

*OrthoTool*TM

User's Guide

END USER LICENSE AGREEMENT

OrthoTool™ Software

This non-exclusive, end-user license agreement (EULA) is a legal agreement between you (either an individual or a single entity) and the owner (*E. Chow & Associates*) from which you acquired the SOFTWARE PRODUCT identified above. By installing, copying or otherwise using this SOFTWARE PRODUCT, you agree to be bound by the terms of this EULA. If you do not agree to the terms of this EULA you should promptly remove all copies of this SOFTWARE PRODUCT from your computer, workstations and network file servers and return the product to *E. Chow & Associates* for a refund (if applicable).

SOFTWARE PRODUCT LICENSE

This SOFTWARE PRODUCT is protected by copyright and intellectual property laws. This SOFTWARE PRODUCT is licensed and is not sold.

Grant of License. This EULA grants you the following rights.

Software: You may install and use this SOFTWARE PRODUCT on one personal computer at one location. You may not install this SOFTWARE PRODUCT on a network file server and download and use this SOFTWARE PRODUCT on computers attached to the network. Network use of this product requires a "seat license" for each workstation or notebook computer. Contact *E. Chow & Associates* for purchase information on additional licenses. This license does not include other offices of the licensee unless expressly mentioned.

Operating System: This product was developed using Microsoft Excel for Windows. The user is responsible for platform compatibility.

DESCRIPTION OF OTHER RIGHTS AND LIMITATIONS

Limitations of Reverse Engineering, Decompilation and Disassembly: You may not reverse engineer, decompile or disassemble this SOFTWARE PRODUCT, except and only to the extent that applicable law expressly permits such activity.

Separation of components: This SOFTWARE PRODUCT is licensed as a single product. It's component parts may not be separated from the product for use on any computer, computer network or software product. The SOFTWARE PRODUCT, as a whole unit, may be integrated into existing and future systems with the written consent of the owner.

Rental: You may not rent out or sub-lease this SOFTWARE PRODUCT.

Software Transfer: You may permanently transfer all of your rights under this EULA only as part of a sale or transfer of the software, providing you retain no copies, you transfer all of the SOFTWARE PRODUCT (including all components parts, the media and printed materials, upgrades and this EULA) and the recipient agrees to the terms of this EULA. If the SOFTWARE PRODUCT is an upgrade, any transfer must include all prior versions of the SOFTWARE PRODUCT. All software transfers require the written consent of the owner.

Termination: Without prejudice to any other rights, *E. Chow & Associates* may immediately terminate this EULA if you fail to comply with any of the terms and conditions of this EULA. In such event, you will be notified in writing by registered mail and must immediately destroy all copies of the SOFTWARE PRODUCT and all of its component parts.

Copyright: *E. Chow & Associates* owns all copyrights to the SOFTWARE PRODUCT. The SOFTWARE PRODUCT is protected by copyright laws. You may not copy the printed materials accompanying the SOFTWARE PRODUCT or screen images with written consent of the author.

Product Support: Technical support and upgrades for the SOFTWARE PRODUCT are provided free to licensed end-users for one year from the original invoice date. Technical support beyond the first year and media distribution may be subject to service fees.

CONTENTS

END USER LICENSE AGREEMENT	2
CONTENTS	3
INTRODUCTION	4
About this Software	4
Assumed Knowledge	4
System Requirements	4
Installing the OrthoTool™ Software	4
Sizing Worksheets for your Monitor	5
Important Concepts	5
Conventions used in OrthoTool™	5
PREFERENCES Worksheet	6
Configuring your OrthoTool™ Software	6
Consulting Prompts and Warnings	6
Residual Astigmatism Warnings	6
Lens Design Suggestions	7
Miscellaneous Setups	7
Preferred Laboratory for Orders	7
Alternate Laboratory for Orders	7
Custom Lens Design Tuners	7
Standard Sphere Design Tuner	8
Thin Lens Design Tuner	9
Aspheric Lens Design Tuner	10
Bitoric Lens Design Tuner	10
Controlled Clearance Reverse Geometry Lens Design Tuner	11
Standard Reverse Geometry Lens Design Tuner	13
DESIGN Worksheet	14
Overview	14
Entering the Patient's Clinical Information	15
Reviewing Clinical Considerations and Warnings	15
Selecting the Initial Lens Design	15
Changing Lens Parameters	16
Problem Solving Difficult Fits	16
Simplifying Complex Lens Designs	16
Aspheric Lenses	16
Aspheric Multifocals	16
Enter the patient's K readings and refractions.	17
Bitoric Lenses	18
Reverse Geometry Lenses	18
ORDER Worksheet	19
GRAPHS Worksheet	20
CALCULATORS Worksheet	21
CROSS CYLINDER TORIC	21
ECCENTRICITY Calculations	21
DIOPTER – MM Conversion	22
VERTEX Conversion	23
MATERIALS Worksheet	24

INTRODUCTION

Everyone hates User's Guides. Software developers hate writing them. Users hate reading them. But a User's Guide is necessary to reap the full benefit from your software purchase. *OrthoTool™* is an extremely sophisticated contact lens design tool and despite our best efforts to make this product intuitive, many of the software's useful features are not immediately obvious. We encourage you to lock yourself in a quiet room with your computer, the *OrthoTool™* software and this manual. Invest a little time preparing for your journey into computer aided lens design and we will share how the software works, point out great features, take the mystery out of complex lens designs and help you quickly achieve success designing rigid contact lenses with *OrthoTool™*.

About this Software

OrthoTool™ is the latest evolution of contact lens design, manufacturing and modeling software that began more than 30 years ago. Instead of traditional fitting charts and slide rule calculators, the *OrthoTool* software lets you enter your patient's K readings and spectacle refraction, select lens designs from a wide variety of fitting options then model the lens design against the cornea in a simulated tear film display. Once a design is selected, *OrthoTool™* allows you to make unlimited changes to the lens specifications and instantly view the changes to the lens as well as the tear film and fitting characteristics.

OrthoTool™ comes with a selection of RGP lens designs including standard spherical, thin, aspheric, bitoric and reverse geometry lens designs. We'll also show you a procedure to design your own aspheric multifocals lenses. *OrthoTool™* also includes a sophisticated lens design tuner, so you can customize all of our standard lens designs to meet your personal fitting preferences.

OrthoTool™ takes the confusion out of rigid lens design by remembering all of the special rules (vertex distance conversion, SAM / FAP, LARS / RALS, et. al.) and brings speed and consistency to your contact lens design process. *OrthoTool™* make sense out of the detailed lens parameters and presents rigid contact lens designs in a convenient way, helping everyone visualize and understand complex lens designs and fitting concepts.

DISCLAIMER: *OrthoTool™* displays design suggestions based on the opinions of the author and several contributors. We make no claim regarding the "suitability for use" of any lens design suggestion that is fabricated and dispensed. The practitioner remains responsible for the final lens selection and proper patient care.

Assumed Knowledge

E. Chow & Associates assumes that you are familiar with your personal computer, Microsoft Windows and Microsoft Excel. If you have difficulties operating your system, Windows or Excel, please consult your user documentation for those products or refer to the on-line help provided with your system.

System Requirements

- A Pentium computer with at least 512 MB of RAM and at least 10 MB of hard disk space
- A CDROM
- A mouse or pointing device supported by Windows.
- A display adapter and monitor capable of at least 256 colors at 800 x 600 pixels.
- Microsoft Windows 2000 through Windows XP
- Microsoft Excel 2000 through Excel for XP.

Installing the *OrthoTool™* Software

Create a new folder on your hard drive. Insert the *OrthoTool™* CD in your CD or DVD drive. Copy all of the files from the CD to the new folder. Create Desktop shortcuts to the in the new folder.

OrthoTool[™] uses Visual Basic for Applications. Current versions of MS Excel (2000 & XP), auto install with the Macro Security set to High, thus disabling critical functionality of the software. Start Excel, go to the Tools pull down menu and select Options. Select the Security tab and press the Macro Security button. Change the security setting to Medium before starting *OrthoTool*[™].

Sizing Worksheets for your Monitor

OrthoTool[™] was originally for a 15 inch monitor or laptop computer with 1024 x 768 pixel display with the zoom set at 129%. You can resize your worksheets for 800 x 600 pixel displays by using a 100% zoom setting. Take a few moments to examine each worksheet and adjust your zoom control to optimize the visible worksheet area for your monitor. Once the zoom controls have been adjusted for all of the worksheets, save *OrthoTool*[™] to your hard drive.

Important Concepts

Controlled Clearance[™]

For the past 50 years, the peripheral curves on rigid contact lenses have been described as set of stepped curves, being so many millimeters or diopters flatter than the base curve. Some current designs use axial or radial edge lift to describe the same base curve to peripheral curve relationship. Controlled Clearance[™] is a design concept that actually calculates the peripheral curve system relative to the patient's cornea shape to create precisely controlled bearing areas, tear film thickness and edge lifts.

Potential Add Power[™]

Aspheric optical and fitting surfaces focus light rays in a manner that stretches the focal point of a lens into a focal range, creating a multifocal effect similar to progressive spectacle lenses. *OrthoTool*[™] displays the potential add power created by front and back aspheric surfaces.

Conventions used in *OrthoTool*[™]

Data Entry cells are unprotected cells uses to enter K readings, refractions and personal design preference information. These cells have black text on white backgrounds. Calculated data that can be modified also appear as black text on white backgrounds.

Calculation data that is locked appears as text on gray backgrounds. The color of the text helps to separate the nature of the information. Black text relates to the clinical or lens information. Blue text relates to the steep axis on bitoric lenses. Green text relates to the tear film thickness. Important information always appears in bold faced text.

Quick Pick lists appear as blue cells. When you click on one of these cells, a list will open with several options to choose. These cells are very important and provide much of the power and convenience in *OrthoTool*[™].

Macro buttons save time. These buttons trigger lens calculations and copies new lens design information onto your worksheets. These buttons have bold maroon text on beige backgrounds.

PREFERENCES Worksheet

Configuring your *OrthoTool*™ Software

Before using *OrthoTool*™, review the information on the PREFERENCES worksheet. This worksheet stores your software license, address, phone, fax and email information that appears on the *OrthoTool*™ screens and order forms. This is also where you set the defaults for clinical warnings, design suggestions and where you customize the lens design tuners. Take time to familiarize yourself with these screens.

	A	B	C	D	E	F	G	H	I	J	K	L	M	
1	OrthoTool™											EChow & Associates		
2	Ver. 04.30.07											Edward Chow, O.D.		
3	Preferences											Copyright 2007 - All Rights Reserved		
4	Software License Information						Consulting Prompts & Warnings							
5	Name	Edward Chow, O.D.					Issue kerataconus warning above:	49.00	diopters	Restore Default Settings				
6	Address 1	9 Honeywell Place					Issue post surgical warning below:	39.00	diopters					
7	Address 2						Issue corneal disease warning when:	4.00	delta K					
8	City/State/Zip	Toronto, Ontario M2L 1Y2					Residual Astigmatism Warnings							
9	Phone:	416-817-8746					Issue residual astigmatism warning when Rx and corneal cylinder differ by:	0.75	Possible					
10	Fax:							1.25	Probable					
11	email							2.00	Certain					
12	Customize Lens Designs						Lens Design Suggestions							
13				Product Name		Code								
14	Std 1	Axial Edge Lift Designs	Spherical AEL 9.6	Std AEL 9.6		Suggest Asphere design when delta K >=						1.50	diopters	
15	Std 2		Spherical AEL 9.2	Std AEL 9.2		Suggest Bitoric design when delta K >=						3.00	diopters	
16	Thin 1		Thin AEL 9.8	Thin AEL 9.8										
17	Thin 2		Thin AEL 9.0	Thin AEL 9.0										
18	Asphere 1		Asphere 35 9.8	Asp 35 9.8										
19	Asphere 2		Asphere 75 9.8	Asp 75 9.8										
20	Bitoric 1		Bitoric 20 9.5	Bitoric20 9.5										
21	Bitoric 2		Bitoric 15 9.2	Bitoric15 9.2										
22	CC RevGeo 1		Controlled Clearance™	Controlled Clearance Rev Geo	CC Rev Geo 1									
23	CC Rev Geo 2		Reverse Geometry	Controlled Clearance Rev Geo	CC Rev Geo 2									
24	CC Rev Geo 3	Geometry	Controlled Clearance Rev Geo	CC Rev Geo 3										
25	Std Rev Geo 1	Std Reverse Geometry	Compression Rev Geo 1	CompRevGeo1										
26	Std Rev Geo 2	Std Reverse Geometry	Compression Rev Geo 2	CompRevGeo2										
27														
28														
29														
30														
												Miscellaneous Setups		
												Effective Add Power Visual Axis	1.0	mm inside OZ
												Preferred Laboratory for Orders		
												Name		
												Attn		
												Address		
												C/S/Z		
												Phone		
												Fax		
												Alternate Laboratory for Orders		
												Name		
												Attn		
												Address		
												C/S/Z		
												Phone		
												Fax		

Consulting Prompts and Warnings

You won't always recognize the signs of clinical conditions that may affect your fitting success. *OrthoTool*™ includes clinic warnings that automatically display when certain conditions occur. You can adjust the thresholds when these warnings display or reset them to the system default with the touch of a button. These pathology warnings include:

- **Kerataconus** – A kerataconus warning appears on the FIT DESIGN worksheet whenever the K readings are steeper than the value entered. (Default = 49.00 Diopters)
- **Post Surgical** – A post surgical warning appears on the FIT DESIGN worksheet whenever the K readings are flatter than the value entered. (Default = 39.00 Diopters)
- **Corneal Disease** – A corneal disease warning appears on the FIT DESIGN worksheet whenever the corneal cylinder exceeds the value entered. (Default = 4.00 diopters delta K)

Residual Astigmatism Warnings

You may want to change your initial lens design when there is a greater risk for residual astigmatism. *OrthoTool*™ includes three advisory levels that will display on the FIT DESIGN worksheet depending on the difference between the refractive and corneal cylinder. You can adjust your own thresholds for "possible", "probable" and "certain" risk of residual astigmatism or reset them to the system default with the touch of a button. (Default = 0.75, 1.25 and 2.00 diopters of cylinder delta respectively)

Lens Design Suggestions

OrthoTool™ displays design suggestions on the FIT DESIGN worksheet depending upon the amount of corneal cylinder in each eye. You can adjust the thresholds when these suggestions display or reset them to the system defaults. These suggestions include:

- Aspheric Lens – *OrthoTool™* suggests an aspheric design when the corneal cylinder exceeds the value entered. (Default = 1.50 diopters cylinder).
- Bitoric Lens – *OrthoTool™* suggests a bitoric design when the corneal cylinder exceeds the value entered. (Default = 3.00 diopters cylinder).

Miscellaneous Setups

The Potential Add Power™ Visual Axis describes the distance inside the back surface optical zone where the Add power will be calculate for aspheric lenses.

Preferred Laboratory for Orders

Enter the address, phone and fax information for the manufacturing laboratory where you order the majority of your rigid lenses. This information will appear on the order fax sheets that are printed from the ORDER worksheet tab.

Alternate Laboratory for Orders

Enter the address, phone and fax information for the manufacturing laboratory where you order the remainder of your rigid lenses. This information will appear on the order fax sheets that are printed from the ORDER worksheet tab when you select the alternate lab with the quick pick list on that worksheet.

Custom Lens Design Tuners

OrthoTool™ allows you to customize the design and fitting characteristics of all standard lens designs. Here is where you predetermine the base curve, diameter, peripheral curves and other characteristics. *OrthoTool™* includes 2 standard spherical designs, 2 thin lens designs, 2 aspheric lens designs, 2 bitoric lens designs and 5 reverse geometry lens designs. Access each Design Tuner by pressing the desired design button in cells A14 through A46.

OrthoTool™ assigns product names and selection codes for all of the lens designs. You may change these names to virtually anything you want, but it/s recommended that the names are consistent with the names used for ordering your lenses and the codes are short and descriptive. Product names and codes are in cells C14 to E26 on the PREFERENCE worksheet tab.

Feel free to change any of the setting to suit your fitting preferences. Every lens design has a button that will restore the original software settings so there is very little risk in experimentation.

There are many similarities in the Design Tuners. We will discuss the first Standard Spherical Lens Design Tuner in great detail and will discuss the differences on the remaining tuners.

Standard Sphere Design Tuner

The Standard Spherical design has a base curve that is fit steeper or flatter than flat K based on the amount of corneal cylinder. The peripheral curve system is a bicurve calculated by the axial edge lift provided by the secondary and peripheral curve.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	OrthoTool™											EChow & Associates	
2	Ver: 04.30.07											Edward Chow, O.D.	
3	Preferences											Copyright 2007 - All Rights Reserved	
31	Std Sphere #1	Design:	Spherical AEL 9.6	Code:	Std AEL 9.6								Top of Form
32	The Standard Spherical design has a base curve that is fit steeper or flatter than flat K based on the amount of corneal cylinder. The peripheral curve system is a bicurve												
33	calculated by the axial edge lift provided by the intermediate and peripheral curve.												
34	Define Base Curves in		Millimeters									Restore Metric Defaults	
35			Delta K	BC - FK +								Restore Dioptric Defaults	
36	Base curves are in MM's		Spherical	0.05	mm								
37	or Diopters.		0.50 cyl	0.05	mm								
38	0.05mm is approximately		0.75 cyl	0.00	mm								
39	0.25 diopters.		1.00 cyl	0.00	mm								
40	For MM Base Curves		1.25 cyl	-0.05	mm								
41	Positive values are Flatter		1.50 cyl	-0.05	mm								
42	than K. Negative values are		1.75 cyl	-0.10	mm								
43	Steeper than K.		2.00 cyl	-0.10	mm								
44	For Diopter Base Curves		2.25 cyl	-0.10	mm								
45	Negative values are Flatter		2.50 cyl	-0.15	mm								
46	than K. Positive values are		2.75 cyl	-0.15	mm								
47	Steeper than K.		3.00 cyl	-0.15	mm								
48													
49													
50													
51													
52													
53													
54													
55													
56													
57													
													Design / Order / Graphs / Calculators / Materials / Preferences /

- **Define Base Curve in:** Use the quick pick list in cell C34 to select whether the base curve will be described in millimeters or diopters.
- **Base Curves:** Enter the base curve offset from the flattest K reading for each delta K value in cell D36 to D47. When you are working in millimeters, positive values (i.e. 0.05, 0.10) describe base curves that are flatter than flat K. Negative values (i.e. -0.05, -0.10) describe base curves that are steeper than flat K. When you are working in diopters the effect is exactly the opposite. Positive values (0.25, 0.50) describe base curves that are steeper than flat K. Negative values (i.e. -0.25, -0.50) describe base curves that are flatter than flat K.
- **Lens Diameter:** Enter the desired default value in cell J36.
- **Lenticular Diameter:** Enter the front surface lenticular bowl diameter in cell J37.
- **Total Axial Edge Lift:** Enter the total desired axial edge lift in cell J38.
- **Axial Edge Lift from PC:** Enter the axial edge lift to be provided by the peripheral curve in cell J39.
- **PC Width:** Enter the default value in cell J40.
- **SC Width:** Enter the default value in cell J41.
- **Min Center Thick:** Enter the minimum center thickness for this lens design in cell J42. OrthoTool™ will calculate center based on the lens power, lenticular diameter and the target body thickness.
- **Target Edge Thick:** Enter the desired edge thickness for the lens design in cell J43. OrthoTool™ will calculate the radius of the lenticular curve based on the lenticular diameter, the target body thickness and the target edge thickness.

- **Target Body Thick:** Enter the desired thickness of the lens at the lenticular junction in cell J44. This value will influence the suggested center thickness for the lens design.
- **Base Curve Rounding:** Enter the base curve rounding factor for the lens design on cell J45. This value must be consistent with base curve descriptor of millimeters or diopters in cell C34. 0.05 mm equals approximately 0.25 diopters.
- **Lens Power Rounding:** Enter the rounding factor for lens power in cell J46.
- **Lens Material:** Enter a default lens material for the lens design in cell J47. This cell uses a quick pick list which refers to the entries on the MATERIALS worksheet.

Press the “Top of Form” macro button to return to top of the PREFERENCE worksheet.

Press the “Restore Metric Defaults” macro button to restore the factory setting in millimeters for this lens design.

Press the “Restore Dioptric Defaults” macro button to restore the factory settings in diopters for this lens design.

Thin Lens Design Tuner

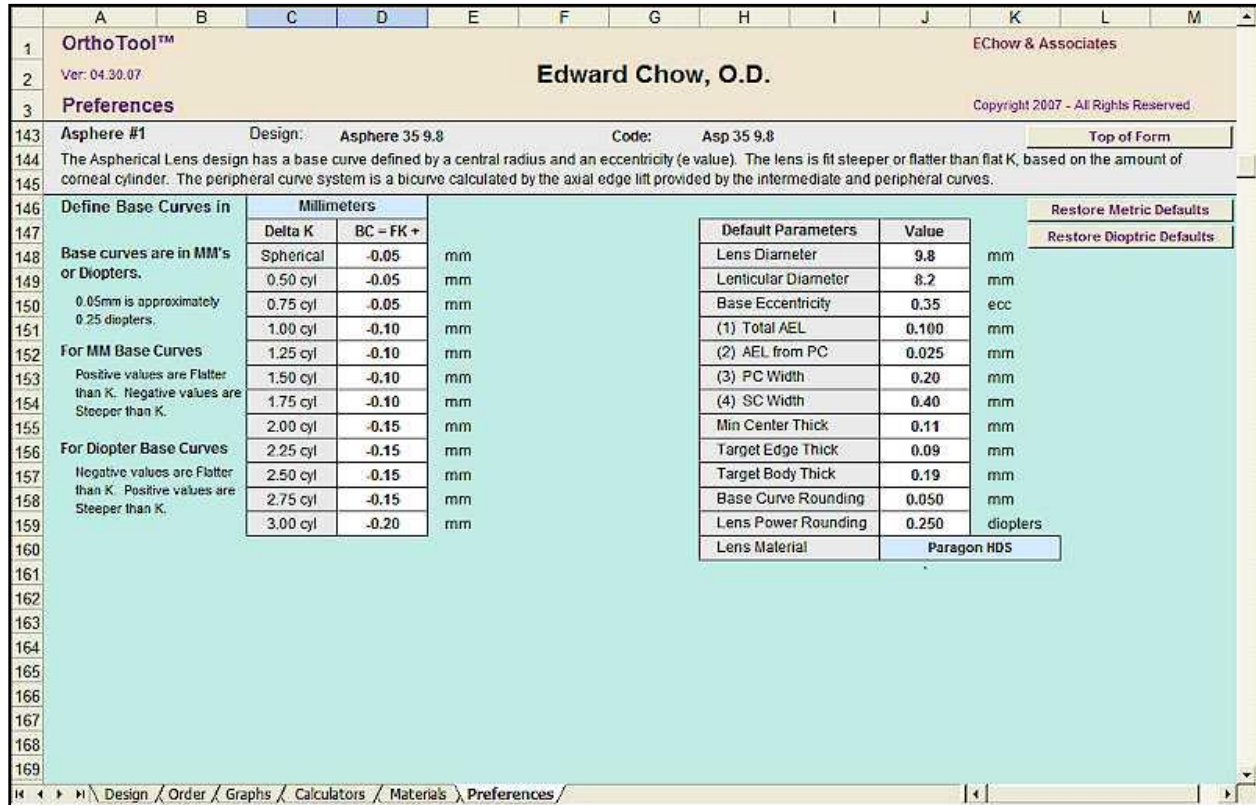
The Thin Spherical design has a base curve that is fit steeper or flatter than flat K based on the amount of corneal cylinder. The peripheral curve system is a bicurve calculated by the axial edge lift provided by the intermediate and peripheral curve. The body of the lens is thinner and lower DK, more durable lens materials are suggested.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	OrthoTool™											EChow & Associates	
2	Ver: 04.30.07											Edward Chow, O.D.	
3	Preferences											Copyright 2007 - All Rights Reserved	
87	Thin #1	Design:	Thin AEL 9.8		Code:	Thin AEL 9.8							Top of Form
88	The Thin Spherical design has a base curve that is fit steeper or flatter than flat K based on the amount of corneal cylinder. The peripheral curve system is a bicurve calculated by the axial edge lift provided by the intermediate and peripheral curve. The body of the lens is thinner and lower DK, more durable lens materials are suggested.												
89													
90	Define Base Curves in	Millimeters								Restore Metric Defaults			
91		Delta K	BC = FK +							Restore Dioptric Defaults			
92	Base curves are in MM's or Diopters.	Spherical	0.05	mm									
93		0.50 cyl	0.05	mm									
94	0.05mm is approximately 0.25 diopters.	0.75 cyl	0.00	mm									
95	For MM Base Curves	-1.00 cyl	0.00	mm									
96		1.25 cyl	-0.05	mm									
97	Positive values are Flatter than K. Negative values are Steeper than K.	1.50 cyl	-0.05	mm									
98		1.75 cyl	-0.10	mm									
99		2.00 cyl	-0.10	mm									
100	For Diopter Base Curves	2.25 cyl	-0.10	mm									
101	Negative values are Flatter than K. Positive values are Steeper than K.	2.50 cyl	-0.15	mm									
102		2.75 cyl	-0.15	mm									
103		3.00 cyl	-0.15	mm									
104													
105													
106													
107													
108													
109													
110													
111													
112													
113													
											Default Parameters	Value	
											Lens Diameter	9.8	mm
											Lenticular Diameter	8.0	mm
											(1) Total AEL	0.110	mm
											(2) AEL from PC	0.030	mm
											(3) PC Width	0.40	mm
											(4) SC Width	0.40	mm
											Min Center Thick	0.08	mm
											Target Edge Thick	0.08	mm
											Target Body Thick	0.16	mm
											Base Curve Rounding	0.050	mm
											Lens Power Rounding	0.250	diopters
											Lens Material	Boston ES	

The Thin lens design has the same adjustment fields as the standard lens design. The only difference between the two designs is that the original values for minimum center thickness, target edge thickness and target body thickness are thinner than the standard design.

Aspheric Lens Design Tuner

The Aspheric Lens design has a base curve defined by a central radius and an eccentricity (e value). The lens is fit steeper or flatter than flat K, based on the amount of corneal cylinder. The peripheral curve system is a bicurve calculated by the axial edge lift provided by the intermediate and peripheral curves.



- **Base Eccentricity:** Enter the base curve eccentricity in cell J150. *OrthoTool™* uses standard conic sections (sphere, ellipse, parabola & hyperbola) in the mathematical calculations for spherical and aspheric lens designs. The range of values is -0.99 to 1.99.

E Value Range	Conic Section	Impact to Fitting and Optical Characteristics
-0.99 to -0.01	Oblate Ellipse	Radius of the curve steepens as diameter increases.
0.00	Sphere	Radius does not change as diameter increases.
0.01 to 0.99	Prolate Ellipse	Radius of the curve flattens as diameter increases.
1.00	Parabola	Same as Prolate Ellipse
1.01 to 1.99	Hyperbola	Same as Prolate Ellipse

Bitoric Lens Design Tuner

The Bitoric design has two base curves and is fit relative to the steep and flat K readings. This lens is designed to fit aligned (+/-) with the horizontal cornea and slightly flatter than the vertical cornea. The outcome is similar to a spherical lens on a "With the Rule" corneal. The peripheral curve system is a bicurve, similar to other designs.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	OrthoTool™											EChow & Associates	
2	Ver: 04.30.07											Edward Chow, O.D.	
3	Preferences											Copyright 2007 - All Rights Reserved	
199	Bitoric #1		Design: Bitoric 20 9.5		Code: Bitoric20 9.5								Top of Form
200	The Bitoric design has two base curves and is fit relative to the steep and flat K readings. This lens is designed to fit aligned (+/-) with the horizontal cornea and slightly flatter than the vertical cornea. The outcome is similar to a spherical lens on a "With the Rule" cornea. The peripheral curve system is a bicurve, similar to other designs.												
202	Define Base Curves in		Diopters										Restore Metric Defaults
203	Base curves are in MM's or Diopters.		Delta K		BC = HK +								Restore Dioptric Defaults
204			Horiz BC vs Horiz K		0.00		diopters						
205	0.05mm is approximately 0.25 diopters.		Vert BC Relief		20		%						
206			For MM Base Curves		Base Curve Rounding		0.125		diopters				
207	Positive values are Flatter than K. Negative values are Steeper than K.		Lens Power Rounding		0.125		diopters						
208	For Diopter Base Curves												
209	Negative values are Flatter than K. Positive values are Steeper than K.												
210													
211													
212													
213													
214													
215													
216													
217													
218													
219													
220													
221													
222													
223													
224													
225													

Default Parameters	Value	
Lens Diameter	9.5	mm
Lenticular Diameter	8.0	mm
(1) Total AEL	0.110	mm
(2) AEL from PC	0.030	mm
(3) PC Width	0.25	mm
(4) SC Width	0.50	mm
Min Center Thick	0.11	mm
Target Edge Thick	0.11	mm
Target Body Thick	0.19	mm
Lens Material	FluoroPerm 30	

- Horizontal Base Curve versus Horizontal K: Enter a value in cell D204 to describe the horizontal base curve relative to the horizontal cornea. The same rules apply to base curve definition (millimeters or diopters) and steepness or flatness as spherical lenses.
- Vertical Base Curve Relief: OrthoTool™ will calculate the vertical base curve to be flatter than the vertical cornea based on the percentage entered in cell D206. Example: If the cornea has 4 diopters of corneal cylinder, a 20% relief factor will initially calculate a lens with 3.20 diopters of cylinder on the base curve and then will round the vertical base curve based on the base curve rounding value entered in cell D204.

Controlled Clearance Reverse Geometry Lens Design Tuner

The Controlled Clearance™ Reverse Geometry Lens is a design that is characterized by a defined base curve, power and diameter, to provide vision and corneal containment, and a reverse and peripheral curve system that is calculated from defined clearance values at the apex of the cornea and at significant points in the periphery.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	OrthoTool™											EChow & Associates	
2	Ver. 04.30.07											Edward Chow, O.D.	
3	Preferences											Copyright 2007 - All Rights Reserved	
255	Cont. Clear. Rev Geo #1	Design:	Controlled Clearance Rev Geo		Code:	CC Rev Geo 1							Top of Form
256	The <i>Controlled Clearance™ Reverse Geometry Lens</i> is a design that is characterized by a defined base curve, power and diameter, to provide vision and corneal containment, and a reverse and peripheral curve system that is calculated from defined clearance values at the apex of the cornea and at significant points in the periphery.												
258	Base Curve		Millimeters								Restore Default Settings		
259			Default Parameters:		Value						Default Parameters		Value
260			Apical Clearance	0.0050	mm						Lens Diameter	10.6	mm
261			Rev Curve Clearance	0.0100	mm						Lenticular Diameter	7.0	mm
262			2nd Curve Clearance	0.0005	mm						Reverse Curve Width	1.00	mm
263			3rd Curve Clearance	0.0000	mm						2nd Curve Width	0.50	mm
264			Edge Clearance	0.0900	mm						3rd Curve Width	0.50	mm
265			Target Lens Power	0.75	dioplers						4th Curve Width	0.30	mm
266			Maximum Correction	-6.50	dioplers						Min Center Thick	0.18	mm
267													
268	Valid Design for Controlled Clearance Reverse Geometry												
269													
270													
271													
272													
273													
274													
275													
276													
277													
278													
279													
280													
281													

- **Apex Clearance:** Enter a clearance value describing the tear film thickness at the center of the lens in cell D260. 0.001 mm = 1 micron
- **Reverse Curve Clearance:** Enter a clearance value describing the tear film thickness at the end of the reverse curve in cell D261. This value determines the reverse curve radius.
- **2nd Curve Clearance:** Enter a clearance value describing the tear film thickness at the end of the 2nd curve (i.e. intermediate curve) in cell D262.
- **3rd Curve Clearance:** Enter a clearance value describing the tear film thickness at the end of the 3rd curve (i.e. secondary curve) in cell D263.
- **Edge Clearance:** Enter a clearance value describing the tear film thickness at the end of the peripheral curve (i.e. lens diameter) in cell D264.
- **Target Lens Power:** Enter the target lens power in cell D265. This determines the base curve calculated from the patient's K readings and spectacle refraction.
- **Maximum Correction:** Enter a value to limit the amount of minus corrected by the lens in cell D266. This can be used to override the Target Lens Power.
- **Reverse Curve Width:** Enter the width of the reverse curve in cell J262.
- **2nd Curve Width:** Enter the width of the 2nd curve in cell J263.
- **3rd Curve Width:** Enter the width of the 3rd curve in cell J264.
- **4th Curve Width:** Enter the width of the 4th curve in cell J265.

All of the parameters of this lens design are based on one point, typically either the reverse curve, the 2nd or 3rd curve, touching the cornea (0.000mm clearance) and defined clearance values at remaining critical design points. This design issues a warning when the above rule is violated (cell B268).

Standard Reverse Geometry Lens Design Tuner

The Standard Reverse Geometry design is a central compression style lens that is characterized by a base curve that is N diopters flatter than the flattest K reading, a reverse curve that is N diopters steeper than the base curve and 3 peripheral curves.

The screenshot shows the OrthoTool™ software interface. The title bar reads "OrthoTool™" and "Edward Chow, O.D.". The menu bar includes "Design", "Order", "Graphs", "Calculators", "Materials", and "Preferences". The main workspace displays the "Standard Reverse Geometry #1" design parameters. A text box explains the design: "The Standard Reverse Geometry design is a central compression style lens that is characterized by a base curve that is N diopters flatter than the flattest K reading, a reverse curve that is N diopters steeper than the base curve and 3 peripheral curves." Below this are two tables for parameter settings.

Base Curve		Diopters	
Default Parameters	Value		
BC Flatter than K (Diop)	1.00	Diop	
RC Steeper than BC	2.00	Diop	
2nd mm Flatter than RC	0.80	mm	
3rd mm Flatter than 2nd	0.80	mm	
4th mm Flatter than 3rd	0.80	mm	

Default Parameters	Value	
Lens Diameter	9.8	mm
Lenticular Diameter	7.0	mm
Reverse Curve Width	1.00	mm
2nd Curve Width	0.20	mm
3rd Curve Width	0.20	mm
4th Curve Width	0.30	mm
Min Center Thick	0.16	mm
Target Edge Thick	0.12	mm
Target Body Thick	0.18	mm
Base Curve Rounding	0.05	diopters
Lens Power Rounding	0.25	mm
Lens Material	FluoroPerm 60	

- **BC Flatter than K (Diop):** Enter the base curve offset from the flattest K reading (in diopters) in cell D344. Refer to the standard sphere for additional details.
- **RC Steeper than BC:** Enter how much steeper (in diopters) the reverse curve should be compared to the base curve in cell D345.
- **2nd mm Flatter than RC:** Enter how much flatter (in millimeters) the 2nd curve should be compared to the reverse curve in cell D346.
- **3rd mm Flatter than 2nd:** Enter how much flatter (in millimeters) the 3rd curve should be compared to the 2nd curve in cell D347.
- **4th mm Flatter and 3rd:** Enter how much flatter (in millimeters) the 4th curve should be compared to the 3rd curve in cell D348.

Now that you have reviewed all of the Design Tuners, you are ready to use *OrthoTool™* to begin designing lenses.

DESIGN Worksheet

Overview

DESIGN worksheet is divided into 6 working sections.

- Cells A4:D14 – Patient's Prescription Information.
- Cells E4:M14 – Clinical Observations, Design and Lens Material Selection
- Cells A15:D36 – Lens Parameter information
- Cells E15:M36 – Tear Film Model

Press the VIEW LENS macro button at M12 to pan the screen to the right and reveal

- Cells N4:V14 – Optical Cross and Lens parameter conversion (millimeters to diopters)
- Cells N15:V36 – Lens Cross Section Model

Press the VIEW TEAR macro button at V12 to pan the screen back to the left

OrthoTool™				Edward Chow, O.D.																	
Ver: 04.30.07				EChow & Associates																	
Design				Copyright 2007 - All Rights Reserved																	
Patient's Rx				Right		Left		Patient ID		Enter Name or ID #			Ref		Enter Date or Reference information						
5	H K Reading			Clear R Rx		Right		Cornea		Refraction		Residual		Warnings		Design					
6	V K Reading					Left		WTR		Probable											
7	V K Axis			Clear L Rx				WTR		Probable											
8	Eccentricity	0.25	0.25																		
9	HVID	11.5	11.5																		
10	Sphere																				
11	Cylinder			Disp Lens																	
12	Axis			Clear Lens																	
13	Vertex	12	12																		
14	Add Power																				
15	Lens Rx	Right	Left	R Apex Vault		R Edge Lift				L Apex Vault				L Edge Lift							
16	Flat Base			Disp Right		Right Tear Film															
17	Sleep Base			Clear Right																	
18	Base Ecc.			Steeper																	
19	Flat Power			Flatter																	
20	Sleep Power			Larger																	
21	Front Ecc			Smaller																	
22	Add Power																				
23	Diameter																				
24	1st Curve			Disp Left		Left Tear Film															
25	1st Width			Clear Left																	
26	2nd Curve			Steeper																	
27	2nd Width			Flatter																	
28	3rd Curve			Larger																	
29	3rd Width			Smaller																	
30	4th Curve																				
31	4th Width																				
32	Base OZ																				
33	Front OZ																				
34	C Thick																				
35	E Thick																				

This page also has a number of useful macro buttons to help you with your lens design chores.

- Clear R (L) Rx – clears the entries in HK Reading, VK Reading, VK Axis, Sphere, Cylinder, Axis & Add Power
- Disp Lens – Calculates and writes the lens parameters, tear film models and lens cross section models from the corneal and refractive attributes. This button actually writes “pointers” to the design attributes based on the design entered in cells F12 and F13. If you change the lens design, *OrthoTool™* will automatically recalculate and display the lens parameters, tear model and lens cross section automatically and without user intervention however, if you overwrite any lens parameter, you must press this button again to rewrite the “pointers”.
- Clear Lens – removes the entries (pointers) for all the editable lens parameters.
- Disp Right (Left) – replaces the lens parameter pointers on the intended lens.

- Clear Right (Left) – removes the lens parameter pointers on the intended lens.
- R (L) Steeper – every time you press this macro, the base curve steepens by 0.25 diopters, the lens power changes by -0.25 diopters and the peripheral curves are recalculated to retain the original design characteristics.
- R (L) Flatter - every time you press this macro, the base curve flattens by 0.25 diopters, the lens power changes by +0.25 diopters and the peripheral curves are recalculated to retain the original design characteristics.
- R (L) Larger - every time you press this macro, the lens diameter increases by 0.5 mm and the peripheral curves are recalculated to retain the original design characteristics.
- R (L) Smaller - every time you press this macro, the lens diameter decreases by 0.5 mm and the peripheral curves are recalculated to retain the original design characteristics.

Entering the Patient's Clinical Information

- Enter the patient's name (cell F4) and the date or other reference information (cell J4).
- Enter the Horizontal and Vertical K Readings in diopters to millimeters (cells B5:C6) and the vertical K axis (cells B7:C7). The vertical K axis must be between 45 & 135.
- The corneal eccentricity value defaults at 0.25e (cell B8:C8). You can use the default values, numbers provided by corneal topography or by measuring the central and peripheral K's then calculate the eccentricity (see CALCULATORS and press the Eccentricity Calculator macro).
- The horizontal visible iris diameter (cell B9:C9) defaults at 11.5 mm. Change this value as required.
- Enter the refractive error in either plus or minus cylinder (cell B10:C12).
- The vertex distance defaults to 12mm (cell B13:C13). OrthoTool™ automatically vertexes every spectacle refraction to the corneal plane. This conversion is not significant for refractive errors below +/- 4.50 diopters.

Reviewing Clinical Considerations and Warnings

- *OrthoTool*™ identifies the cornea and refraction as “With the Rule”, “Against the Rule” or “Oblique” (F7:G8). The background color of these cells change if there is a discrepancy between the cornea and the refraction, warning you of potential data entry errors or fitting problems.
- *OrthoTool*™ displays the risk factor for residual astigmatism (H7:H8) based on the limits you entered on the PREFERENCES worksheet .
- *OrthoTool*™ displays warnings for the potential presence of kerataconus, post surgical and other corneal problems (I7:J8) based on the limits you entered on the PREFERENCES worksheet.
- *OrthoTool*™ displays design suggestions (K7:K8) based on the limits you entered on the PREFERENCES worksheet.

Selecting the Initial Lens Design

The next step in the process is to select your initial lens design based upon your fitting objectives. *OrthoTool*™ provides a convenient Quick Pick for selecting one of lens designs that you reviewed and customized on the PREFERENCES worksheet. Simply click on the blue cell list (F12:G13) and the list appears. Pick the design you want, click and the lens parameters are displayed.

Which Design is best? The CVI Test

The best lens design for any patient is up to you. In most instances, several base curves, diameters and peripheral curve systems will work with equal success. Any lens that meets the CVI Test should be successful.

Comfort –	The lens must provide acceptable comfort for the patient.
Vision –	The lens must provide acceptable visual acuity for the patient.
Integrity –	The lens must sustain corneal integrity and ocular health

Changing Lens Parameters

The DESIGN worksheet displays the lens parameters and performs the optical calculations necessary to fabricate the finished lens. This is where you can prototype various lens designs against the corneal model. You can select different lens designs (F12:G13), different lens materials (H12:I13), front or back vertex (K12:K13), use the macro buttons (D19:D33) to go steeper, flatter, larger or smaller and you can change virtually any parameter and view changes instantly on the tear film and lens cross section models on the same page. For larger and more detailed views of the models, just go to the GRAPHS tab.

The good news is, you can design just about anything you want. *OrthoTool™* has very few design constraints..

The bad news is, you can design just about anything you want, even lenses that are impossible for a lab to fabricate and for your patients to wear. We feel it's better to show why designs won't work rather than tell you it won't work.

The more good news is, when you really mess up a design, you can always press the macro buttons (D16 & D27) to replace all the design pointers and show the original lens specifications. See, we're almost "goof proof".

Note: The material attributes were collected from package inserts and specifications published by the material manufacturers. *E.Chow & Associates* does not warrant the accuracy or completeness of this information. This information should be considered an approximation of the material specifications. Contact the material manufacturer for accurate and current information.

Problem Solving Difficult Fits

When solving a difficult fitting problem, it is often helpful to work on one eye at a time. Enter the same K readings and refraction in both eyes on the DESIGN worksheet. Then use the right and left lens to prototype different designs or to visualize the affect of before and after design changes.

Simplifying Complex Lens Designs

The only thing that makes a complex lens design difficult to understand is lack of information and the "veil of mystery" surrounding the design. If you can visualize the lens and it's relationship to the cornea, you remove the mystery and the design becomes a very simple and predictable design to fit. This is where *OrthoTool™* becomes an invaluable tool to the contact lens fitter and design consultant. Reverse Geometry Designs are a prime example where design changes often have the opposite effect that the same change has on a standard spherical design.

Aspheric Lenses

Most aspheric lenses are regular conic sections (remember your geometry?) and are defined by their eccentricity or e value. These lenses are only difficult to work with when you do not know the e value and can not compare the shape to spherical lenses or the cornea. Most contact lens labs use CNC lathes can build a wide range of aspheres for you.

Aspheric curves fall into two basic groups: surfaces where the radius becomes flatter as the diameter increases (prolate ellipses, parabolas & hyperbolas) and surfaces where the radius becomes steeper (oblate ellipses) as the diameter increases. The prolate ellipse (e values between 0.01 & 0.99) are the most common aspheric shape used on the back surface of a contact lens as it more closely approximates the corneas natural flattening.

Aspheric Multifocals

Aspheric multifocals are widely prescribed for presbyopes. Unfortunately, they're confusing to calculate, challenging to fit and expensive to buy. Not any more. *OrthoTool™* calculates the potential add power effect that's created by aspheric surfaces applied to your RGP lenses.

When you enter a base curve eccentricity (B18:C18) and / or a front eccentricity (B22:C22) on the DESIGN worksheet, *OrthoTool™* displays the potential add power in cells (B23:C23). You can manipulate the eccentricity (+/- values) to design distance point centered lenses or near point centered lenses. Any lab with CNC lathes should be capable of manufacturing lenses with your defined aspheric surfaces to create your own multifocal lenses. Try designing your own aspheric multifocal with the following procedure.

- Enter the patient's K readings and refractions.
- Select the ASP 75 9.8 design from the design quick pick (F12:G13)
- Steepen or flatten the base curve, change the back eccentricity, change the diameter or change the peripheral curves until you're satisfied with the tear film model.
- Add +0.25 to the distance power.
- Enter values in the front eccentricity (B22:C22) until you are satisfied with the potential add power. Minus values will increase the add induced by the back surface, plus values will decrease the add induced by the back surface. Don't forget to check the Potential Add Power™ Visual Axis value on the PREFERENCE tab. This identifies the point where the Potential Add Power™ is calculated.
- Press the VIEW LENS macro (M12) to look at the lens cross section and determine if you have adequate center thickness for lens stability and front surface lenticulation for edge thickness and profile.
- Order your lens.

	A	B	C	D	N	O	P	Q	R	S	T	U	V	
1	Ortho Tool™				Edward Chow, O.D.				<i>EChow & Associates</i>					
2	Ver: 05.22.07								Copyright 2007 - All Rights Reserved					
3	Design													
4	Patient's Rx		Right	Left	Rx Conversions		Right	Left	Lens Conversions		Right	Left		
5	H K Reading	42.25	7.80	Clear R Rx	H K Reading	7.99	43.25	Flat base		43.87	43.25			
6	V K Reading	43.75	7.65		V K Reading	7.71	44.12	Sleep Base						
7	V K Axis	90	85	Clear L Rx	WTR		WTR							
8	Eccentricity	0.25	0.25		H Vertaxed Rx		-0.99	-2.19	1st Curve					
9	HVID	11.5	11.5	Disp Lens	V Vertaxed Rx		-2.19	-3.01	2nd Curve					
10	Sphere	-1.00	-2.25				WTR	WTR	3rd Curve		35.37	-38.12		
11	Cylinder	-1.25	-0.87	Clear Lens					4th Curve		34.00	33.25		
12	Axis	180	165						A.E.L.		0.069	0.120		View Tear
13	Vertex	12	12											
14	Add Power													
15	Lens Rx		Right	Left										
16	Flat Base	7.70	7.80	Disp Right										
17	Steep Base			Clear Right										
18	Base Ecc.	0.75		R Steeper										
19	Flat Power	-2.50	-2.25	R Flatter										
20	Sleep Power			R Larger										
21				R Smaller										
22	Front Ecc	-0.30												
23	Add Power	+2.00		Disp Left										
24	Diameter	9.8	9.6	Clear Left										
25	1st Curve			L Steeper										
26	1st Width			L Flatter										
27	2nd Curve			L Larger										
28	2nd Width			L Smaller										
29	3rd Curve	9.54	8.87											
30	3rd Width	0.30	0.50											
31	4th Curve	9.94	10.14											
32	4th Width	0.30	0.30											
33	Base OZ	8.6	8.0											
34	Front OZ	8.2	8.0											
35	C Thick	0.18	0.14											
36	E Thick	0.09	0.11											

Bitoric Lenses

Bitoric lenses are confusing because of the many designs (cylinder power effect, spherical power effect and countless proprietary designs) and all the different calculation techniques employed for “with the rule” and “against the rule” corneas. If you forget everything everyone taught you about bitoric lens design and go back to basic fitting concepts, the bitoric lens is one of the easiest lens designs to fit. Welcome to the Bitoric 20™ design.

Consider the easiest RGP fitting scenario, a one diopter, “with the rule” corneal cylinder. A well designed spherical lens will align with the horizontal (flattest) corneal meridian and will be slightly flatter than the vertical (steepest) corneal meridian. Well that’s exactly what *OrthoTool*™ does. Forget all the calculation rules and worksheets. Forget about “with the rule” or “against the rule”. Enter your K’s, corneal axis and refraction, select the Bitoric 20™ and that’s exactly what you get, a lens that aligns with the horizontal meridian, is slightly flatter than the vertical meridian (20% of delta K) and has lens powers, accurately calculated for the vertex distance at each meridian. We tried to make it harder, but couldn’t figure out how.

Reverse Geometry Lenses

There is a lot of research, lectures and published articles on reverse geometry lens designs for orthokeratology. There is also a lot of regulations and controversy surrounding fitting, wearing schedules, approved materials, approved designs and advertised claims. We encourage you to consult industry experts, attend fitting courses and review the regulations before fitting RGP lenses for orthokeratology.

Once you’re satisfied with your base knowledge and understand your legal and ethical responsibilities, consider the OrthoK CC™ design as an excellent reverse geometry design that lets you control the customization of the central clearance and tear film thickness in the paracentral region. Refer to the information on the PREFERENCE worksheet for setup information.

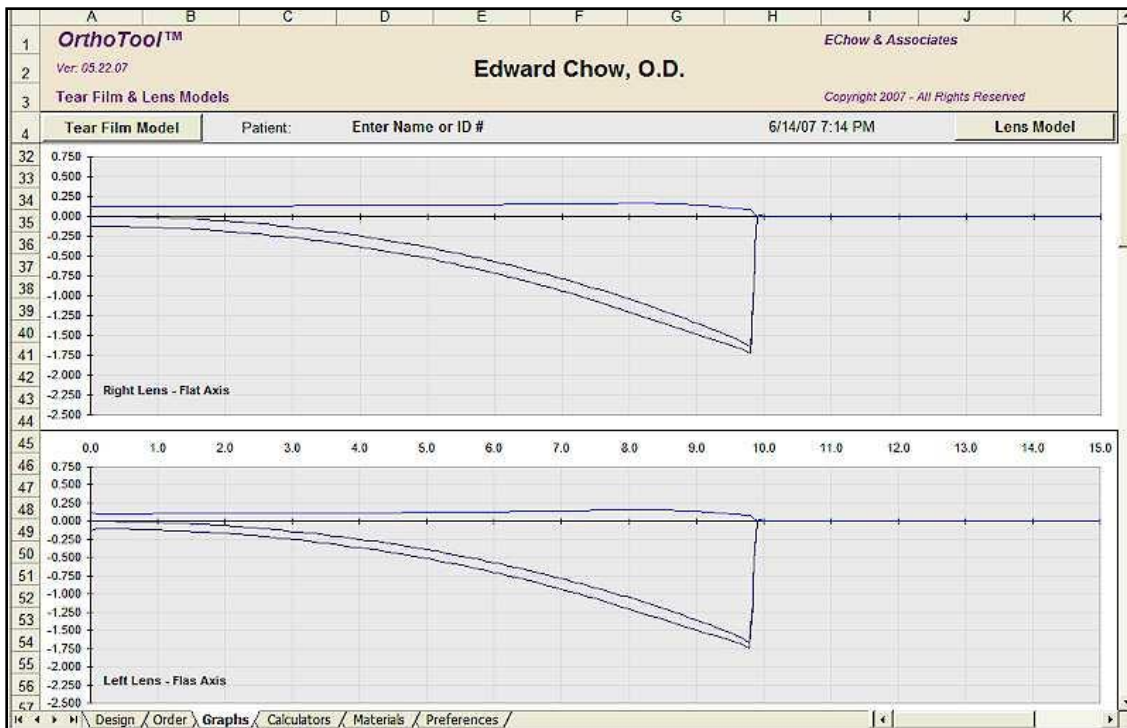
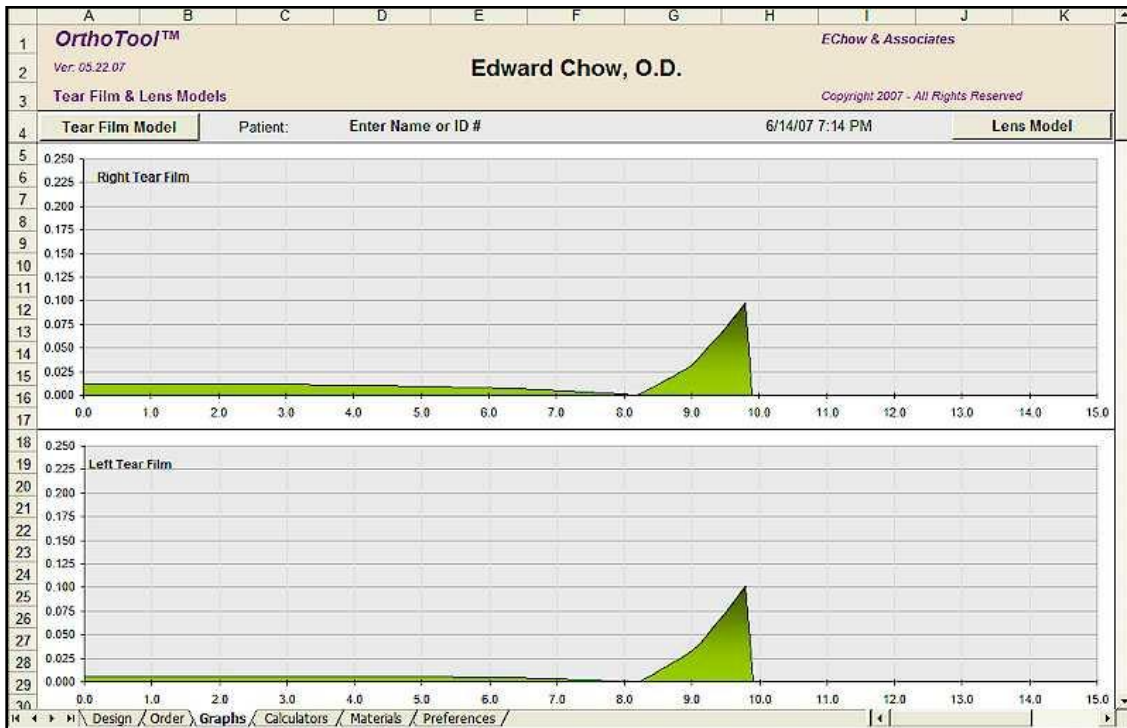
ORDER Worksheet

Lens designs created on the DESIGN worksheet can be quickly transferred to an order form by pressing the macro buttons, *Fill Right Lens* (cell A7) and *Fill Left Lens* (cell A12) on this worksheet. This form is not "write protected" so you can make adjustments to the lens specifications, change design names, change materials, add lens colors and special instructions to each eye individually or the complete order. This form includes a Quick Pick list to change between front and back vertex power measurements and to select the primary or secondary lab for the fax sheet. Refer to the PREFERENCE tab for additional information on lab selections. Once this form is completed, simply print the page and fax it to your manufacturing laboratory.

	A	B	C	D	E	F	G	H	I	J	K	L	
1	OrthoTool™										EChow & Associates		
2	Ver: 05.22.07												
3	Lens Order Form										Copyright 2007 - All Rights Reserved		
4	Order Date	6/14/07 7:14 PM			Edward Chow, D.D.			Tel:		416-817-8716			
5	Patient	Enter Name or ID #			9 Honeywell Place			Fax:					
6	Reference	Enter Date or Reference information			Toronto, Ontario M2L 1Y2			email:					
7	Fill Right Lens	Clear	Base	BV	Diameter	CT	IC1	IC2	IC3	IC4	BO2	FO2/ET	
8	Tha AEL 9.8	Design	7.95	.125	9.8	0.13			8.88	9.77	8.2	8.0	
9	Boston ES	Material			OO Notes:				0.40	0.40		0.08	
10		Color	Base Ecc	Front Ecc									
11													
12	Fill Left Lens	Clear	Base	BV	Diameter	CT	IC1	IC2	IC3	IC4	BO2	FO2/ET	
13	Tha AEL 9.8	Design	7.80	.225	9.8	0.10			8.67	9.49	8.2	8.0	
14	Boston ES	Material			OO Notes:				0.40	0.40		0.08	
15		Color	Base Ecc	Front Ecc									
16													
17	Special Instructions												
18													
19	Laboratory	Primary											
20													
21													
22													

GRAPHS Worksheet

Sometimes you may want to look closer at the tear film model or the lens cross section model. The GRAPHS worksheet has full sized models of the lenses shown on the DESIGN worksheet. Press the *Tear Film Model* or the *Lens Model* macro buttons to flip between the two views.



CALCULATORS Worksheet

Cross Cylinder Toric Calculations

The cross cylinder toric calculator helps you refine the fit of soft toric lenses by resolving visual problems caused by lens rotation and cylinder over-refractions. This calculator uses the *RALS* rule to compensate for lens rotation, combines the sine waves of the lens power and over refraction and then applies the *LARS* rule to determine the final lens power. This calculator is a simple, reliable and convenient tool for calculating the soft toric lens to reorder for your patients. No more rules to remember.

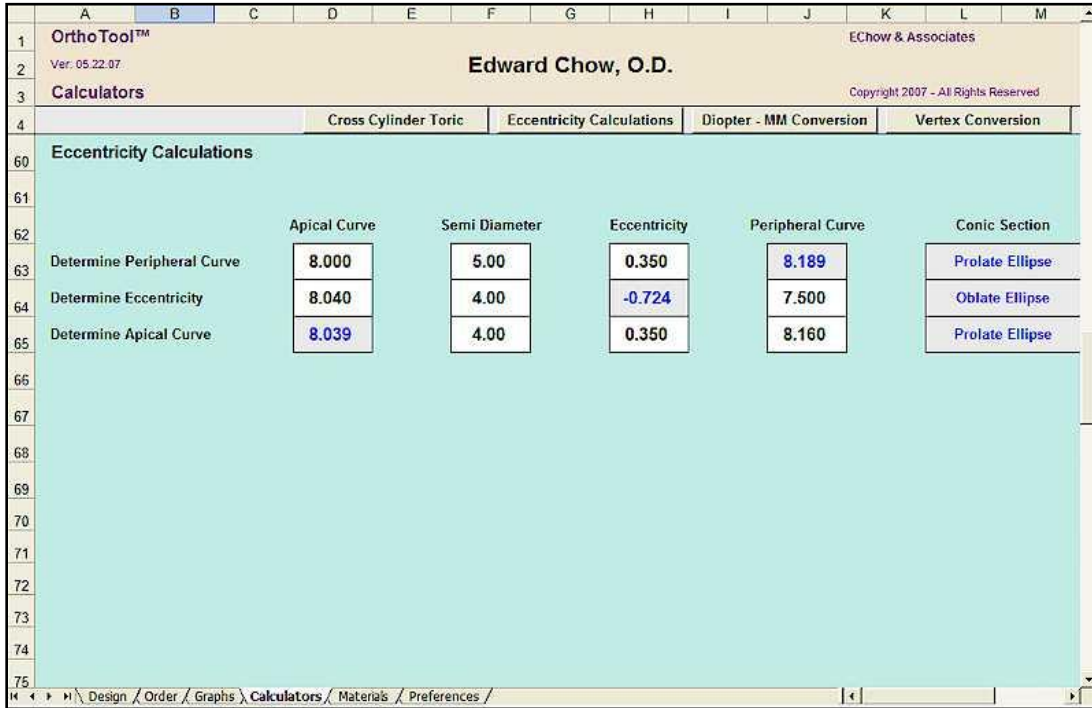


Procedure:

- Enter the sphere, cylinder and axis of the original toric lens (B7:C9).
- Enter the over refraction that provides the best visual acuity (B11:C13).
- Enter the direction of lens rotation (B13:C14).
- Enter the amount of lens rotation in degrees (B15:C15)
- Order the resultant toric lens powers (B17:C19). It's just that simple.

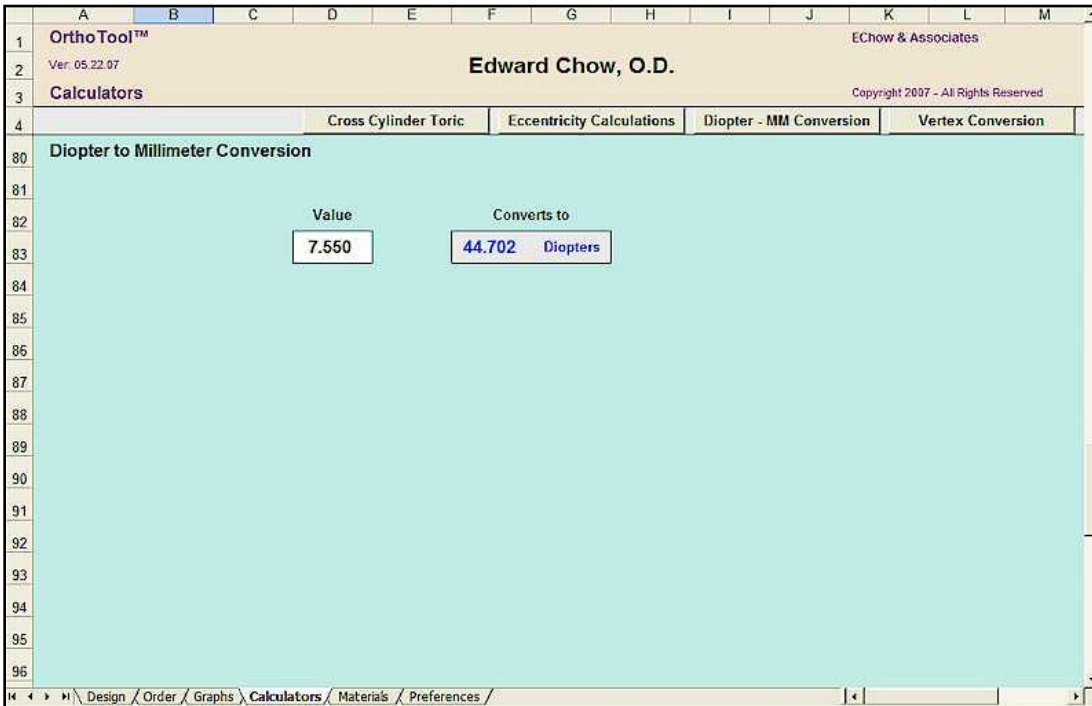
Eccentricity Calculations

The Eccentricity calculator is a set of tools to calculate the e value or radii at different points of the lens. You can determine: (a) the peripheral radius calculated from the apical radius, semi diameter and eccentricity, (b) the eccentricity calculated from the apical radius, semi diameter and peripheral radius, (c) the apical radius calculated from the semi diameter, eccentricity and peripheral radius.



Diopter – MM Conversion

The diopter to millimeter calculator converts between the two units of measure using the formula: $\text{radius} = (n - 1) / \text{diopters}$, where the refractive index (n) = 1.3375.



Vertex Calculator

This calculator converts spectacle refractions to the corneal plane using the formula:

$$1000 / ((1000/Rx) - \text{vertex distance})$$

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	OrthoTool™											EChow & Associates	
2	Ver: 05.22.07											Edward Chow, O.D.	
3	Calculators											Copyright 2007 - All Rights Reserved	
4				Cross Cylinder Toric			Eccentricity Calculations			Diopter - MM Conversion		Vertex Conversion	
100	Vertex Distance Conversion												
101													
102	Rx				Vertex Distance				Lens Power				
103	-3.25				@ 12.0 mm				-3.13				
104													
105													
106													
107													
108													
109													
110													
111													
112													
113													
114													
115													
116													
Design / Order / Graphs / Calculators / Materials / Preferences													

MATERIALS Worksheet

The MATERIALS worksheet is a reference chart that contains the physical attributes and properties of many FDA approved lens materials. This worksheet is the source for the material codes that are found on the quick pick list for materials on the DESIGN worksheet.

DISCLAIMER: The information on this worksheet was collected in the public domain from package inserts and specifications published by the material manufacturers and from trade publications. *E.Chow & Associates* does not warrant the accuracy or the completeness of this information. This information should only be used as an approximation of the various specifications. Contact the material manufacturer for current information.

Ortho Tool™		Edward Chow, O.D.											EChow & Associates
Ver: 05.22.07.													
Lens Material Attributes													Copyright 2007 - All Rights Reserved
Supplier	Material Names	Code	Mfg Ref. Index *	Pub Ref. Index	Dk	Wetting Angle	Specific Gravity	Hardness	Material	Type	UV	Color	
	Fluorolens 15	FL15	1.479	1.479	18.0	23.0	1.156	83.0		FSA	No	Blue, Lt Green, Med Green, Grey	
	Fluorolens 25	FL25	1.479	1.479	28.0	23.0	1.156	83.0		FSA	No	Blue, Grey, Clear	
	Fluorolens 50	FL50	1.466	1.466	56.0	23.0	1.150	82.0		FSA	No	Blue, Grey, Clear	
	Fluorolens 70	FL70	1.461	1.461	75.0	24.0	1.154	81.0		FSA	No	Blue, Grey, Clear	
	Fluorolens 90	FL90	1.460	1.460	102.0	25.0	1.161	81.0		FSA	No	Blue, Grey, Clear	
	Hybrid FS	HFS	1.447	1.447	31.0	n/a	1.177	78.1		AFSA	No	Blue, Green, Grey, Clear	
	Hybrid FS Plus	HFS+	1.447	1.447	60.0	n/a	1.157	77.6		AFSA	No	Blue, Green, Grey, Clear	
	EuroPerm 30	EP30	1.471	1.471	32.0		1.120	82.0			No	Blue, Grey, Clear	
	EuroPerm 60	EP60	1.467	1.467	64.0		1.110	80.0			No	Blue, Grey, Clear	
	EuroPerm 90	EP90	1.463	1.463	96.0		1.090	78.0			No	Blue, Grey, Clear	
EuroPerm 120	EP120	1.460	1.460	128.0		1.130	76.0			No	Blue		
Euro 18	E18	1.473	1.473	17.0		1.150	82.0			No	Blue, Grey, Clear		
Euro 32	E32	1.471	1.471	30.0		1.120	82.0			No	Blue, Grey, Clear		
Polymer Technology 1-800-225-1241	Bestan XO	XO	1.415	1.415	100.0	49.0	1.270	112.0	hexafocon A	FS-DW	Yes	Blue, Violet, Ice Blue, Green	
	Bestan EO	EO	1.429	1.429	58.0	49.0	1.230	114.0	enflufocon B	FS-DW	Yes	Blue, Ice Blue, Green, Gray, B	
	Bestan ES	ES	1.443	1.443	18.0	52.0	1.220	117.0	enflufocon A	FS-DW	Yes	Blue, Ice Blue, Green, Gray, B	
	Bestan RXD	RXD	1.435	1.435	24.0	39.0	1.270	122.0	itabisfluorofocon	FS-DW	Yes	Blue, Ice Blue	
	Bestan IV	B4	1.468	1.468	19.0	17.0	1.100	116.5	itafocon B	SA-DW	No	Blue, Electric Blue, Clear	
	Bestan II	B2	1.471	1.471	12.0	20.0	1.130	118.5	itafocon A	SA-DW	No	Blue, Green, Clear	
	Equalens	EQ	1.439	1.439	47.0	30.0	1.190	115.0	itafluorofocon A	FS-EW	Yes	Blue, Electric Blue, Clear	
	Equalens II	EQ2	1.423	1.423	85.0		1.240	112.0	oprifocon A	FS-EW	Yes	Blue, Green, Clear	
Paragon HDS 100	H100	1.442	1.442	100.0	42.0	1.100		paflufocon D	FS-EW	No	Blue, Green		
Paragon HDS	HDS	1.449	1.449	58.0	14.7	1.160		paflufocon B	FS-EW	Yes	Blue, Crystal Blue, Green, For		

In Closing

Thank you for taking the time to familiarize yourself with the *OrthoTool™* software. We hope you feel comfortable with the operation and features of our software and are able to design rigid contact lenses for almost any patient application. If you have additional questions, please contact technical support.