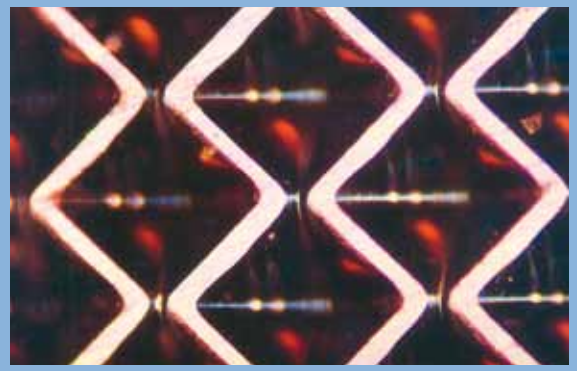
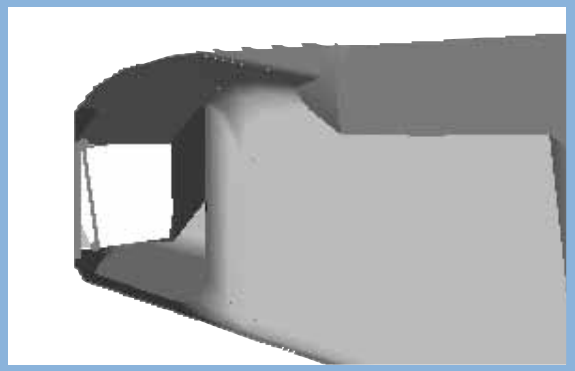
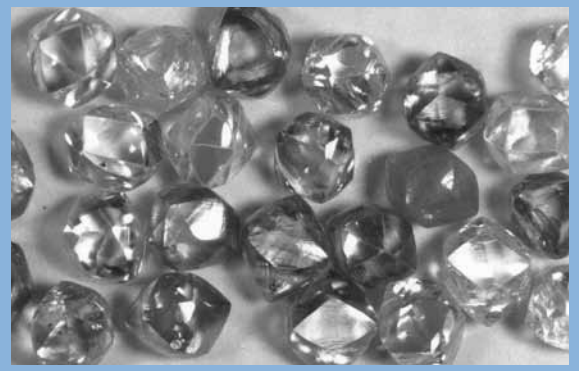
INDIMANT

Stylus





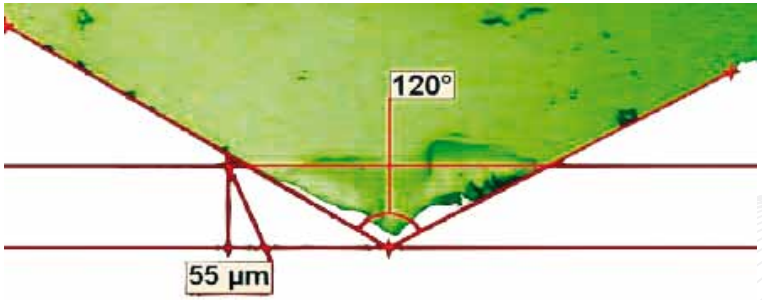


Stand 12.06.2012

Normal wear

When a diamond stylus is used in the engraving system of a HelioKlischograph over a period of time, the mechanical load of the engraving process has a wear effect on the diamond and changes the geometrical shape of it over the time.

Normal wear which affects every mechanical tool is indicated by cratering off the stylus tip. Experiences and repeated stylus analyses have shown wears more at the side (middle section of the stylus) than on the tip itself. The structure of the diamond is the reason for this.

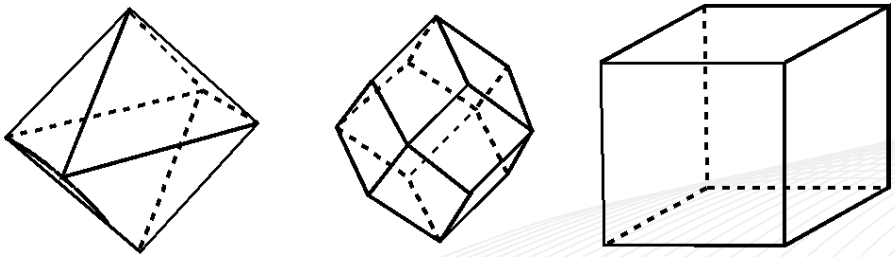


As a matter of course, a change in the stylus geometry has an effect on the cut cell shape and this in turn influences the printing gradation.

To prevent stylus wear from causing uncontrolled printing characteristics which deviate from the specified gradation, the HelioKlischograph has an electronic correction stage which compensates deviation on the basis of the stylus wear.

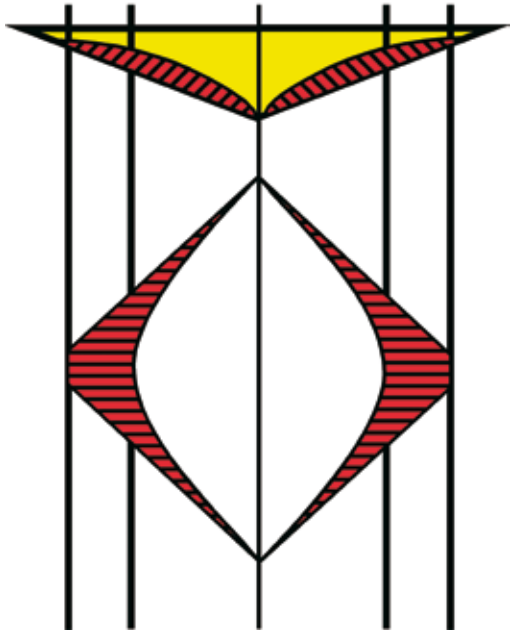
If the wear deviation of the separating diamond can no longer be compensated by electronic correction, a new stylus must be fitted. However, whether a stylus can be used up to this point or whether it has to be changed before or after this point has been reached mainly depends on the desired quality of the printing and reproduction results.

It is therefore up to the responsible technicians of a company to decide whether a severely worn cutting diamond may continue to be used for jobs of a lower quality. Or whether, for safety reasons, the stylus is always to be changed after a certain period of time.



Diamonds may have different crystalline geometries – most frequently octahedrons and rhombic dodecahedrons, very rarely cubic geometries.

Indications of wear

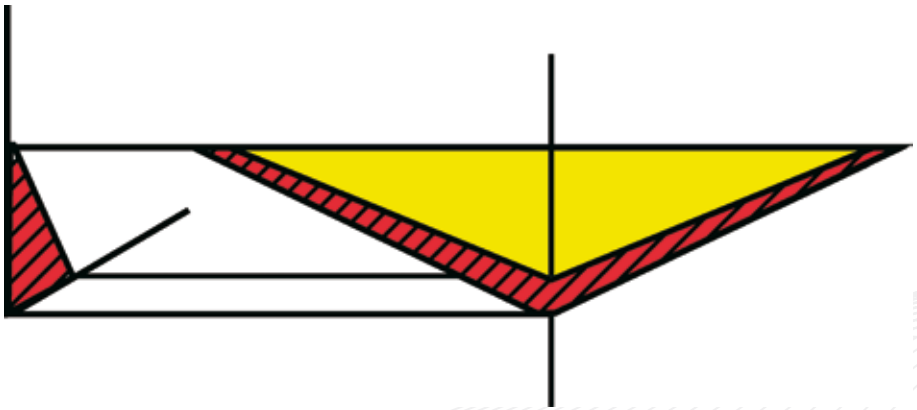


When the test cut is made, it is no longer possible to achieve the target diagonal of the cell despite the default current setting for the engraving amplifier. The above described cratering on the sides of the cutting edge is therefore so advanced that with standard default current settings only a smaller cell is engraved.

It is also possible that although the target diagonal exists when the cells are measured, the specified printing density cannot be achieved in the proof print. In this case, the cratering at the sides of the stylus results in erosion of the stylus tip. This second scenario is considerably more unpleasant because it is not possible to detect flaws until the cylinder has been completely finished.

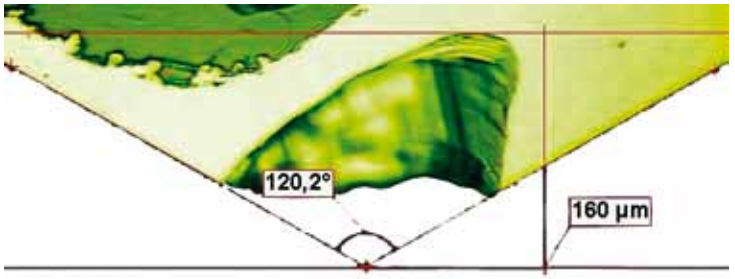
Normally in the case of worn styli, the loss in volume is due to a combination of inadequate cell depth and reduction cell diagonal. Wear solely due to tip erosion is very rare. In practice, it is possible to analyze the condition of the stylus using the test cut.

Newer HELIO models manufactured with automated test-cut features take diamond-wear factors into account for the correct calibration of target cell size.

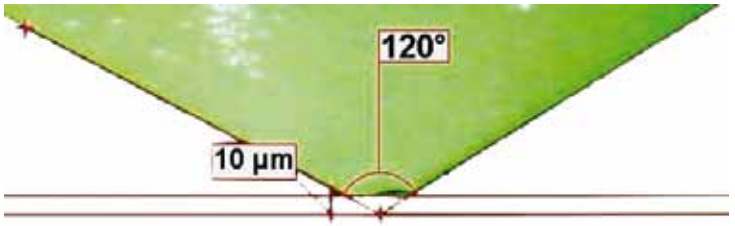


Broken Stylus

The stylus may break for various reasons. New styli and worn cutting diamonds are equally prone to breakage. Depending on the type and nature of damage and the extent of the breakage, damaged styli will cause partial or total deterioration in the quality of the engraved cell.



Broken tip



If the stylus tip is lost, the first printing tone can no longer be produced correctly. Screen cells in highlight areas are missing completely and higher tonal values have irregular cell edges. The cell volume is reduced, and the positive effects that the pyramid geometry has with respect to ink transfer are spoilt.

The results are insufficient printing density, loss of detail and uncontrolled variations in print densities. The diamond can no longer be used and must be replaced.

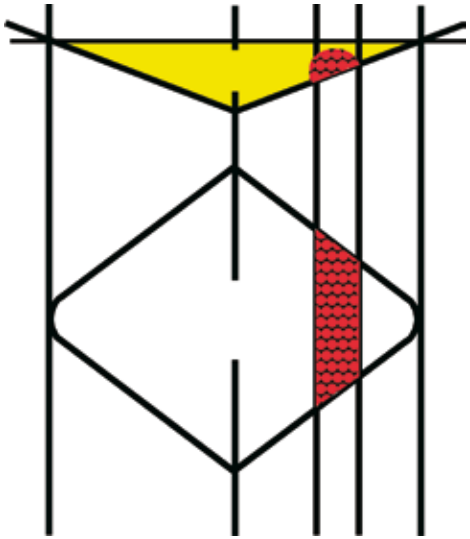
Possible causes

Broken tips result e.g. from incorrect setting at the engraving amplifier. It is often falsely assumed that high vibration values result in increased cell volumes.
In case of over-dimensional vibrations, the stylus does actually penetrate deeper into the surface of the copper and logically produces a higher lateral diagonal, but at the same time reduces the longitudinal diagonal. This results in only a limited increase in volume.

However, since the stylus penetrates more deeply than actually intended for the cut of the diamond, the rear “free” facets of the stylus hit the copper with each cut. Consequently the stylus is overloaded and will break prematurely! Impurities in the copper and excessive Vickers hardness also cause breakage. Its inclined position minimizes the risk of breakage.
The cut of the stylus diamond is designed for a specific cutting behavior. The respective forces occurring during the cutting and burr removal stroke are therefore coped for with no problem.
Once the force directions acting on the diamond change, the tip will break. An insufficient Vickers hardness results in poor chip removal and therefore in a poor (blurred) engraving image.

Other causes of tip breakage may be due to incorrect handling, e.g. when setting down the engraving system hard with the sliding spindle set too short, etc.

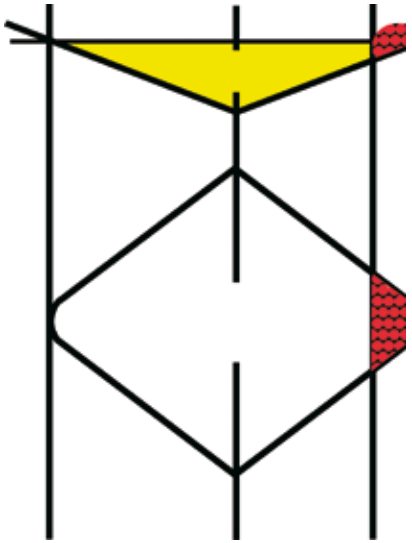
Coarse breakage



More severe damages to the cutting edges frequently result in unreliable measurement of the cell diagonal at cut cells.

This in turn makes adjustments of the engraving system more difficult. The cell configuration thus becomes asymmetrical and the absence of burr removal results in a reduction in volume. This causes a loss in printing density and shifts in gradation, especially in the light tones. Such styli can obviously no longer be used for high quality work.

Possible causes



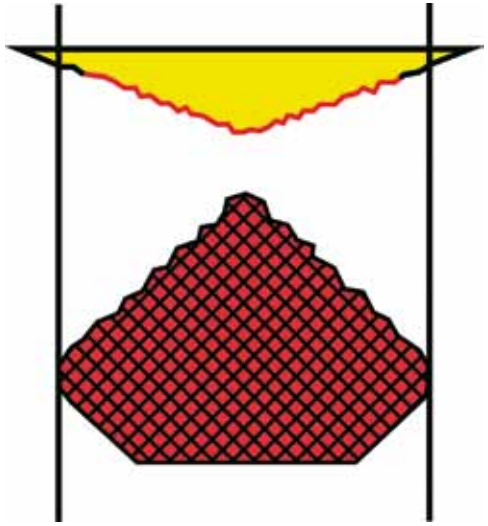
The cutting diamond hits hard particles in the copper or the cylinder grinding residue (abrasive grit) or porous points (cavities) in the copper, e.g. coarse crystalline copper structure.

Fine breakages

After a certain period of time, fine notches may be formed on the cutting surfaces which leave groves in the base of the cell during cutting.
Apart from the resulting difficulties in precisely determining the diagonal, the jagged cell walls also have a major effect on ink transfer.
This upsets the relationship between current, cell diagonal and the resulting printing density.
The extent of scoring can be determined under the measuring microscope. If the effect of scoring measurably increases on the printing density, no attempt should be made to compensate this using excessive vibration. If the extent of density deviation exceeds the company's own tolerance limits, the only option is to change the stylus.

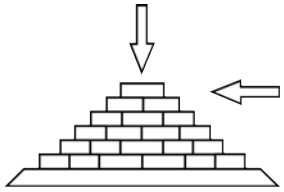
Possible causes

E.g. touching the stylus with your fingers, or if the cutting diamond hits fine abrasive residue (used for polishing the copper surface), impurities in the copper, and attempts to clean the stylus with putty, a brush or compressed air.



Correct handling

Since diamonds are generally known for their hardness and strength, warnings not to touch cutting diamonds with your fingers or any kind of textiles may seem overcautious.
However, even slight contact can result in the above mentioned damage and destruction and render the stylus unusable. This can be explained more clearly taking a pyramid as an example.



A stone pyramid structure only retains its shape because the weight of the stone blocks stabilizes the construction by applying pressure to the substructure. The structure cannot be damaged by forces applied from above. However, relatively little effort is required to move the stone blocks sideways.

During mechanical engraving work, force is primarily applied to the tip of the stylus (i.e. tip of the pyramid) which is therefore able to withstand the load. If, however, you touch the cutting edge of the diamond with your fingers, there is always uncontrolled pressure on a “less stable pyramid face’” and parts of the cutting edge will break away.

Attempts to clean with compressed air are just as dangerous for the stylus. If a particle of abrasive grit or dust strikes the cutting edge of the stylus at great speed, it will destroy the cutting edge.
Furthermore, it is also possible that a blast of compressed air could blow copper burr into the bearings of the engraving system which would then have a detrimental effect on the stylus damping.