

# Technical Reference

## How to select patterns for 3D surfaces

### Matching Patterns to suitable Surfaces - pattern groups.

Using the diagrams on this page you can see which patterns will work on which surfaces.

Each of the basic primitives from which all surfaces are defined (e.g. an egg would be included with the dome primitive as would be a doughnut ring) are represented as icons. Arrows indicate the direction you could cut on these surfaces without difficulty. Things as spiral cutting on tubes, cones and spherical shapes are not included.

It is also very well worth noting that most complex looking shapes can, with a little imagination, be resolved to a part of one of these primitive shape groups, or reasonably closely to it.



The basic icons. Arrow colours are arbitrary here.

The Primitive Icons represent the following shapes in the order illustrated above: This is the explanation of the icons. This list is NOT the pattern group list! See below.

1. Cylinder - Tube of any profile, (non round more expensive), boxes, bangles, rings etc including SLIGHTLY tapered tube as for a pen body.
2. Cones - from tapered tube to shallow angles like a shallow round roof point.
3. Curved Cones - from large bases to narrow stands and trumpet shapes (beware not too concave!). This can also include convex curved cones.
4. Domes - All Spherical shapes such as eggs, curved bases, mudguard shapes, doughnut shapes.
5. Flat or nearly flat Surfaces with approximately parallel cutting in whatever direction, or with circular cutting.
6. Flat Surfaces with Sunray Cutting - cut direction radiating. If the surface is not quite flat then complete sunrays are as Red or Blue Arrows.

**The colour of the arrows indicates the possibility of cutting the pattern in that direction.**

**Red** indicates that the pattern is geometrically unsuited to the surface and would either be prohibitively expensive or impossible to do with a reasonable chance of acceptable quality. It is possible that there also might be some stretching of the pattern.

**Blue** indicates that the pattern can be cut with certain restrictions - e.g. a sunray pattern can be cut even on a

domed surface but there would be problems completing the last few cuts as the guide would have to pass over the first few cuts, (the guide being on the right of the tool and progress of cutting lines from left to right on the work) as you get back to where you started! There may or may not be some stretching of the pattern. Often there are ways in which this problem can be solved, though the solution can be expensive.

**Light Brown** indicates that there is no problem technically with this direction on this surface and it can usually be done economically. However it must be born in mind that the pattern will stretch and be distorted as it covers the surface. This applies to all circular patterns (where the cuts are either concentric circles, wavy circles, or arcs and wavy arcs of circles) and sunray patterns where the cuts radiate from a point on or off the workpiece. The Radial element in a circular design (e.g. the amplitude of the waves) is the same at all diameters and the number of waves in a circle or the number of cuts in a sunray remain constant (though they may swirl around the centre). All sunray work falls into this category because the pattern is always distorted by its radial nature.

**Green** indicates that the pattern will look similar to the illustration on the surface in the direction indicated.

### Scaling

There is some ability to scale all Low Relief type patterns, but most ordinary 2D engine turning (on a flat or a 3D surface) is effectively same size to the pattern bar or diametrically related to the rosette for a circular machine

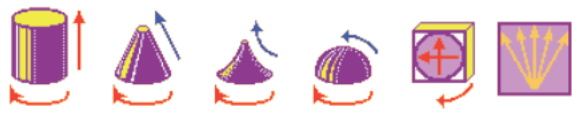
### General Pattern Groups and availability for 3D surfaces

1. Straight Line



Patterns where the cutting is approximately parallel.

2. Sunray Patterns



Patterns where the cuts radiate from a point which can be either inside or outside the area being cut, or even not in line with the cuts themselves.

3. Circular Patterns, 2D and 3D



Patterns where the cutting is rotary or elliptical on flat or 3D shapes.

4. 2D Circular Patterns



2 dimensional circular work where the surface is either flat or else only slightly curved.

5. Bi-directional patterns



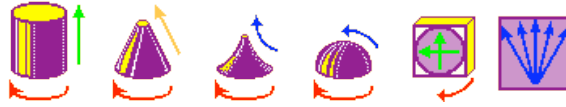
Patterns where the work is cut in more than one basic direction such as squares, hobnail etc. These can be 2D or 3D as illustrated here.

6. True spiral cutting



Somewhat expensive and unusual; often with segmented or faceted cuts (usually polished smooth with threads after cutting).

7. Straight Line Low Relief



Low Relief patterns. (N.B. Our hand operated circular Low Relief machine is currently out of action)

8. CAD/CAM



CAD/CAM. Blue arrows here indicate investment required in major tooling. Light Brown or Green indicate we can do it with little more than the normal holding tooling requirement for any new production run.