolerance
- Each actual local size must be between LMS and MMS

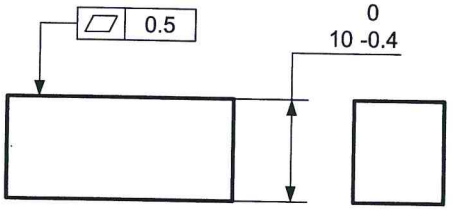
Figure 6.14 ***Straightness Applied to a Surface Element With Independency***

Flatness Tolerance With Independency Principle

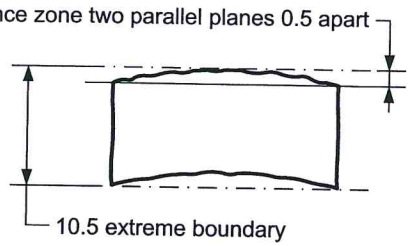
Where a drawing uses the independency principle (ISO 8015 stated on the drawing), the part functional requirements may require that a flatness tolerance be added to the drawing. The flatness tolerance frame is commonly applied to a surface element using a directed leader line applied either to the integral feature or to the feature's extension line.

Figure 6.6 shows a flatness tolerance application on a drawing where the independency principle applies. In this application, the flatness tolerance defines a tolerance zone as the space between two parallel planes that are 0.5 apart. The real surface must be within this tolerance zone. The flatness tolerance value is added to the dimension to establish the extreme boundary.

Drawing (see page 6)



Practical Interpretation (see page 8)



Comments

- The extreme boundary is equal to the MMS + flatness tolerance value
- The flatness tolerance value may be larger than the size dimension
- Each actual local size must be between LMS and MMS

Figure 6.6 ***Flatness Applied to a Surface With Independency***