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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 the day.

#### **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, GemRay, 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 minimum RI 2.15) the information block provides the following:

$P/W = 0.393$   $C/W = 0.115$

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?

$P/9 = 0.393$  so  $P = 9 \times .393 = 3.537$  mm.  $C/W = 0.115$  so  $C = 9 \times 0.115 = 1.035$  mm. Total = 4.572 mm.

Allowing 0.4 mm for the girdle (UKFCG competition rules say 0.3mm +/- 0.1mm) total required 4.972 mm.

‘Optimised’ for spinel Gem Cut Studio suggests the same pavilion angles but a reduction in crown height. Is this desirable? Maybe, maybe not!

## **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

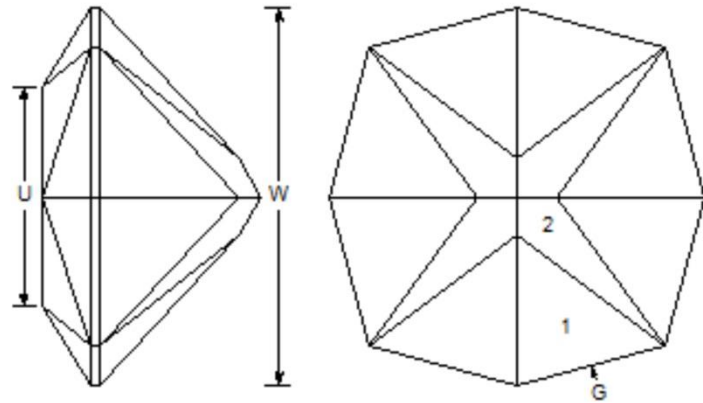
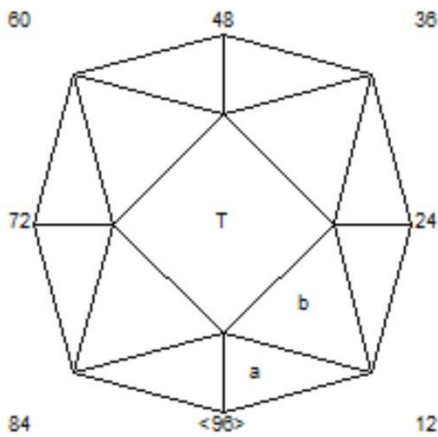
### Storing cut stones

#### Price list for recommended Ultra Tec supplied items (February 2020)

1	1607.5CDR/L	Ultra Tec digital V5, right side mast	\$4,950
1	1301.7	Lamp \$82	
1	1905.678	Index gear set, 64, 72, 80	\$205
1	1351.7	Table aligner \$66	
1	2320.L	260 mesh plated diamond lap	\$115
1	2317.L	360 mesh plated diamond lap	\$110
1	2321.L	600 mesh plated diamond lap	\$100
1	2322.L	1,200 mesh plated diamond lap	\$110
2	2381.7	BATT lap	\$316
1	2281	Extra set of 12 dops 2, 3, 4, 5 mm	\$102
1	7940.3K	Pandimonium 3,000 mesh prepolish	\$34
1	7940.60K	Pandimonium 60,000 mesh polish	\$34
1	2556.7	Prof. Iggy's Snake Oil	\$18
1		Shipping and handling	\$500

TOTAL \$6,742

Two variations on the design suggested as a first stone. These will be discussed in detail during the course of tuition.



### Gem2 stacked

By Steve Sweetman Feb.2020

Angles for R.I. = 2.160

25 + 8 girdles = 33 facets

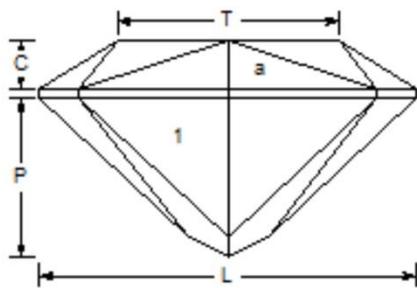
4-fold, mirror-image symmetry

96 index

$L/W = 1.000$   $T/W = 0.586$   $U/W = 0.586$

$P/W = 0.424$   $C/W = 0.126$

$Vol./W^3 = 0.202$

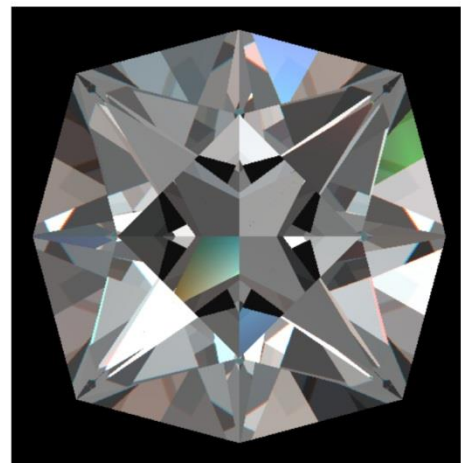


#### PAVILION

1	43.92°	04-20-28-44- 52-68-76-92	Cut to TCP
G	90.00°	04-20-28-44- 52-68-76-92	Establish gem size / outline
2	37.22°	12-36-60-84	To girdle meets

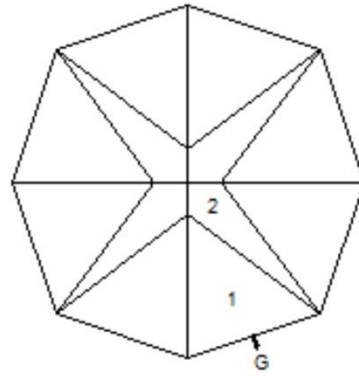
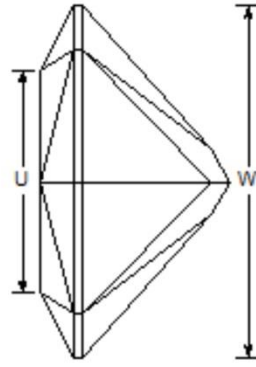
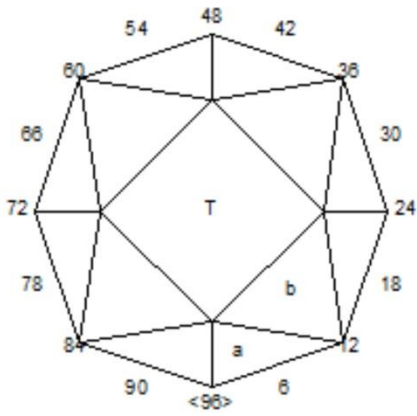
#### CROWN

a	32.28°	04-20-28-44- 52-68-76-92	Establish girdle thicknes
b	19.82°	12-36-60-84	Cut to girdle meets
T	0.00°	Table	Cut to a - b meets



To follow on from Tom Herbst's GeM101, this mirror image symmetry design takes things a step further with 4 table meets to make but total number of meets is the same. Angles for optimised for CZ. Works well for lowewr RIs but optimise in GemRay or Gem Cut Studio.

C:\Users\SCS\Desktop\Facetng\Tuition\Gem2\Gem2 stacked.gem



### Gem2-5 stacked

by Steve Sweetman Feb 2020

Angles for R.I. = 2.150

25 + 8 girdles = 33 facets

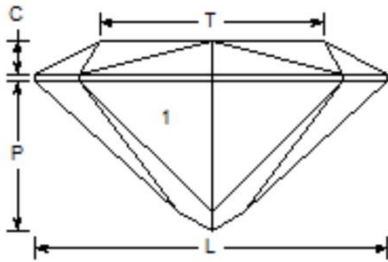
4-fold, mirror-image symmetry

96 index

$L/W = 1.000$   $T/W = 0.634$   $U/W = 0.634$

$P/W = 0.423$   $C/W = 0.099$

$Vol./W^3 = 0.173$

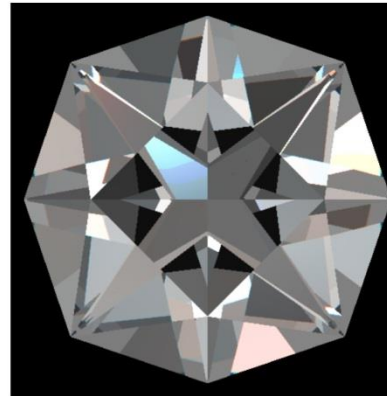


#### PAVILION

1	43.92°	05-19-29-43- 53-67-77-91	Cut to TCP
G	90.00°	05-19-29-43- 53-67-77-91	Establish size
2	38.73°	12-36-60-84	To girdle meets

#### CROWN

a	29.62°	05-19-29-43- 53-67-77-91	Establish girdle thickness
b	17.97°	12-36-60-84	To girdle meets
T	0.00°	Table	To a - b meets



A modification of Gem2 to demonstrate the affects of changing outline by changing girdle index spacing from 4 to 5. Unaltered angles produced a big head shadow and loss of brightness. Raising the crown and pavilion angles corrected this.

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