Glossary of Engine Turning Terms

The A to Z of Engine Turning

This Glossary is intended primarily for designers and users of engine turning and for those learning or practicing the craft.

Here is the simple dictionary definitions; the links will take you to more detailed information.

Glossary Definitions

Arc
The arc slide which carries the tool slide on the sliderest, moved with the tangent screw using the heel of the right hand on a Plant sliderest and some other good designs. Used for centring the tip of the tool at the surface of the work so that convex or even concave shapes can be engine turned.

Arkansas Stone
A cream coloured hard smooth stone used with oil for polishing tools.

Barley (Barleycorn, Grain)
A pattern consisting of fine waves in which every cut is moved half the length of the wave in the direction of cut to give a grain like appearance. A much over-used pattern!

Barley Mow
A pattern resembling the look of a mown barley field, often used on objects with difficult shapes as it hides a multitude of sins!

Basket
A large group of patterns which in some way resemble basket work.

Basse Taille
Enamelling over a low relief engraved background, so that the shade of the enamel varies with the variable depth of the recess. Produces a monochrome picture effect. Very effective used with Low Relief Engine Turning.

Basse Taille Coloratus
A style of enamelling developed by David Pledge in 1998, named using a Latin word for colour in respect of the origin of Basse Taille in Italy. Laid over Low Relief Engine Turning, More than one dark translucent colour is laid as a base over which a thin layer of different paler colours is added giving very subtle graduations of colour and shade, the effect being like a 3D Oil Painting.

Bed
The part of a machine that is like a bench, supported by the base or legs. The working parts are located on the bed, which in "modern" machines is usually a casting. In older machines the bed is more often mahogany. Interestingly the mahogany bed of a large rose engine has very useful absorption characteristics that suppress unwanted vibration.

Bell Chuck
A primitive centring device, sometimes a separate item, sometimes, particularly with Swiss machine manufacturers, integrated into things like oval and old fashioned straight line chucks.

Bright Cutting
A form of hand engraving of repeating patterns which pre-dates engine turning. Sometimes confused by non-craftsmen with engine turning. More sophisticated than simple flinking.

Brocade (engine)
See Low Relief.

Cartouche
A plain uncut panel, usually on a watch or clock dial, usually left for engraving.

Cross Slide
The slide on a straight line machine which is sprung against the pattern bars to generate wavy lines.

Crossing
Moving the wave in the direction of the cut to vary the pattern.

Crossing Plate
A plate with notches and detente found on rose engines for crossing the pattern. The detente is usually attached to the main pulley and when released the rosette barrel can rotate relative to the spindle and workpiece. On some rose engines a second crossing plate is mounted on the front of the rosette barrel allowing some of the rosettes to be rotated relative to the rest for more complex patterns.

Crossing Slide
The vertical slide which carries the pattern bar clamp on a straight line machine and which is used for crossing the pattern.

Crossing Worm
On the Rose Engine; the slower but more flexible alternative to the crossing plate, sometimes used for spiral patterns.

Daisy
A name Asprey and possibly others use for the four point stipple pattern we call Fleur de Lys.

Depth Stop
A screw on the tool slide limiting its movement to control depth of cut. Does not follow the surface of the work like the guide. Used sometimes for the final cut where there is no border, or for the final cuts on a 2D sunray design. Also often used for very fine work such as watch dials and other items where a mechanically flat result is required. When in use, a guide is not required.

Dividing Plate
Fitted to some older rose engines, a plate with circles of holes for holding the work at different positions while a spotting tool is used.

Double Eccentric Patterns
These patterns, cut on a rose engine, involve offsetting the centre of revolution of the pattern from the centre of revolution of the work and cutting a series of arcs, either wavy or plain, which produce a sort of swirled pattern.

Drape
A group of patterns which resemble curtain drapes. Usually created by moving a wavy pattern in carefully defined variable moves to create a curved appearance which is repeated to give the drape effect. See also Moiré

Eccentric Patterns
Many patterns such as sunrays and circular wave patterns are cut with the centre eccentric and often completely outside the edge of the pattern area, giving a pleasing sunrise effect.

Embossing

Using a tool, usually a diamond, which scratches a line in the surface rather than actually removing metal (though very small amounts are usually removed due to tearing). Mostly used on sharply curving or complex surfaces when a fine pattern is required, particularly with difficult materials.

Engine Turners Cement

See Wax

Epicycloidal Chuck

See Geometric Chuck - more or less the same thing by a matter of degree. I hope that doesn't upset any purists out there!

Escutcheon (tool)

A vee tool which is asymmetrical used mostly for edging cartouches (plain panels for engraving). Can be right or left handed.

Feathering out

Used when a recess is cut only at the edge and left unrecessed in the middle. See recessing.

Fleur de lys

Either a literal 3D low relief Fleur de Lys or a stipple pattern which could be complex or in it's simplest form a 4 point version of Foxhead. Asprey & Garrard call this 4 point pattern Daisy. The latter is similar to the three point Foxhead pattern.

Flinking

flinking, flinqué in French, is a form of hand engraving often used where engine turning would be difficult or very expensive because of the shape of the workpiece. It produces an effect that can be compared to some types of engine turned pattern, but is not so uniform in character. Sometimes confused with engine turning by non-craftsmen. See also Bright Cutting.

Foxhead, Foxmask

A pattern produced with a finely notched pattern bar. Each notch produces what looks like a point of light and the pattern is moved to group the points in threes, two side by side and one between and below, resembling a foxes face. There are many variants.

Geometric Chuck

Simply . . . Wheels within wheels! This is a most esoteric branch of engine turning. The Geometric or Epicycloidal Chuck is a device which works rather like a spirograph, with multiple eccentric rotations producing an eventually complete pattern. Depending on the complexity of the chuck design, many, perhaps thousands of revolutions of the work could happen before the pattern joins up and repeats itself. This is a subject for study on it's own. I

Goniostat

A device for grinding and polishing tools to precise angles. An India stone is used first to make the basic tool shape, which is then polished to a mirror finish with Arkansas stone.

Guide

Sometimes known in Birmingham as the "Black Mark". The small stylus which is set next to the cutting tool and which follows the work surface regulating the cut depth.

Guide Mark

The mark caused by the guide as it rubs the workpiece. This is usually removed by the next cut but the last one may be visible. Careful shaping of the guide usually makes this unobtrusive though in certain instances this is not possible and the guide marks may need to be removed by stoning and polishing.

Guillochage, Guillochis

French term for engine turning, done on a rose engine (tour à guillocher). Guillocher is the verb and guilloché is an adjective. Guillochée is the feminine form. (My thanks to Sandra Petch for some linguistic assistance!)

Hobnail
A pattern generated by cutting lines in 2 directions at 90 degrees on a flat or curved surface.

Inside Work, Internal Engine Turning
To get a pattern on the inside of something, for instance an egg, it is usually engine turned as a flat plate and domed, stamped, or spun up afterwards. Shallow concave areas can be directly engine turned in the finished shape, depending on clearance issues with the machinery.

Indian Ink
Old Fashioned Waterproof Indian Ink is used to prevent solder from running down engine turned lines. Much better than rouge, because it is not washed away when borax or other flux is applied. Don't ask us where to get it, ours has run out and we don't know either, perhaps you do?

Laying Back
Grinding a tool with negative primary clearance for use without a guide. A trade secret!

Lemel
The turnings removed from the workpiece. Traditionally, engine turners return gold and platinum lemel to the customer but do not return silver lemel. About 2 or 3 percent of the lemel removed is usually unrecoverable having pinged off the tool at the end of the cut.

Low Relief, Brocade Work
The process of cutting metal with a tool that varies it's depth of cut to generate a 3D surface. Except for the Pledge & Aldworth CAD/CAM system which is unique, the surface is always reproduced mechanically from a master pattern on a cylinder or disk.

Moiré
A group of patterns, some of which are created by alternately inverting a drape pattern and some of which are created by overlaying one pattern on another to produce an interference effect. The latter is sometimes referred to as moiré silk or shot silk, depending on the effect produced.

Mokumé Gané
The art of producing laminated metals and cutting through the layers, finally rolling out the result to produce a smooth metal surface with coloured patterns.

Multiple Raq, Multiple Rack
A pattern bar consisting of more than one parallel face with different profiles. Pledge & Aldworth have one which can produce the whole alphabet in upper and lower case.

Multiple Touch
See Touch.

Nose
The male screw thread on which work is held in a chuck.

Oval (elliptical) chuck
A chuck for cutting ellipses. Mostly used for elliptical trimming lines on cufflinks and picture frame centres but very useful also when working on complex 3D shapes.

Pencil Chuck
A chuck for holding thin cylindrical objects, usually for cutting along the axis of the cylinder. This device is like a tiny lathe which is rotated usually by the use of a worm wheel.

Perles
French for Spotting, QV.

Platinum
Engine turning on Platinum is possible. Use a HM (Hard Machining) alloy and consult your supplier for this.

Pumice
A fine pumice powder used in the polishing process. Usually available in 90 and 180 grades.

Raq, Rack, Pattern Bar
A Pattern bar for use in a straight line machine. Can be single faced, double or multiple. Can also be 3D.

Ribs
A pattern which consists rounded convex ribs. Fine versions are sometimes mistakenly called reed.

Recessing or Sinking
Where enamel is to be laid champlevé style in cells the recess can be very cleanly cut and carefully prepared with a surface almost as good as the bare metal. Usually engine turned in the recess. Depth of recess is usually about 0.35mm for enamelling most colours. Sometimes Feathered (q.v.) out from the edge.

Reed
A pattern consisting of alternating fluted or spoon cuts and pairs or single vee cuts. Often in books and elsewhere a fine ribbed pattern is mistakenly referred to as reed.

Rocking
The motion of a rose engine headstock when the edge of the rosette is used to cut circular waves on flat surfaces (face turning). See also Traversing.

Rolling
The process of rolling the pattern onto the metal from a hardened steel die. The cheapest way to reproduce an engine turned pattern for mass produced products. The metal is rolled and then pressed into shape. The engine turning will be undamaged even around hinges!

Rose Engine
A Lathe with a rocking and traversing headstock used for engraving wavy circular and elliptical lines mostly on metal. In French: tour à guillocher.

Rosette
One of the wavy cams set on the spindle of a rose engine

Rosin, Resin
One of the ingredients of Engine Turners Cement. The correct type to use is known as "Water White Soluble Resin" - I believe that is the grade refered to as "WW". This is essentially a tree resin, which, in fossilized form, becomes the semi precious stone: amber. . Other varieties do not dissolve so easily when they are to be removed from the workpiece. It is also used for rubbing on the belts of the machine to prevent them from slipping under tension, especially when cutting large diameter workpieces such as salvers on rose engines. Stringed instrument players do the same thing to make the bow play properly.

Scoring (Scoring Tool)
Metal sheets are scored usually with a tool of nearly 45 degrees for folding and soldering into boxes etc.

Shade
A defect in engine turning caused by either an incorrectly moved arc tangent screw, most often occurring on gently curving surfaces cut by inexperienced people, or more often caused by deterioration of the edge or even loss of the tip of the tool as a result of impurities, faults, cracks or grit in the metal, or incorrect polishing of the tool. Distinguishing which is which is easy with a 10 power loop. Very often the exact place where the tool broke can be pinpointed. Shades always follow the direction of cut.

Shadow

A defect in engine turning caused by the guide passing over an uneven surface or a gap or join between two surfaces. Very occasionally caused by cracks or other defects in the metal surface. Shadows should be prevented by careful planning at the design stage as well as correct choice of guide, pattern type and order of cutting. Use of good quality materials is essential. Shadows do not usually follow the direction of cut.

Sinking
See Recessing.

Sinking Tool
A flat or chisel ended tool for cutting a flat bottomed line or recess.

Spherical Chuck
A chuck which can present the workpiece to the tool at any angle three dimensionally.

Spoon (Spoon Cut, Spoon Tool)
A spoon tool has a convex round cutting edge and cuts a concave profiled flute or spoon cut.

Spotting (1 - perles)
The process of using a rotating tool to cut small circles and rose patterns, usually on a pre engine turned surface, sometimes as a recess for enamel.

Spotting (2)
The process of polishing a surface with a rotating felt giving small overlapping circles. Sometimes done with the help of an engine turning machine. It is common to produce a number of variations on this by using a moving spindle in straight lines and waves.

Stellite
General purpose tool material. Much harder than High Speed Steel.

Sticking up
Workpieces are often either filled with wax or stuck with wax to a wooden block for holding.

Stipple
The large group of patterns cut with finely notched, often multiple pattern bars, including foxhead, fleur de lys (daisy), chequerboard, and innumerable others.

Stoning
The use of Water of Ayr stone as an abrasive to remove marks in gold and silver.

Stops, End Stops
Used on a straight line machine to limit the travel of the work against the tool. A time saving device to prevent overruns when working fast. See also Depth Stop.

Straight Line Chuck
An obsolete device for producing straight line work on a rose engine.
The Straight Line Chuck is the predecessor for the straight line engine turning machine. However references to the "Square Machine" by Plumier and Bergeron have been interpreted as indicating that the straight line machine might have been a modification of the Planing Machine. This is unlikely when the development process is considered. In reality the engine turning process is a branch of Ornamental Turning and the Straight Line Machine is a development of the rose engine, preceded by the straight line chuck. If you look at early straight line machines, they are badly designed because of this inheritance. The shape of the bed of old straight line machines is indicative of this.

Streak
A defect in engine turning caused either by a loss of concentration on the part of the engine turner or a

small piece of dirt under the guide. On automatic machines streaks may also be caused by incorrectly ground or blunt tools, but the streaks would then be all over the work piece. Streaks always follow the direction of cut.

Sunray

A pattern in which the direction of cutting is radial. It should be noted that to generate rays of light and shade it is necessary to use a circular wave pattern not a sunray.

Traversing

The pumping motion of a rose engine spindle moving along it's axis when the side of the rosette is used to cut waves on a cylinder. See also Rocking.

Trim Lines

The border lines around the edges of a pattern. Adds to the cost, sometimes it is better to go off the ends but trimming left and right allows somewhere for the guide to rub on the last cut.

Touch

The steel stylus that follows the surface of the rosette or pattern bar. For fine waved straight line patterns a multiple touch (invented in 1931 by G Plant & Son) is often used to reduce wear.

Vee (cut)

A (usually) shallow cut made with a pointed tool. For most patterns an angle of about 12 degrees away from the work surface is used. The right half of the tool being ground to be only marginally greater than the right half of the cut so that the guide can be set as close as possible.

Vitreous

Adjective, when referring to enamel means Made of Glass, usually implying a silica based formula.

Water of Ayr Stone

A particular type of soft slate formerly mined only at Ayr in Scotland. Used as an abrasive in the traditional gold and silver industry at the early stages of the polishing process. Easily filed to shape for difficult corners. Mostly superseded by other materials for commercial reasons as well as closure of the mine but irreplaceable for certain jobs.

Wax

Otherwise Known as Engine Turner's Cement. The material used for filling and sticking up work, the most flexible way to hold small or irregular shapes. Made from Tree Resin and a filler with small quantities of beeswax and tallow.

Weave, Basket Weave, Cross Hatch, Woven Patterns

Produced in two ways, one where cuts are short and intermittent and very expensive, the other where the pattern is really a zig zag in which some of the cuts take the same path, creating a woven effect. We use the latter version frequently in extreme miniature form on watch dials. A circular version is also possible, using the crossing plate to zig zag the pattern creating the woven effect, either on flat or domed surfaces.