On behalf of Vision Expo, we sincerely thank you for being with us this year.

Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended! Your feedback is important to us as our Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.

vision expo

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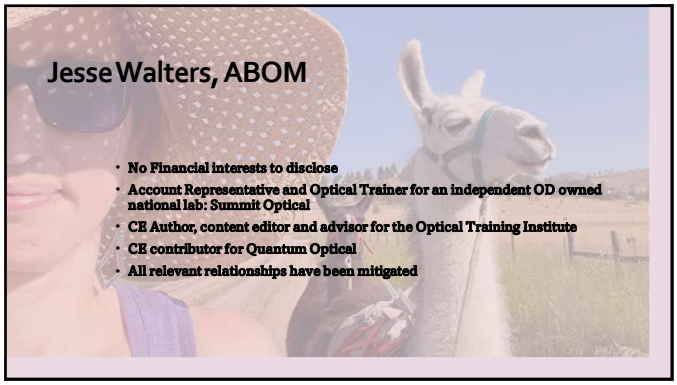

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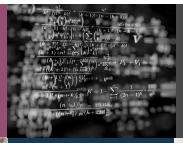
Learning Objectives

Calculating Prescription Behavior

Effective Power Formula
Compensated Power Formula
Martin's Tilt Formula

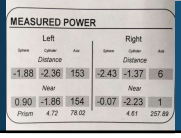


Verifying Compensated Lenses

Reading Measured Power
Evaluating Compensations

Alignment

OC Height
Prism Compensation
Adjustments



Potential Problems

Record Keeping
Prescription Evaluation
Identifying Digital Design

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How does the effective power change with position of wear?

Vertex Distance

- The distance from the front of the eye to the back of the lens
- Effective power gains plus/loses minus as vertex increases
- Effective power loses plus/gains minus as vertex decreases

Pantoscopic Tilt

- The lens angle bent on the horizontal axis
- Effective power induces unwanted cylinder at 180 degrees
- Vertical prismatic alignment changes in same direction for both lenses

Frame Wrap

- The lens angle bent on the vertical axis
- Effective power induces unwanted cylinder at 90 degrees
- Horizontal prismatic alignment changes in opposing directions

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Effective Power Formula

$$De = \frac{Dl}{(1 + dDl)}$$

De= new power experienced by the wearer
Dl= original lens power
d= change in vertex distance in METERS
If the lens is moved towards the eye "d" is positive
If the lens is moved away "d" is negative

Demonstrates the effective sphere power change as fitting vertex distance is increased or decreased from the refracted vertex

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Example:

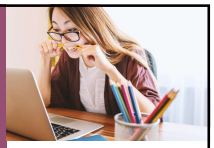
Rx: -7.50 -2.25 x 176

Refracted at 13mm

Fitting vertex measured at 18mm

What is the patient's experienced effective power?

1. Find the powers in the two major meridians
   - **-7.50** @ 176
   - **-9.75** @ 086
2. Calculate the vertex difference in *meters*
   - 13 to 18 is a change of 5mm
   - 5mm= 0.005 meters= **-0.005m** change in vertex
   - The vertex distance in moving *further* so this number will be expressed as *negative*
3. Solve the equation…



$$De = \frac{Dl}{(1 + dDl)}$$

De= new power experienced by the wearer

Dl= original lens power

d= change in vertex distance in METERS

(If the lens is moved towards the eye "d" is positive.

If the lens is moved away "d" is negative).

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Effective Power Formula

What's going on here?

- Minus lenses lose minus effective power as vertex increases
- The patient was prescribed and filled an Rx written at a refracted distance of 13mm, then wears then 5mm further than tested
- The Rx experienced by the patient is weaker than prescribed
- Larger lens powers and/or larger changes in fitting distances will change the effective power more dramatically
- This demonstrates a need to compensate the Rx to deliver the exam acuities…

Rx prescribed & fabricated:

-7.50 -2.25 x 176

$$De = \frac{-7.50}{1+(-0.005x-7.50)} = \frac{-7.50}{1.0375} = \textbf{-7.2289}$$

$$De = \frac{-9.75}{1+(-0.005 \quad .75)} = \frac{-9.75}{1.04875} = \textbf{-9.2968}$$

Reassemble the new Effective Power

First # is the new sphere, then find the difference between them for the new cylinder power, keep the axis the same

Rx experienced by the patient as a result of vertex variance:

-7.23 -2.07 x 176

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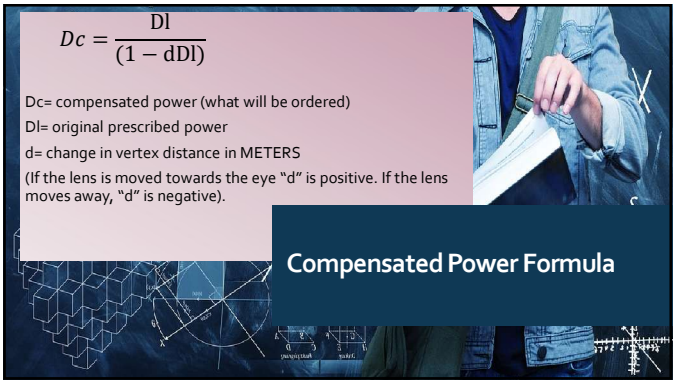

$$Dc = \frac{\mathrm{Dl}}{(1 - \mathrm{dDl})}$$

Dc= compensated power (what will be ordered)

Dl= original prescribed power

d= change in vertex distance in METERS

(If the lens is moved towards the eye "d" is positive. If the lens moves away, "d" is negative).

Compensated Power Formula

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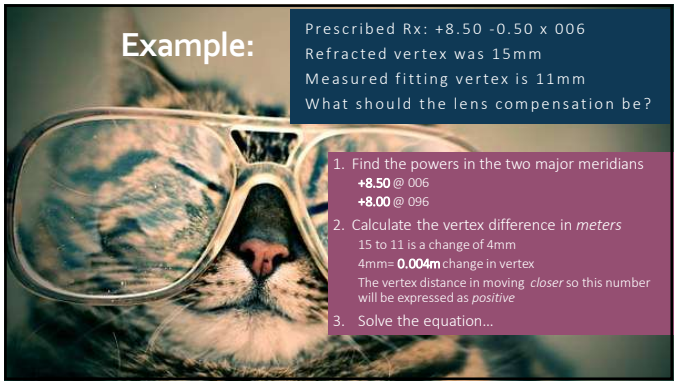

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Compensated Power Formula

What's going on here?

- Plus lenses lose effective plus power as vertex decreases
- The patient's prescribed power must be compensated and fabricated with a stronger plus power
- The Rx experienced by the patient is weaker than compensated, so the effective power translates as the original written Rx
- Larger lens powers and/or larger changes in fitting distances will change the effective power more dramatically

Rx prescribed:
+8.50 -0.50 x 006

$$De = \frac{+8.50}{1-(0.004\ x\ 8.50)} = \frac{+8.50}{0.966} = +8.7991$$

$$De = \frac{+8.00}{1-(0.004\ x\ 8.00)} = \frac{+8.00}{0.968} = +8.2644$$

Reassemble the new Compensated Power

First # is the new sphere, then find the difference between them for the new cylinder power, keep the axis the same

Rx experienced by the patient will match the prescribed Rx if fabricated as this compensated Rx adjusted for the fitting vertex:

+8.80 -0.53 x 006

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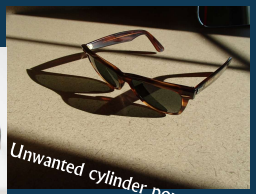
Frame Wrap and Lens Tilt

CREATE



Unwanted cylinder power on the tilt axis

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Martin's Tilt Formula

$$S1 = S[1 + (sina)^2/2n]$$
$$C1 = S1(tana)^2$$

S1= new sphere power
S= original sphere power
a= degrees of tilt
n= index of refraction of lens material
C1= induced cylinder power on the axis of rotation

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Using Martin's Tilt Formula

Wrap vs. Panto

- Both wrap and Panto are measured in degrees
- Wrap can be measured with the frame off the patient
- Panto must be measured while frame is worn and pre-adjusted
- Tilt changes the sphere power as well as inducing cylinder, there is a separate equation for each
- Cylinder axis is at 90˚ for wrap and at 180˚ for panto
- Plus cylinder is expressed for plus powers and minus cylinder is expressed for minus powers.
- The formula requires knowing the lens index

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$$S1 = S[1 + (sina)^2/2n]$$
$$C1 = S1(tana)^2$$

S1= new sphere power
S= original sphere power
a= degrees of tilt
n= index of refraction of lens material
C1= induced cylinder power on the axis of rotation

Example:

Rx: +4.00 sph OU

Patient chose a High-wrap safety frame which measures 25˚ frame wrap and ordered in a 1.53 Trivex lens.

Using Martin's Tilt Formula, what is the effective power they will experience without lens compensation?

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Rx: +4.00 Sph OU
25˚ frame Wrap
1.53 Trivex

Effective Power= +4.23 +0.92 x 090
or
+5.15 -0.92 x 180

Martin's Tilt Formula:

$S1 = S[1 + (sina)^2/2n]$
$C1 = S1(tana)^2$

$S1 = 4[1 + (sin25)^2/2(1.53)]$
$= 4\left[1 + \left(\frac{0.1786}{3.06}\right)\right]$
$= (4)(1.0583)$
$= +4.2332 = +4.23$

S1= new sphere power
S= original sphere power
a= degrees of tilt
n= index of refraction of lens material
C1= induced cylinder power on the axis of rotation

$C1 = +4.23(tan25)^2$
$= (+4.23)(0.21744)$
$= +0.92\ x\ 090$

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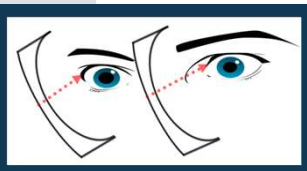
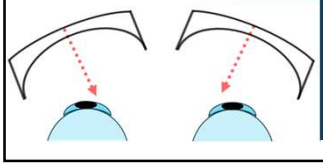
- Tilt changes OC alignment
- Panto moves both OCs **up**
- Wrap moves OCs **in** for both eyes





Alignment & Unwanted Prism

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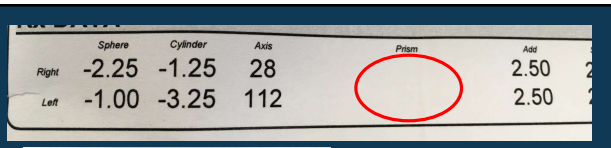

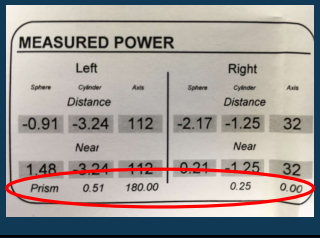

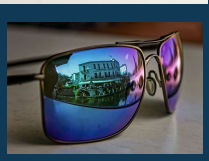

Wrap Compensation

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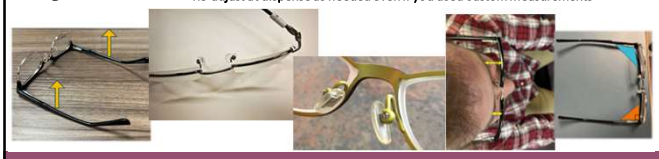
Adjustments

- Pre-adjust Frames how they should be worn
- Re-adjust at dispense as needed even if you used custom measurements



Panto

- Never adjust or measure retroscopic tilt (negative panto)
- Increase panto to:
  - ✓ Improve ground-view
  - ✓ Widen near zone & corridor
  - ✓ Improve clarity of fine print
- When leveling frames, err on the side of more panto

Wrap

- A frame should never have negative face-form
- Any wrap angle above 12 degrees is considered "high wrap"
- Compensation doesn't repair all lens aberrations- it is always better to get higher Rx patients in lower wrap angle frames
- Increase wrap to narrow PDs & reduce peripheral distortion, decrease wrap to widen PDs

Vertex

- Vertex should be set equal to both eyes
- Closer vertex improves corridor width
- Too close vertex in large lenses makes it difficult to use near zone
- Vertex is changed through nosepad adjustment and temple splay

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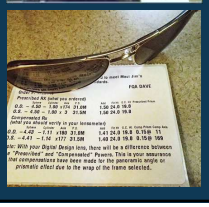
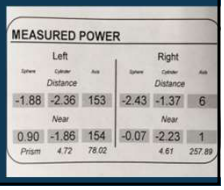
Verifying Lens Compensations



- Verify against the prescription compensation
- ANSI standards get applied to the measured power, not the prescribed
- Trust the math, but know logical outcomes based on POWs
- Double-check values input in the order
- Record lens compensation in the patient record if wildly different from prescribed
- Power is written to 0.01D
- Add is also compensated
- Prism is written in lab notation



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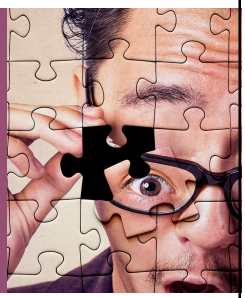
Troubleshooting

- Laser engravings on the back side of the lens- with exceptions
- Compensated Add sometimes marked on the lens
- Labs must provide compensation
- Larger powers and extreme adjustment cause more changes in the compensation
- Lens compensations don't fix poorly selected or adjusted frames



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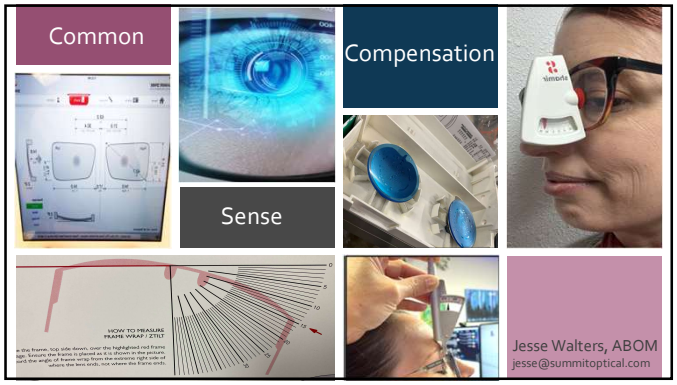
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Compensation
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