Dr. Facet Gem Cutting Studio

Fantasy Cutting

Supplement June 2025

Dr. Facet (Tom Ross)

4507 Wakonda Pkwy

Des Moines, IA 50315

tom__ross@hotmail.com

515-979-9890

Facebook Group: Dr. Facet

Ultra Tec

Authorized Representative

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Foreward

Fantasy Cutting was written five years ago, and the Fantasy World has continued to develop, with new applications of fantasy cuts in creative cutting patterns, and with the development of new and improved tools. This Supplement will chronicle my observations on some of these new developments in the exciting world of Fantasy Cutting.

Introduction

The UltraTec Fantasy Machine has given gem artists the freedom to move beyond flat faceting to incorporate creative placement of parallel and/or intersecting concaves, v-grooves, and optical dishes in full 360 degree interfaces with the gem creation. This innovation of creativity has spawned new Fantasy designs and new tools to create them. By popular demand, I am writing this Supplement to the popular Fantasy Cutting book, now over five years old, to share what I have learned about some of these innovations in the Fantasy tool and design world today.

Tools

UltraTec includes many useful cutting and polishing tools in the basic tool kit included with the UltraTec Fantasy Machine: copper, maple and phenolic cylindrical mandrels v-groove cutters (slitters), and ball-end tools (to cut optical dishes). Additionally, UltraTec offers some optional diamond plated cutting tools in the same shapes and sizes. These tools from UltraTec are a great starter package and can keep a Fantasy cutter going for a long while. I went through several sets of the diamond plated cutters, and have acquired and continue to use quite a few copper tools. For Fantasy cutters who delve deeper into the art, the limitations of the diamond plated tools become too onerous, especially with the v-groove cutters. The sharp cutting edge on the v-groove cutters bears a much greater brunt of the cut than the surface of the cylindrical mandrels, simply by nature of the cutting mechanism. The brunt of the cutting is spread across the surface of the cylindrical mandrels, whereas the brunt of the cutting on the v-groove cutters is born on the knife edge of the cutter—much more cutting spread over a much smaller relative surface area of the cutter. Consequently the single layer of diamond on the knife edge of the v-groove cutters gets worn off relatively quickly—even being extremely careful to protect the knife edge.

V-groove Cutters

After going through several sets of the diamond plated v-groove cutters, I purchased a set of bronze sintered v-groove cutters from Baltic Abrasives. I purchased cutters with a 90 degree included angle, in 260, 600, 1200, 3000, and 10,000 grits. Setting the included angle at 90 degrees, gives you 45 degrees off of each side of the center axis of the stone. That leaves a 45 degree angle on the stone, relative to the center axis of the stone, as well as 45 degrees relative to the table of the stone. I know some Fantasy cutters got v-groove cutters made with an included angle of less than 90 degrees, presumably to increase light return to the eye of the observer. However, if the included angle is 85 degrees for example, that leaves a 42.5 degree angle on the stone relative to the center axis of the stone, and 47.5 degrees relative to the table of the stone. The US Faceters Guild reports the critical angle for quartz as 40.49 degrees, and notes that going below the critical angle causes windowing. They say older diagrams use 43 as recommended pavilion main angles for quartz, although they say in newer designs, common SRB main angles for quartz are 41 to 43 degrees, as approaching the critical angle increases brightness of the stone.

What does this mean for the “better” included angle of the v-groove cutter? If we want to maximize brightness, but as the same time, stay a “safe” distance above critical angle, to allow for minor tipping of the stone without causing windowing, we need to keep our pavilion angles at or above a certain angle—41 or 43 degrees. Going too far below causes windowing. Going too far above causes extinction. Generally both are bad, although some creative designers, like Phan Trung, use these characteristics in their designs to create special effects in a design. In the case of a v-groove cutter, moving that included angle from 90 degrees to 85 degrees, changes the angle cut into the stone from 45 degrees, to 47.5 degrees relative to the table. If you think about your angle settings on your standard flat faceting machine (UT v-5, etc.) the angle you set on the angle control of the machine is the angle relative to the table of the stone. It is NOT relative to the center axis of the stone. When you cut your girdle facets at 90 degrees, that is 90 degrees relative to the table of the stone. It is paralled to the center axis, or 0 degrees relative to the center axis. If you intentionally cut below critical angle, say 35 degrees, that is 35 degrees relative to the table. It would be 65 degrees relative to the center axis of the stone. The angle you set on your machine, and the critical angle you must stay above to avoid windowing is the angle relative to the table. Thus, moving the included angle of the v-groove cutter from 90 to 85 degrees, gives you an angle on the stone of 47.5 degrees relative to the table, moving you away from increasing brightness by moving towards the critical angle, and it moves you towards extinction of the light. Thus, unless you are striving for extinction, moving the included angle to 85 degrees is a mistake.

My Plated v-groove cutters from UltraTec

Sintered bronze v-groove cutters from Baltic Abrasive

A copper v-groove cutter from UltraTec, charged with 14K diamond

Composite Sintered v-groove cutters from R D Consultants (Ed Perry). I store them in pill boxes, labeled with the grit of the cutter.

I successfully have used the Baltic Abrasive v-groove bronze sintered cutters for several years. The cutting edge lasts way longer than plated cutters, although the cutting edges are not as sharp as they were when new, and the cutting action has slowed somewhat. I have thought about "dressing" them with an aluminum oxide dressing stick (for flat sintered laps), but have not done so yet. I have heard from other Fantasy Cutter friends, that Balti Abrasives does not want to sell single cutters of each grit any more, and, additionally, I was told that one friend received his cutters from Baltic Abrasive with uneven surfaces, leaving deep grooves in the flat face of the v-groove, and that Baltic Abrasive would not do anything to correct the problem.

I had another friend/student who contacted me about some sintered v-groove cutters he purchased from Anthony Fitzgerald. He could not get them to make clean cuts, and so he brought them to my studio to get my perspective on them. I tried them on his machine and my machine, with his shaft and with my shaft, and I concluded they were defective in that the hole in the cutter was "off center" so the edge of the cutters moved up and down with each rotation, making the stone "bounce" or bump up and down. Also, the cutting edge weaved back and forth with each rotation. My student returned the cutters with my recommendation that they be replaced. To Anthony Fitzgerald's credit, my student reported that the replacements were good and that Mr. Fitzgerald made it right with him. Kudos to Mr. Fitzgerald.

I recently purchased a set of Hyper-Edge v-groove cutters from Ed Perry, of R D Consultants. Ed's flat Hyper-Edge laps have long impressed me and I was eager to try his new Hyper-Edge v-groove cutters. He did NOT disappoint. The Hyper-Edge v-groove cutters exhibited the highest level of quality and precision Ed has become known for. The cutting edge is exceedingly sharp and stays sharp. If they ever loose their sharp edge, Ed offers a resharpening service for a very reasonable cost. The 500 grit cutter cuts like a new 500 grit, and leaves a 1000 grit finish. It is smooth as butter. All of Ed's cutters are smooth, fast, and provide an exceptional finish. As usual, Ed's products are impressive.

Cylindrical Mandrels

While the cylindrical diamond plated mandrels last longer than the plated v-groove cutters; as with all plated cutters, the plated diamond eventually wears out. I was fortunate enough to have purchased some composite sintered cylindrical mandrels from Adamas Lapidary before its founder's untimely death from brain cancer. Those Adamas sintered mandrels work similarly to Hyper-Edge cutters—very well. Unfortunately, the Adamas mandrels no longer are available. I use the Adamas mandrels I have, in addition to continuing to use plated mandrels and copper mandrels charged with several different grits of diamond. I also have some Gearloose Lapidary Batt mandrels and a Creamway. I continue to keep my eyes open for composite as well as bronze sintered cylindrical v-groove cutters.

Optical Dishes

When I cut Optical dishes, or dimples, into stones, which is infrequently, I usually do it with a ball end bit freehand in a Fordham tool. Then I polish, again freehand, with short sections of shishkebab sticks shaped to fit the dish, and charged with various grits of diamond paste.

Circle V-groove cutters

I have wanted to cut v-grooves in circles and arcs since I first saw some created by Dalan Hargrave in 2019. I experimented with creating my own on a metal lathe, but recently purchased some sintered circle v -groove cutters from UKAM Industrial Superhard Tools. They are available in a wide variety of sizes and grits. I got 6, 10, & 14 mm OD cutters in 600, 1200, & 8000 grit.

The three cutters front and center are my

UKAM 10 mm circle cutters

Scintillation in Fantasy Cut Stones

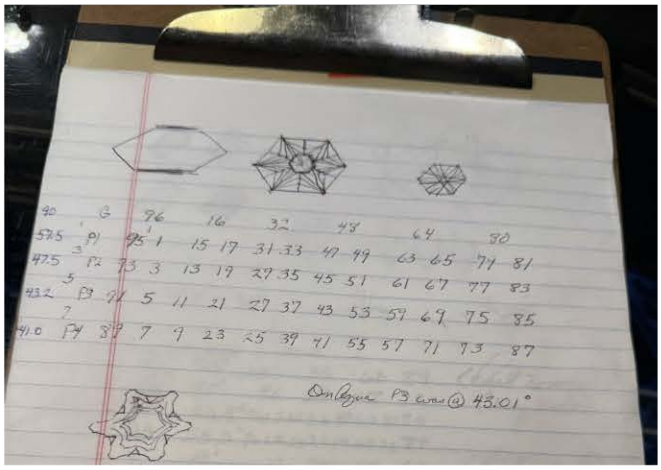
THE FANTASY/SCINTILLATION CONUNDRUM

Old School: You must choose - Fantasy or Scintillation . . . . BUT I WANT BOTH!

A well known and highly respected Fantasy cutter recently said you cannot have both scintillation and fantasy cut stones. You must choose one or the other. It is widely recognized that concave facets dis-purse light away from a focused flat flash of light (scintillation), and the curve of the concave spreads the light in an arc from the concave surface.

Scintillation is the beautiful flash of light reflecting off traditional flat facets on the pavilion as the stone is moved, playing the light reflection across the pavilion facets and reflecting them back up through the stone to the eye of the beholder. This movement makes the stone sparkle or twinkle (paraphrase of the GIA definition of Scintillation). Two ways of creating Scintillation are to place small flat triangle or diamond shaped facets so they emanate flashes of light from near the culet (bottom) of the stone (as in brilliant/ Portuguese type cuts), or to place them so they emanate from the girdle/pavilion corners (as in princess type cuts).

Fantasy stones typically are known for the smooth play of light across the pleasing fantasy shapes - concave, v-groove and optical dishes (paraphrase of GIA definition of Fantasy cuts), as opposed to the scintillation of flat facet brilliant and Princess designs. I have been working on bringing Scintillation back into Fantasy Cuts by incorporating some strategically placed flat facets in the Fantasy designs. My Spirographic Blossom stones infuse Princess type scintillation into a Fantasy design incorporating spirographic culet cuts (Hargrave), Merle's Surprise type concave fantasy (Alger), and girdle cuts compounding flat, concave, and v-groove cuts (attribution unsure). The scintillation, Princess type chevron cuts are placed at the pavilion corners, just under the girdle (as in a Princess cut).



This is my Spirographic Blossum on Dew Mountain stone, which won the Fantasy Division at the Tucson 2024 US Faceters Guild Symposium contest. You can see how I created the chevron shaped Princess-like facets under each pavilion corner. The angles and index settings are shown old school on my tablet to the left. This strategic placement of flat Princess-type facets re-infuses the Fantasy stone with scintillation.

Another way to infuse scintillation into a Fantasy cut stone, is to place Portuguese type flat facets around the culet. My Heritage stones infuse Portuguese type scintillation into a hybrid concave fantasy (Chris Alger's Merles Surprise), and traditional flat facet "R" Initial design on the crown (Robert Strickland Initial cuts).

The bottom line is that if you want to, you can re-infuse Fantasy cut stones with scintillation by including some strategically placed flat facets in the pavilion of your Fantasy stones.

Conclusion

This supplement is intended to update my basic Fantasy Cutting book with some more current information about tools now available and some new thinking about Fantasy designs. Obviously, this supplement is not comprehensive by any means, as new information becomes available every day. Some of the Fantasy pioneers still are fabricating their own new tool inventions, and are using them to create new Fantasy designed works of art in gemstones. Thank you to them for their continued contributions to the creative world of Fantasy cutting.

I am including a short Appendix to this Supplement, listing contact information for several suppliers of Fantasy tools. Special thank you to Mark Oros for his contribution to this list.

Appendix

Wide variety of Fantasy cutters/polishing tools and supplies
In addition to the UT Fantasy Machine
www.ultratec-facet.com
(I am a UT authorized dealer and would appreciate your business)

Circle v-groove cutters, bronze sintered
UKAM Industrial Superhard Tools
25205 Avenue Tibbitts
Valencia, CA 91355
Voice: 661-257-2288
www.Ukam.com

Hyper-edge sintered v-groove and flat laps
R D Consultants (Ed Perry)
Email: edperrydr@msn.com

Gearloose products
Gearloose Lapidary
www.Gearloose.co

Bronze sintered v-groove cutters
Baltic Abrasives
www.baltic-abrasives.com email: darius@baltic-abrasives.com

Felt buffs, bristle brushes, and lapidary supplies
Kingsley North
www.kingsleynorth.com

Rio Grande
www.Riogrande.com

Felt Bobs
www.Feltbobs.com/catalog/

Premium diamond compounds
Mountain Mist
www.Mmist.shop

Nova points and carving tools
SUVA Lapidary
www.suvalapidary.com

Sintered and plated carving bits
Jade Carver
www.Jadecarver.com

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The Author, Dr. Facet (Tom Ross), at his
Ultra Tec v5

In the Dr. Facet Gem Cutting Studio