

Spauwe: Brilliance

Spauwe> Let's start with a definition so we know what we talk about

Spauwe> I'll use the Gem_A one:

Spauwe> the degree of brightness resulting from reflection of light by a gemstone when viewed through the crown facets of a cut stone

Spauwe> this 'reflected light' comes from 2 phenomena

Spauwe> the lustre

Spauwe> and the internally reflected light

Spauwe> first up: the lustre

Spauwe> lustre is the surface reflection by a polished surface

Spauwe> when light hits a surface some of the light doesn't get refracted, it gets reflected

Spauwe> which means: doesn't penetrate the substance but 'bounces off it' ...

Spauwe> Rule of thumb here is: the higher the RI (discussed in last week's chat) the higher the lustre

Spauwe> BUT: there's exceptions

Spauwe> why?

Spauwe> don't know and can't find anything on 'm

Spauwe> any of you know more?

elbdogs> nope

Frank_> surface polish, hardness etc can make some difference to lustre

Frank_> generally harder stones have greater lustre but there are exceptions to this rule too

Frank_> eg...demantoid

Spauwe> yes That was the next bit... the ability of a material to take a good polish adds to the lustre

Frank_> also cut

Frank_> forget that that relates to brilliance not lustre

Spauwe> Basically, materials that are hard take a very good polish

Spauwe> since they are hard they have a strong (and therefore tight) atomic structure

Spauwe> so there is little room for 'dents'

Spauwe> So to sum up what we know about lustre:

Spauwe> High RI materials have good lustre on the condition that they take a good polish

Spauwe> They display a lot of surface reflection: lustre

Spauwe> Any questions about the phenomenon lustre?

Spauwe> or additives....

Spauwe> I'll take this as a no

elbdogs> no questions

Frank_> lol

ravirus> go ahead

Spauwe> let's get into the more important bit:

Spauwe> internal reflection

Spauwe> tis is the light we see coming back at us from the pavilion facets

Spauwe> What does that depend on?

Frank_> cut mostly

ravirus> critical angle

Spauwe> that's the best one

Spauwe> a combination of those two is the best answer

ravirus> yep

Spauwe> a certain RI commands a certain angle of crown and pavilion

Spauwe> cutting

Spauwe> but there's more

Spauwe> what about transparency, quality of crystal etc

ravirus> clarity

Spauwe> exactly

Spauwe> if I cut a piece of rough that has a lot of shit in it

Spauwe> brilliancy is not guaranteed

Spauwe> So,

Spauwe> we need good crystal and the right angles of cutting to achieve maximum brilliance

* jleb (n=fn-javac@ip70-171-243-168.tc.ph.cox.net) has joined #gemology

Spauwe> what have those angles of cutting have to do with internal reflection?

ravirus> HI

Spauwe> jleb you have perfect timing

jleb> Hi folks.. just got spauwes pm

Spauwe> thanks for joining

jleb> np

DragonStek> if its reflected or refracted

ravirus> refracted

Frank_> Hi jleb

jleb> sorry what's the question??

Spauwe> I just finished the basics, and am going into the practical bit

jleb> ok

Spauwe> for those that don't know jleb: he's a cutter

jleb> so is the question about angles and cutting?

Frank_> all the angles must have a relationship to the critical angle which will cause TIR and keep the light in the stone till it reaches the crown again on the rebound

jleb> great idea! sometimes difficult to achieve!

Spauwe> to get you started: what's so important about getting your angles right in order to achieve maximum brilliance?

ravirus> yeah

jleb> may I chime in?

Frank_> course

Spauwe> that's the purpose of a cutter being here!

jleb> ah..ok.. snell's law angle of incidence = angle of reflection.

jleb> The correct way i believe to consider this is to think of each internal facet

jleb> as have a light cone around it. Everything that hits "inside" the cone gets reflected

jleb> everything that strikes outside the cone is lost.. that causes extinction/loss of return

Spauwe> resulting in...?

jleb> So the critical angle defines inside the stone, the cone in which light will be either returned to the crown or lost outside the pavilion

<ravirus> loss of brilliance

jleb> correct

jleb> Now, one of the problems is that if you cut a low pavilion to save weight, say 40 degrees on a 39.5 CA emerald

jleb> yes.. you'll save weight, but a good bit of the light will be lost on the bounce..

jleb> for an emerald that's not bad.. you want the stone deep in color

jleb> for a tsavorite.. that totally sucks. that thing should glitter!

Spauwe> ok...

jleb> so you have two parameters to consider.. are you cutting for deepening the color or for the total light return?

jleb> I cut that emerald with the bottom facet below the ca so I'd get depth in the stone and "draw the eye in"

Spauwe> for those that can't follow let's pause and give room for a question

jleb> (the one i posted in off the dop)

jleb> sure

Spauwe> any?

elbdogs> related to windowing?

jleb> yes?

Spauwe> elbdogs all clear?

Frank_> are you saying jleb that you deliberately "let the light out the bottom" of an emerald to improve it's look?

jleb> yes

jleb> the culet facet

jleb> I cut that one at 28 degrees

Frank_> yes doesn't that cause a window?

Spauwe> the window (that needs difining)

elbdogs> a little clear, jleb doing advanced cutting theory

jleb> Windows are where the entire pavilion or so is transparent.. so you can read text through it.

jleb> when you have a small .5 mm facet.. it doesn't window especially on the bottom V

Spauwe> yes he's in there as good as I hoped him to be...

Spauwe> we'll slow him down a bit

jleb> ok.. I type 130 wpm.. :0

jleb> shall i continue on windowing?

Spauwe> let's start of with a window:

jleb> ok..

Spauwe> a stone cut to shallow will loose light through the bootem

Spauwe> bottem

ravirus> lol

jleb> correct...)

Spauwe> causing us to see nothing but transmitted light (light coming from the sides and back)

jleb> yes

Spauwe> through that bit

Spauwe> now in some cases when colour is more important than light return (brilliance) that might be the objective

Spauwe> by the cutter

jleb> actually not..

Spauwe> various reasons may be the cause:

Spauwe> ai

jleb> yes..

Spauwe> enlighten me

jleb> The typical habit of burmese rubies are pincacoid and trapazoid form if i remember correctly

jleb> think flat plates.

Spauwe> flat plates works fine

GemGuest20> got dumped

GemGuest20> this is jleb

Spauwe> nothing was said

GemGuest20> ok

Spauwe> she's all yours

GemGuest20> the ruby forms from burma

GemGuest20> are pinacoid and trapezoid

Frank_> ok jleb give us it at 130 words/ minute and well save our question till the end

GemGuest20> not the "hounds tooth' like aussie sapphire

GemGuest20> so they are flat / tabular

Spauwe> same thing diffrebt habit

GemGuest20> if the cutter needs a 4mm diameter, but only has a 1.5mm depth

GemGuest20> he's going to lower the pavilion angle till he can tack something on that 4mm for to

GemGuest20> cut it at the correct angle, he might end up with a 2.6 mm diameter

GemGuest20> so windowing is almost always caused by an attempt to squeeze more diameter from the stone.

Spauwe> which sounds like a huge loss but...

GemGuest20> yes.. the angles are defined by $\arctan(1/2 \text{ diam})/\text{depth}$ (\arctan) converts a tan ratio to an angle

Spauwe> that's it: brilliance in cutting always is a compromise between yield and light return

GemGuest20> so that's why they do it.. and tack little plates all around for sparkles.

Spauwe> Now onto a couple of trade terms:

GemGuest20> yes that's one way to look at it.. there's another issue w/ brillance as well..

Spauwe> definition of window

Spauwe> defintion of fish eye

Spauwe> all yours if you want it

GemGuest20> ok.. windows are where you can see/read text through the pavilion..

Spauwe> caused by too shallow pavilios

GemGuest20> fisheye's are a diamond term refering to a spread table/girdle and a lower ca/ pavilion

GemGuest20> causing the stone to have an eye like a fish in it.. usually refering to

GemGuest20> single round brilliants of any material

GemGuest20> since it has to be round to look like an eye

Spauwe> which means the cutter tried to retain more weight by thicken the girdle area

GemGuest20> no, spread the diameter to make a 1.5 carat diamond look like a 2 carat

Spauwe> one can get away with that to a certain extend...

GemGuest20> yes.. you can..

GemGuest20> There's a two more things i should mention

GemGuest20> Critical angle on the pavilion is what affects the light return the most. But you need to be

GemGuest20> in the center of the upper/lower C.A. for the type of material your using.

GemGuest20> I posted a chart in lapidary cnr. showing

GemGuest20> the parabolic curve of the upper/lower angles.

GemGuest20> If your too far to the low side.. you leak on reflections from the low side

GemGuest20> if your too high up on the ca.. you leak from the top reflections.. so for total light

GemGuest20> return you want right in the middle.

GemGuest20> I'll be posting pictures today of some recuts I did for a client

GemGuest20> what happened was that they bellied the stone for weight. the 1st was 1.99 cts. I did

GemGuest20> the recut and got it at 1.77. The stone is totally different, as the dark sapphire had

GemGuest20> huge extinction on the belly cut and now, cut correctly it really sparkles.. that's the

GemGuest20> brilliance issue w/ belly cuts and weight..

GemGuest20> Ok those were the two things I wanted to mention

Spauwe> cool

Spauwe> cheers for that

[23:12] <GemGuest20> they are really nice :)

Spauwe> I'll try to sum it up

DragonStek> thanksjleb

GemGuest20> sure

Spauwe> correct me if necceary

GemGuest20> kk

elbdogs> looking forward to seeing the pix

ravirus> yep

Frank_> yes thanks jleb nice one

Spauwe> In order to achieve maximun brilliance one has to obey to certain rules

GemGuest20> btw richard huges on rubysapphire.com has a post on extinction

ravirus> AARGHH

Spauwe> but there's ways around it

Spauwe> I see an aaaargh

DragonStek> hehe i read that before class

ravirus> i'm seraching for THAT book....

ravirus> sigh

Spauwe> aha

ravirus> someone ask me 1000 \$

Spauwe> cough up the 600 dollars....

Frank_> it's going at around \$1000 per copy now I hear

GemGuest20> wow

DragonStek> print it off online

Spauwe> gheheh

GemGuest20> I'll scan it and sell my copy!

Frank_> pay me \$100 and I'll scan it for you

Spauwe> you're not supposed to say that here dragon

ravirus> YESSS

ravirus> i will do sooner or later

Spauwe> :)

GemGuest20> ok.. back tow spauwe

GemGuest20> two

DragonStek> i didnt it was my evil twin sorry

Spauwe> :)

Spauwe> I've got a question that will require a short answer to jleb and then a explanation bu ravirus

GemGuest20> ok..

ravirus> ?

ravirus> k

Spauwe> when dealing wit low RI material one has to use steep (deep pavilion) angles in order to achieve brilliance, is that right?

GemGuest20> yes quartz 1.54 is cut at 46 degrees

Spauwe> Then to Ravirus: why is this a problem in order to use it in a ring?

Spauwe> (i'm thinking lower RI's than quartz)

ravirus> the stone may be too high?

Spauwe> exactly

ravirus> for setting

GemGuest20> the pavilion is too deep..

GemGuest20> same problem w/ barion cuts

GemGuest20> although you get a darker stone..

ravirus> barion?

Spauwe> that's whay cutters compromise between: weight, brilliance, and practical use

GemGuest20> barion cuts developed by basil watermeyer

Spauwe> that's where I'm heading

GemGuest20> named after him and his wife marion b+arion

ravirus> don't know, i will google

Spauwe> diffrent cuts may enter the stage

GemGuest20> Ok, crowns control dispersion and sparkle

Spauwe> cuts that don't go for brilliance

GemGuest20> high crown = more disp/sparkle

GemGuest20> low crown = less disp/sparkle

GemGuest20> 3 factors

GemGuest20> Depth of color

GemGuest20> sparkle dispersion

GemGuest20> brilliance / light return

GemGuest20> in cutting we check the iso, the random and the cosine light return for brilliance

GemGuest20> found in gem cad

Spauwe> elbdogs still following?

ravirus> high crown = small table = more crown space = more dispersion

elbdogs> yup still following

GemGuest20> iso is a uniform light pattern.. think cloudy bright sky

Spauwe> ask when noty clear!

GemGuest20> random is random light coming in all directions

GemGuest20> cosine is a spotlight.. bright in center.. fading towards edges..

GemGuest20> each factor is a consideration in design. BOG software allows you to optimize a design

GemGuest20> for several of these paramters..

Frank_> question

GemGuest20> other issue is what material?

GemGuest20> yes???

GemGuest20> frank?

Spauwe> he's in France...

GemGuest20> oh ok..

elbdogs> iso gives brilliance? random gives sparkle?

Spauwe> takes a long time to get it through...

Spauwe> :)

Frank_> when you cut a stone with pretty high birefringence which is also dichroic do you use the angles which suit which ray / colour you are cutting for?

Frank_> is that question clearly stated?

GemGuest20> I wish we could.. but the dispersion difference is so small that you can't really do that..

GemGuest20> you just have to pick the one that gives the best sparkle/dispersion for your material

ravirus> yup it will be cool

Frank_> so do you use an average of the critical angle for both rays?

GemGuest20> for sapphire (no disp necessary) they cut it at 24 degrees

GemGuest20> Actually i model it in bog and pick the one with the highest dispersion.. even w/
demantoid

GemGuest20> at .057 dispersion.. thats the difference between the refractive index of the

GemGuest20> blue and the red ray.. that's not very much to work with

GemGuest20> elbdogs.. your question.. they are just 3 different light sources.. not about sparkle/disp

GemGuest20> However for dichroic, you can alter the orientation of the pavilion to suck both colors
in

Spauwe> explain both question and answer please

GemGuest20> and get a good mix or some really interesting split colors

Spauwe> I stopped following here...)

GemGuest20> ok..

GemGuest20> frank asked, if you have a stone that has a two color axis, say green on one and yellow
on the other,

Spauwe> no the elbdogs one

GemGuest20> do we adjust angles to pick up one color or the other..

GemGuest20> oh..

GemGuest20> His question was whether the 3 light sources had anything to do with dispersion

GemGuest20> and my reply was: No, they are just 3 different types of light.. uniform cloud sky (iso)
random rays (random)and

GemGuest20> a spotlight from above (cosine). Cosine is what you get in jewelry stores Iso is what
everyone

GemGuest20> photographs with so you can see the facets

Spauwe> otherwise alexandrite would be a hard thing to cut...

GemGuest20> back to materials??

Spauwe> no

GemGuest20> ie: types of stones?

GemGuest20> ok

Spauwe> leave that question

Spauwe> I'm pretty cool with summing things up

GemGuest20> kk

DragonStek> if i have a gemstone with a window if i had it recut it would lighten its color

Spauwe> and enjoy a chat without responsibility

Spauwe> :)

GemGuest20> no dragon it would improve it

DragonStek> hehe thanks

elbdogs> good question, how do get rid of a window?

Spauwe> or maybe.. when to cut one?

GemGuest20> you can calculate how much smaller in diameter the stone will be when you recut it to the correct

GemGuest20> critical angle + some to get there

elbdogs> aah okay, would have to give up diameter

GemGuest20> yes as the pavilion angle will increase so the pavilion "cone" will shrink the diameter as it gets steeper

Spauwe> as a cutter I assume you've had pieces of rough where you had to lose a lot to get optimal brilliance going on

Spauwe> where do you draw the line...

Spauwe> ?

GemGuest20> painfully so!

GemGuest20> I model it in bog a program

GemGuest20> tsavorite! akk

ravirus> but BEFORE using bog?

GemGuest20> well, i have to decide looking at the design, what angle I'm going to put on the pavilion

GemGuest20> I have to decide if i'm going to let \$4000/2cts worth of material go down the drain..

GemGuest20> that's a really hard choice sometimes

Spauwe> And to drag Ravirus into this: Very deep pavilions are a pain to set aren't they?

ravirus> yessssssssssssssssssssssssssss

GemGuest20> So, I'll cut with a low angle and if it doesn't look good i'll recut it till it does.. (pre bog)

Spauwe> let's get into that bog a bit more

GemGuest20> Now I bog it and that's pretty right on..

GemGuest20> BOG= Better Gemcad Optimizer

GemGuest20> You need gem cad..

Spauwe> it'll give you estimates how to get good return...

GemGuest20> it extracts the pavilion crown angles from the gemcad design

ravirus> like the sarin for diamonds

GemGuest20> and it models the stone across your upper/lower pavilion crown range

GemGuest20> and gives you a map of each set

GemGuest20> yes like sarin only free!

ravirus> free?

Spauwe> free?

elbdogs> free, i like that

Spauwe> ghehehe

GemGuest20> plus you can do tilt performance and dispersion/sparkle

GemGuest20> yes you just need gemcad first

ravirus> lol

GemGuest20> \$49 for gemcad

ravirus> which is not for free

ravirus> ah

GemGuest20> \$49.00

ravirus> WHERE

elbdogs> compared to sarin...

Frank_> not too much

Spauwe> gemcad isn't but every cutter should hace it... agreed?

GemGuest20> www.boghome.com

Frank_> is it hard to use / figure out?

ravirus> gotit

GemGuest20> www.gemcad.com

GemGuest20> well, you need to play with it.. and be patient

Spauwe> and have a faceting machine...

GemGuest20> there are tutorials w/ it.. and I can always answer questions

GemGuest20> no.. don't need a machine :)

ravirus> ...windows 95?

Spauwe> as long as you're happy looking at printouts

GemGuest20> runs on xp

GemGuest20> that tsavorite project I put up on lapidary cnr was done in bog/ with some pictures of

GemGuest20> outputs

Spauwe> it's good to have you with us john

GemGuest20> and the gem was modeled on bog first

GemGuest20> thx

DragonStek> so ravirus do you make a new setting for the stone or dont set it?

GemGuest20> so crawl through that thread there's a lot of info

ravirus> for which stone?

DragonStek> the high crowns

ravirus> make new setting

DragonStek> oh ok

Spauwe> I detect a freeze...

GemGuest20> i'm here

DragonStek> oh i was gonna ask

DragonStek> well it was great info thanks jlab

DragonStek> and thanks ravirus

ravirus> yw

GemGuest20> (just discovered the font colors) np

Spauwe> what do you say about R Wises way of determining brilliance

Spauwe> ?

GemGuest20> I like it a lot.. I use it

Spauwe> Half a stone first

GemGuest20> practical vs theoretical

GemGuest20> yes

ravirus> explain, i don't jhave the book

Spauwe> then the other half

Frank_> John which thread is the gemcad prints on?...is it the off the dop thread?

Spauwe> RW Wise

GemGuest20> ok.. i'll explain

ravirus> i know the man

GemGuest20> (frank it's on creating a tsavorite)

GemGuest20> (creating a TANZANITE)

GemGuest20> ok. back to light source

Spauwe> teaches us to look at a stone tilted at 45 degrees to the lightsource

GemGuest20> tilt the stone in hand so that you rotate it 45 degrees up.. see what percent return

Spauwe> and have us estimating the lightreturn of the bottem half of the stone

GemGuest20> $x^2 = \text{total return}$

Spauwe> (buy the book)

ravirus> available in EU?

GemGuest20> amazon

ravirus> ...or not?

ravirus> in EU?

Spauwe> turn the stone 180 degrees and repeat

GemGuest20> sure

Frank_> yes ravirus

Spauwe> fully

ravirus> k

Spauwe> just amazon it

ravirus> doesn't exist

GemGuest20> I'm going to have to run in about 5..

Spauwe> jleb

Spauwe> thanks for coming

elbdogs> thanks, great info

GemGuest20> well time for a few more Q's if anyone has any..

Frank_> yes thanks John interesting stuff

ravirus> thx jleb

DragonStek> yes thanks answered alot of my questions

Spauwe> you've been more of a hlep than you can imagine

Spauwe> ghehehe

GemGuest20> great.. ok.. just one more thing..

GemGuest20> Diamonds are the absence of color.. they are all about sparkle dispersion

Frank_> I read that thread but never looked at the larger pic of the printouts (long loading time...I'll look now

GemGuest20> Emeralds are all about color.. no sparkle necessary

Spauwe> yep that's the thing isn't it

Spauwe> colour vs brilliance

jleb> so

jleb> if you want to increase the color saturation of an aqua, you cut it deep

jleb> if you want to lighten a demantoid you cut it shallow.. barion vs angle cuts

Spauwe> longer travel of light the more absorbtion you get

ravirus> pool effect

jleb> barions have half moon facets around the girdle to drop the pavilion to srb type

Spauwe> the brighter a dark colour the shorter the oath

jleb> yes.. more path = more color

jleb> yes

jleb> The best color in an aqua (which can never be too dark) is found in a barion cut

jleb> but as ravirus can testify.. deep pavilions are a design pin

jleb> pain

ravirus> sure

DragonStek> so one way or another it gonna cost you

jleb> r.w. wise book is the best guide for what you want.. sparkle/disperion or color / saturation

jleb> yes.. all about tradeoff optimization

jleb> so.. anyway gots to go.. last question anyone??

DragonStek> no thanks for your time

Frank_> yes thanks

elbdogs> thanks again

jleb> sure thing.. lots of fun.. you can always pm if you have follow ups or other questions..

ravirus> thank u

jleb> ciao!