3D Animation Style Dictionaries

A *3D animation style dictionary* (PDF 1.7) specifies the preferred method that viewer applications should use to apply timeline scaling to keyframe animations. It can also specify that keyframe animations be played repeatedly. The **AN** entry of the 3D stream can specify a 3D animation style dictionary.

A keyframe animation provides key frames and specifies the mapping for the position of geometry over a set period of time (*animation timeline*). Keyframe animation is an interactive feature that is highly dependent on the behavior and controls provided by the viewer application.

Table 9.36 shows the entries in an animation style dictionary.

Optional?

KEY	TYPE	VALUE
TABLE 9.36 Entries in an 3D animation style dictionary		
Type	name	(*Required*). The type of PDF object that this dictionary describes; if present, must be **3DAnimationStyle**
Subtype	name	(*Optional*) The animation style described by this dictionary; see Table 9.37 for valid values. If an animation style is encountered other than those described in Table 9.37, an animation style of **None** is used. Default value: **None**
PC	integer	(*Optional*) An integer specifying the play count for this animation style. A non-negative integer represents the number of times the animation is played. A negative integer indicates that the animation is infinitely repeated. This value is ignored for animation styles of type **None.** Default value: 0

The descriptions of the animation styles (see Table 9.37) use the following variables to represent application time or keyframe settings specified in the 3D artwork.

- t is a point on the animation time line. This value is used in conjunction with

the keyframe animation data to determine the state of the 3D artwork.

- [r_0, r_1] is the keyframe animation time line.

- t_a is the current time of the viewer application.

- t_0 is the time when the viewer application starts the animation.

- p is the time it takes to play the keyframe animation through one cycle. In the case of the **Linear** animation style, one cycle plays the animation through once from beginning to end. In the case of the **Oscillating** animation style, one cycle plays the animation from beginning to end and then from end to beginning.

- m is the positive multiplier specified by the **TM** entry in the animation style dictionary

TABLE 9.37 Animation styles	
None	Keyframe animations should not be driven directly by the viewer application. This value is used by documents that are intended to drive animations through an alternate means, such as JavaScript.
Linear	Keyframe animations are driven linearly from beginning to end. This animation style results in a repetitive playthrough of the animation, such as in a walking motion. $t = (m(t_a - t_0) + r_0) \% (r_1 - r_0)$ $p = (r_1 - r_0) / m$ The "%" symbol indicates the modulus operator.
Oscillating	Keyframe animations should oscillate along their time range. This animation style results in a back-and-forth playing of the animation, such as exploding or collapsing parts. $t = (0.5)(r_1 - r_0)(1 - \cos(m(t_a - t_0))) + r_0$ $p = 2 * pi / m$