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TWO DAY FACETING TUITION SCHEDULE AND TOPICS TO BE COVERED

The objective is to cut and polish a stone of simple but effective design and gain experience of the cutting process using an Ultra Tec V5 digital faceting machine. To do this it is first necessary to understand the machine and its operation, to understand facet diagrams and the information they provide, and to learn how to orientate and dop the rough. These topics will be covered first. Cutting the pavilion of the stone will follow and upon completion the stone will be mounted in the transfer fixture ready for release the following morning. Any time left in the day will be devoted to other matters outlined below. Day two will involve completion of transfer and cutting the crown of the stone. When complete any remaining time will be spent dealing with theoretical items not covered on day 1. It is anticipated that the stone can be completed and released from the dop by the end of day two. If not, it will posted by special delivery as soon as possible thereafter.

Understanding the faceting machine

The mast
The base unit – platen – 'safety' nut
Splash pan - splash pan hold down arms - sponge
Height control
Angle control – 'hard' stop
Digital angle display
Fore and aft control
Rotational control – index gears – symmetry
Cheater
Speed and direction controls
Water supply and waste water
45 Degree adapter
Table alignment tool
Dops and the quill
Laps
Lighting

Sundry items and further information on laps is provided here: https://www.bespokegems.uk/equipment-links

Trim saw – comments on use
Facet saw – comments on use

Selection of rough

Gemstone properties
Use of immersion fluid

Synthetic v natural for the learning process
Preforming
Measuring to ensure the chosen design can be accommodated – see below
Orientation for pleochroism, closed C axis, birefringence

Facet diagrams

Design and optimisation software – GemCad and Gem Cut Studio
Understanding the information provided
Optimising designs to maximise light performance and colour for the chosen material, the compromises
Unsuitability of some designs for lower RI materials
Apex crowns v tabled crowns
For Gem2 (Optimised for CZ with RI 2.15) the information block provides the following:
P/W = 0.398 C/W = 0.106
Available rough indicates that a stone of 9 mm length and width can be cut from it. What is the minimum depth of rough required?
P/9 = 0.398 so P = 9 x .398 = 3.582 mm. C/W = 0.106 so C = 9 x 0.106 = 0.954 mm. Total = 4.536 mm.
Allowing 0.4 mm for the girdle (UKFCG competition rules say 0.3mm +/- 0.1mm) total required 4.936 mm.
Is a reduction in crown height desirable? Maybe, maybe not for colour in some materials and dispersion in others.

Cutting strategies

CAM, Centre Angle Method
OMNI method
CLAM, Corner Locator Angle Method
ECED, Equal Centre to Edge Distance method
'Clever' CAM – preforms
Barion cuts

Dopping

Dops
Positioning rough for good yield – use of the transfer fixture
The importance of degreasing
Adhesives and their application
Transfer
Release upon completion
Clean-up of stone and dop

Cutting and polishing

The importance of cleanliness
Zeroing the cheater
Laps
Water supply
Holding the stone, use of the handle and hand pressure
Roughing out the pavilion and girdle
Limitations of dial readings

Hearing completion of a cut to depth
Consistency in depth of cut at a predetermined position on the lap
Use of the loupe
Fine cutting
Prepolishing
Polishing
Use of the cheater
Keeping notes
Cutting the crown
Obtaining an even and level girdle
Girdle thickness
Cutting the table – use of the 45 degree adapter, cheater and angle adjustments
Adjusting table meets

Storing cut stones

Price list for recommended Ultra Tec supplied items (Feb. 2026)

Digital V5 Right side mast	1607.5 CDR	$5,590 analogue version $4,990
Digital VL	1607.VLDR	$4.490 analogue version $3.890
*Dust cover	1581.7	$45
Lamp	1301.7	$106
Master lap	2332.7	$65
Plated 600 grit lap	2321.L	$175
Plated 1200 grit lap	2322.L	$145
BATT lap	2381.7	$269
BATT lap	2381.7	$269
Darkside lap (See notes)	2381.9	$159
Table aligner	1351.7	$66
*Index gear set	1905.678	$205
3 – 8mm dop set	2283.15	$150
9mm flat dop	77.9.1	$15
9mm cone dop	77.9.2	$16
12mm flat dop	77.12.1	$15
12mm cone dop	77.12.2	$16
Pandimonium 3K	7940.3K	$35
Pandimonium 60K	7940.60K	$35
Battstik Cerium Oxide	7911.CE	$35
Battstik Aluminium Oxide	7912.AL	$29
Snake Oil	2559.7	$19
*Snake fluid	2559.7	$18
Alcohol lamp	2552.7	$15
Dop wax	2553.7	$61.00
Aluminium pencil	2555.7	$15.00

Two variations on the design suggested as a first stone. These will be discussed in detail during the course of tuition. As will modification of crown and pavilion angles to accommodate materials with different refractive indices.

Gem2

By Steve Sweetman June 2018

Facet Data

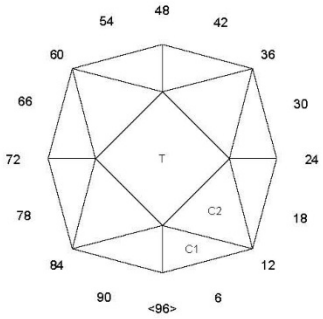
Pavilion facets	12	Pavilion tiers	2
Girdle facets	8	Girdle tiers	1
Crown facets	12+1	Crown tiers	2+1
Total facets	**33**	Total tiers	6

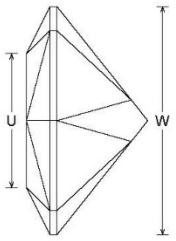
Size Data

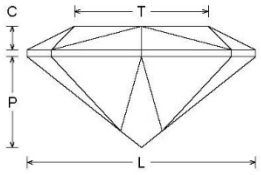
L/W	1.000	P/W	0.398
T/W	0.586	C/W	0.103
U/W	0.586	H/W	0.531
V/W^3	0.182	P/C	3.849

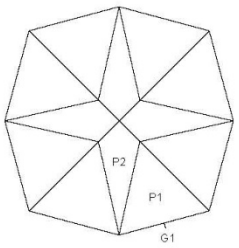
Design Data

Angles for R.I.	2.15
Symmetry	4-fold, mirror
Index gear	96
Shape	Octagon









Comments

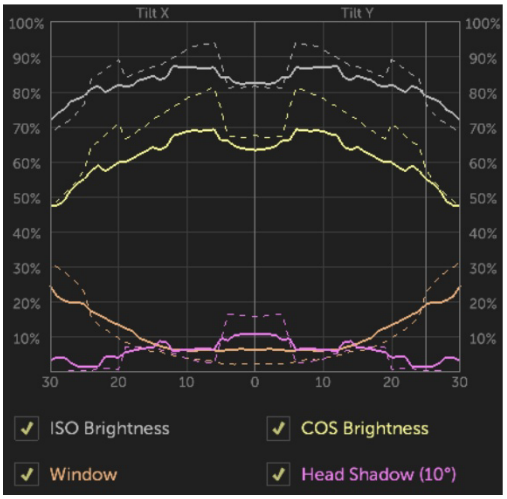
To follow on from Tom Herbst's GeM101, this mirror image symmetry design takes things a step further with four table meets to make but total number of meets is the same. Angles for optimised for CZ.

Pavilion

P1	41.20	04-20-28-44-52-68-76-92	Cut to TCP
G1	90.00	04-20-28-44-52-68-76-92	Establish gem size / outline
P2	38.50	96-24-48-72	Cut to girdle meets, forms PCP

Crown

C1	27.33	04-20-28-44-52-68-76-92	Establish girdle thicknes
C2	16.43	12-36-60-84	Cut to C1 - G1 meets
T	0.00	Table	Cut to C1 - C2 meets



Gem 2 Stacked

By Steve Sweetman June 2018

Facet Data

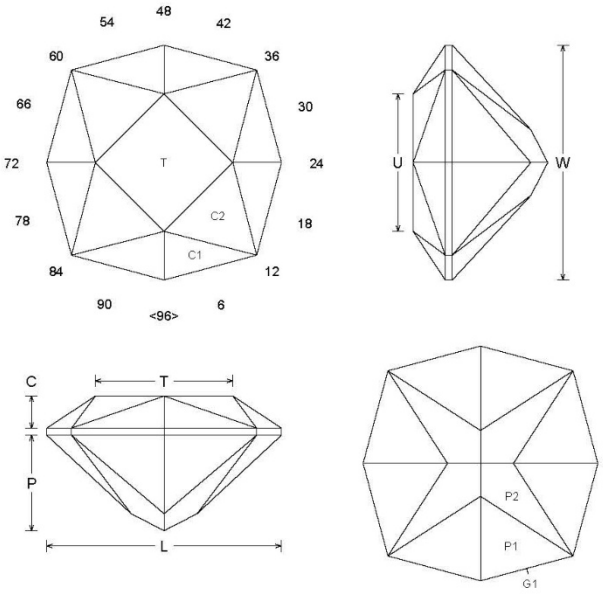
Pavilion facets	12	Pavilion tiers	2
Girdle facets	8	Girdle tiers	1
Crown facets	12+1	Crown tiers	2+1
Total facets	**33**	Total tiers	6

Size Data

L/W	1.000	P/W	0.407
T/W	0.586	C/W	0.136
U/W	0.586	H/W	0.573
V/W^3	0.206	P/C	2.984

Design Data

Angles for R.I.	2.15
Symmetry	4-fold, mirror
Index gear	96



Comments

Gem 2 with stacked pavilion mains. A demonstration of design options and performance.

Pavilion

P1	43.92	04-20-28-44-52-68-76-92	Cut to TCP
G1	90.00	04-20-28-44-52-68-76-92	Set size
P2	36.13	12-36-60-84	To girdle meets forms PCP

Crown

C1	34.31	04-20-28-44-52-68-76-92	Establish girdle thicknes
C2	21.27	12-36-60-84	Cut to C1 - G1 meets
T	0.00	Table	Cut to C1 - C2 meets