

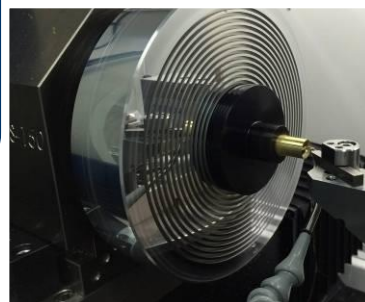


K&Y Diamond, Precision Tooling

METAL & PLASTIC OPTICAL ELEMENTS OR MOLD INSERTS



Mono-crystalline diamond tooling used in conjunction with ultra-precision, CNC machine tools are used to deterministically manufacture optical elements and/or mold inserts in non ferrous metals, alloys and plastics. Evolving optical technology and high resolution imaging has increased demand for optics in high volume with low figure error and visible quality surface roughness. Much of this accuracy relies on low waviness, diamond tool edge profiles. These optical elements are comprised of the following materials.



Metals/Alloys: Cu, NiP (>10% P), Al, CuZn (Brass), CuSn (Bronze), CuNi, Sn, Moldmax®

Plastics: Acrylic, Zeonex/Zeonor, Polystyrene, Polycarbonate, Isoplast, Topas, Suncolor, Ultem



The cutting table of the diamond for machining these materials is configured with a neutral rake (0°) for metals and alloys, and a subtle positive rake ($+3^\circ$) for plastics. Diamond tool edge profiles can be configured with radii ranging from 0.001 mm—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.

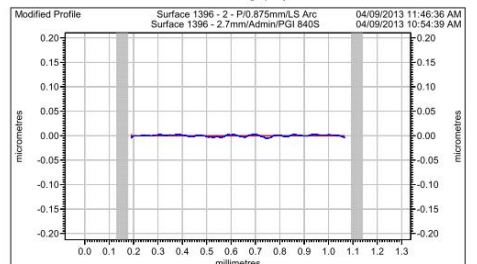


K&Y Diamond's state of the art manufacturing and metrology techniques provide unique capabilities for shaping diamond into complex shapes with unsurpassed accuracy.



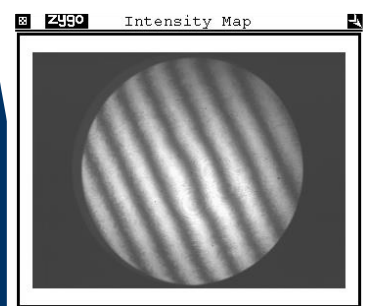
MEASUREMENT CERTIFICATE

Date	04/09/2013 11:46:36 AM	Included Angle	60
Customer	R18041	1st clearance	12
Serial Number	333027	2nd clearance	0
Tool type	NL460R050mLFC	Clearance shape	Conical
Tool Manufacturer	K&Y	Rake angle	0
Diamond material	Natural	Edge quality	100x



Radius	0.5164 mm
Pin	0.8750 mm
Pv	0.0052 μm
Pp	0.0028 μm
Tolerance Specification	100nm
Pt	0.0079 μm

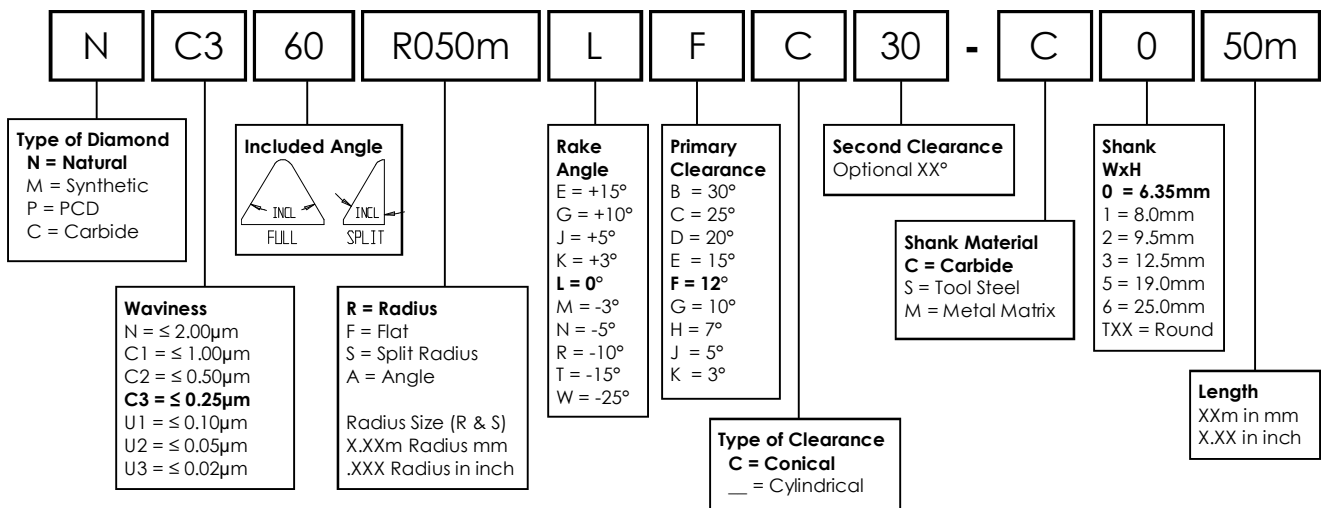
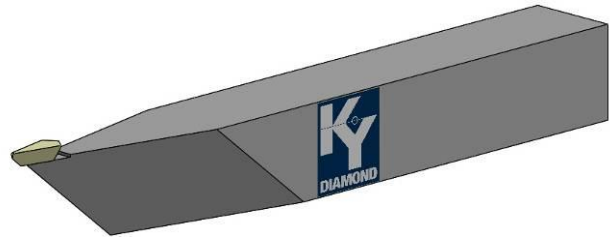
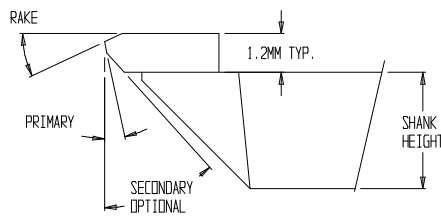
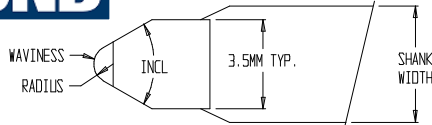
Feature	K&Y Capability
Radius	0.001 mm to 600.0mm
Waviness	<20nm P/V over 120°
Rake	-25° - $+15^\circ$, $\pm 0.5^\circ$
Front Clearance	3° - 30° , Cylindrical or Conical
Cutting profile	Full Radius, Split Radius, V-Tool, Flat, Elliptical, Custom Facet
Included angle/Sweep	10° Smallest included angle 180° maximum sweep
Shank Material	Tool Steel, Carbide, Matrix





K&Y Diamond Ordering Information

METAL & PLASTIC OPTICAL ELEMENTS OR MOLD INSERTS



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