ASME Y14.5M Terminology Review

1. Material Condition

The size of a geometric entity, e.g., a sphere, in terms of the amount of material associated with it. For example, the MMC or LMC

2. Maximum Material Condition (MMC)

The condition of a geometric entity of size when it has the most material associated with it. For example, the largest pin or smallest bore.

3. Least Material Condition (LMC)

The condition of a geometric entity of size when it has the least material associated with it. For example, the smallest pin or largest bore.

4. Considered Feature

The feature under study

5. Geometric Characteristic

A physical attribute of a feature pertaining to its size, location, orientation, runout, or form.

6. BASIC Dimension

A linear or angular dimension enclosed in a frame, which specifies either:

- the target location or orientation of a feature
- the location of a Datum Target
- the location or orientation of a tolerance zone

BASIC dimensions have no tolerance associated with them.

7. Nominal Value

The target value for the size, location, orientation, or form of a machine part feature, with which a tolerance is associated.

8. Actual Value

The measured value of a geometric characteristic.

9. Feature Control Frame

A rectangular frame on a drawing with two or more compartments that is used to specify:

a. the geometric control to be applied to a feature
b. the shape and size of the tolerance zone (plus possible Material Condition and other modifiers)
c. an ordered list of Datum Features (with possible Material Condition modifiers), which serve to define the applicable Datum Reference Frame

10. Datum Feature

A specially designated, physical part feature, which serves to eliminate degrees of freedom during Datum Reference Frame construction.

11. Datum Reference Frame

A Cartesian coordinate system constructed using Datum Features that serves to define the locations and orientations of tolerance zones associated with a part's features.

12. Datum

One of the seven components of a Datum Reference Frame, thus either a reference point and/or line, and/or plane.

13. The process of Datum Reference Frame construction

a. reading the FCF

b. constructing a set of Datum Feature Simulators

c. engaging the primary, secondary, and tertiary Datum Feature Simulators with their associated Datum Features (and thus eliminating the degrees of freedom of the part)

14. The ability to visualize the components of common machine part features helps:

one understand which Y14.5M tolerancing tool can be used, since each tool applies to only specific feature components.

15. Describe the shapes of the tolerance zones defined by:

Flatness: slab-like

Surface Element Straightness: straight ribbon-like

Derived Median Line Straightness: cylindrical, with potential Material Condition distensions.

Derived Median Plane Straightness: slab-like with potential Material Condition distensions

Circularity: annular ribbon-like

Cylindricity: tube-like

Position: depending on the feature and feature component, the tolerance zone shape could be cylindrical, slab-like, spherical, conical, wedge-like, and ellipsoidal.

Concentricity: cylindrical

Symmetry: slab-like

Section Profile: (curved) ribbon-like

Surface Profile: skin-like

Parallelism: depending on the nature of the Datum Feature to which parallelism is specified and the nature of the feature component to be controlled, the tolerance zone shape can be slab-like, cylindrical, or straight ribbon-like.

15. Describe the shapes of the tolerance zones defined by:

Position requires the entire axis of the considered feature to lie within a cylindrical tolerance zone of diameter .015 inches, regardless of the feature's size, relative to a Datum Reference Frame constructed using Datum Features A, B, and C.

Reference: Course Notes, "Applying ASME Y14.5M to Design, Manufacturing, & Inspection, W. Tandler, 1999.