`AGG_TRANSFORM_NULL`	$\mathbf{x}$	
`AGG_TRANSFORM_REVERSE`	$[-x,\, y]$	reverse direction of curve
`AGG_TRANSFORM_PLANE_ROTATE`	$\mathbf{x}_0 + (\mathbf{x}-\mathbf{x}_0)\mathbf{R}^T$	rotate about $\mathbf{x}_0$
`AGG_TRANSFORM_SHRINK`	$\mathbf{x}_0 + s(\mathbf{x}-\mathbf{x}_0)$	scale about $\mathbf{x}_0$
`AGG_TRANSFORM_SHIFT`	$\mathbf{x} + \Delta\mathbf{x}$	3D translation by $\Delta\mathbf{x}$
`AGG_TRANSFORM_SCALE`	$s\mathbf{x}$	global scale in plane

Table 1: Transforms in order of application to a shape

Closed curves ("shapes") used to define cross-sections are parameterized using x, $-1 \leq x \leq 1$ with $x < 0$ defining the lower portion of the curve and $x > 0$ the upper. The variable runs continuously from the trailing edge along the lower surface to the leading edge and back to the trailing edge. Coordinates are calculated as

$$y_U = x^{n_1}(1-x)^{n_2}\sum_{i=0}^{n} s_i^{(U)} S_{n,i}(x), \tag{1}$$

$$y_L = -|x|^{n_1}(1-|x|)^{n_2}\sum_{i=0}^{n} s_i^{(L)} S_{n,i}(|x|). \tag{2}$$

"Aerofoils" are defined similarly but in terms of the thickness distribution, the trailing edge thickness, and the camber line.

Definition of a sphere of unit diameter centred at $[0, 0, 1/2]$:

$$x = 2u^{1/2}(1-u)^{1/2}(|v|-1/2); \tag{3a}$$

$$y = \operatorname{sgn}(v)2u^{1/2}(1-u)^{1/2}|v|^{1/2}(1-|v|)^{1/2}; \tag{3b}$$

$$z = u, \tag{3c}$$

$0 \leq u \leq 1$, $-1 \leq v \leq 1$.

Cosine point spacing:

$$t = \begin{cases} (1-\cos\theta)/2, & \theta < \pi; \\ -(1-\cos\theta)/2, & \theta \geq \pi. \end{cases} \tag{4a}$$

$$\theta = \begin{cases} \cos^{-1}(2t-1), & t > 0, \\ \cos^{-1}(2t+1)+\pi, & t \leq 0. \end{cases} \tag{4b}$$

Built-in grids: spherical, hemispherical, tube, linear.

Spherical grid:

$$\mathbf{x} = \begin{bmatrix} 2s^{1/2}(1-s)^{1/2}(|t|-1/2) \\ (\mathrm{sgn}t)2s^{1/2}(1-s)^{1/2}t^{1/2}(1-t)^{1/2} \\ s \end{bmatrix} \tag{5}$$

$$0 \le s \le 1,\ -1 \le t \le 1, \tag{6}$$

sphere of unit diameter centred at $[0, 0, 1/2]$

Hemispherical grid:

$$r = (1-s^2)^{1/2}, \tag{7}$$

$$\mathbf{x} = \begin{bmatrix} (|t|-1/2)r \\ (\mathrm{sgn}(t))t^{1/2}(1-|t|)^{1/2}r \\ s/2 \end{bmatrix}, \tag{8}$$

hemisphere of radius $1/2$ centred at $[0, 0, 0]$.