CONTOUR
FINE TOOLING

Rainbow:

Colour in component caused by diffraction

Problem:

Rainbow is 'light scatter' and is sometimes seen in the component being cut.

One cause for this phenomenon is chips in the tool cutting edge. Contour takes great care when lapping the cutting edge and we inspect it at x500 under a Nomarski microscope. We are confident that tools are chip free when we supply them.

The material being cut can also cause rainbow: Cutting with a perfectly sharp diamond tool, on a very stiff machine, in a perfect material with small crystals, always gives a fine 'grid' in the surface finish. If the grid has the right dimensions diffraction (rainbow) is seen on the surface. The stitch of the grid must be very small to avoid the colours on the surface. (Feed/Rev or stitch ~ 1µm, depends on the tool radius size). Altering 'speeds and feeds' can change this.

Answer:

- Avoid chipping of the tool cutting edge. There should be a minimum handling of tools prior to fitting to the machine. There should be no reason to clean or inspect tools as Contour takes responsibility for this. Tools should always be kept in their containers (other than when fitted to the machine).
- Follow Contour's tool handling procedures when setting the tool into the lathe.
- When rainbow is seen, first of all, check that coolant/chip removal is optimised.
- If there is some impurity in the metal like Fe or Cr, then this can cause such a problem. NiP must have the right content of phosphorus, around 12% - 14% is recommended.
- If there is some imbalance or bad clamping of the tool, toolholder or insert (mould) this will cause vibration that can damage the cutting edge of the diamond tool (chipping) and result in rainbow.

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