



K&Y Diamond, Precision Tooling

CRYSTALLINE & CHALCOGENIDE OPTICAL ELEMENTS

Mono-crystalline diamond tooling used in conjunction with ultra-precision, CNC machine tools are used to deterministically manufacture infrared optical filter elements to a form accuracy of $\lambda/8$ or better. These optical elements are comprised of the following materials.

Crystals: Si, Ge, ZnS, ZnSe, CaF, InSb, GaAs, LiNb
 Chalcogenide: AMTIR, Amorphous Materials
 Black Diamond, Lightpath
 Gasir, Umicore
 IRG, Schott

The cutting table of the diamond for machining these materials is configured with a negative rake ($-20^\circ - 35^\circ$) for optimal surface quality and tool life (see fig 1.). Diamond edge profiles can be configured with radii ranging from 0.001mm - 600mm, flat, V-shaped or split radius. K&Y Diamond can produce control waviness cutting edges over 120° tool sweep, as low as 20nm P/V.

K&Y Diamond's state of the art manufacturing and metrology techniques provide unique capabilities for shaping diamond into complex shapes with unsurpassed accuracy.



MEASUREMENT CERTIFICATE

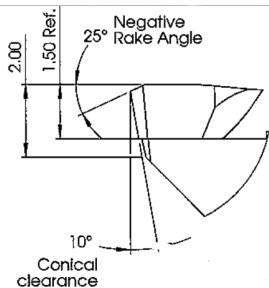
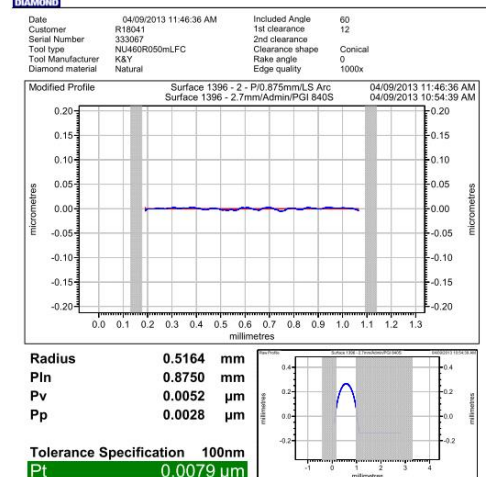
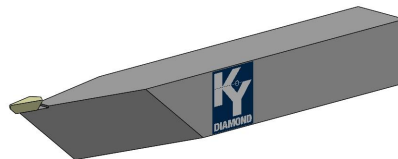
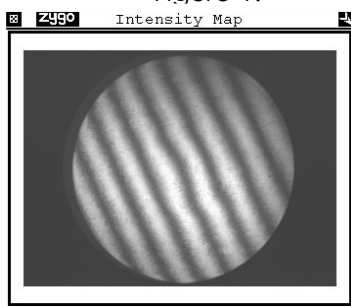


Figure 1.

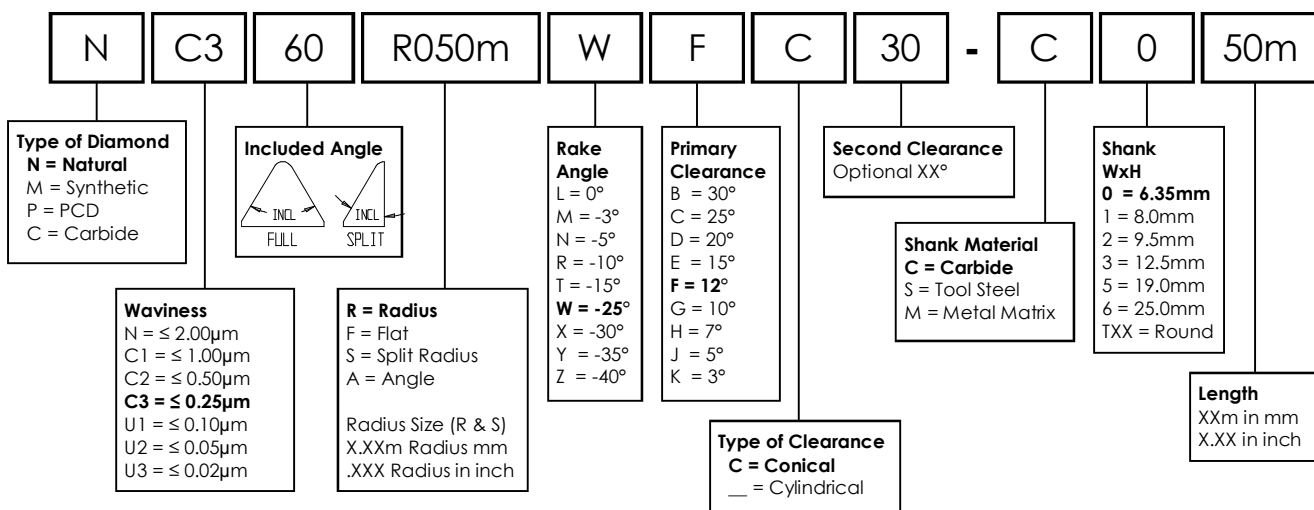
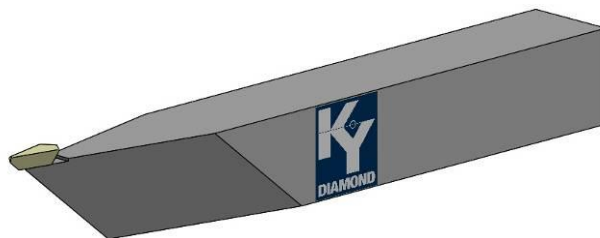
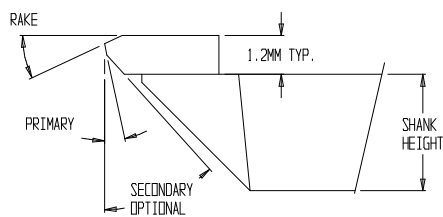
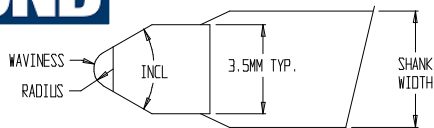


Feature	K&Y Capability
Radius	0.001 mm to 600.0mm
Waviness	<20nm P/V over 120°
Rake	$-45^\circ - 0^\circ, \pm 0.5^\circ$
Front Clearance	$3^\circ - 30^\circ$, Cylindrical or Conical
Cutting profile	Full Radius, Split Radius, V-Tool, Flat, Elliptical, Custom Facet
Included angle/ Sweep	10° Smallest included angle 180° maximum sweep
Shank Material	Tool Steel, Carbide, Matrix



K&Y Diamond Ordering Information

CRYSTALLINE & CHALCOGENIDE OPTICAL ELEMENTS



K&Y Diamond Re-Lap and Re-Cone Service

K&Y Diamond has internal capacity to re-lap over 400 tools per day. All tools sent to K&Y Diamond for repair undergo incoming inspection for excessive wear or damage. Customer's are notified if a tool requires a re-cone or repair prior to service. Re-lapped tools are turned around in one day. Re-coned tools are turned around in 1-2 weeks. K&Y Diamond will repair tools from any manufacturer.

WHEN TO SEND A TOOL TO K&Y DIAMOND FOR 'RE-LAP'?

Contrary to popular belief, diamonds are not forever when used as tooling. Diamond tool wear is micro-fracturing of the diamond at the cutting edge, resulting in increasing surface roughness and/or grain decoration (orange peel), varying power and surface irregularity in a machined optical element. The rate of wear is a function of localized heat due to cutting and vibration. Workpiece material properties and machine dynamic stiffness are the primary drivers for heat and vibration in a machining process. There are several parameters a diamond turning technician can adjust to reduce the tool wear rate. Note: Adjusting these variables may have an adverse effect to the process in other areas.

Send all diamond tool repairs to:

USA Customers

K&Y Diamond
 Trimex Building
 2330 Champlain St.
 Mooers, NY 12958
 T: 514.333.5606

Canada & International

K&Y Diamond
 2645 Diab
 St-Laurent, Quebec, H4S 1E7
 CANADA
 T: 514.333.5606