`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 $[0, 0, 1/2]$:

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

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

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

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

To generate using AGG:

```
global {
# syntax: <identifier> = "<expression>" (quotes required)
# diameter of sphere
  D = 1.0
  n1 = 0.5
  n2 = 0.5
}

distribution("sphere", 0, 1, 24, 9, 17, "cosine", "cosine", "cosine")
{
```

```
  shape("ellipse", -1, 1, n1, n2)
  transform("shrink", 0.5, 0.0, "sqrt(t*(1-t))")
  transform("scale", "2*D")
  transform("shift", "-D", 0.0, "D*t")
}
```