





## Topography and Soft Contact Lens Fitting

Whereas RGP fitting really only requires central corneal information, soft contact lenses fit over the corneo-scleral junction and neither machine type map this region. For this reason, topography cannot be used as the sole guide to fitting complex corneas.

### Using Topography as a Guide to Fitting Soft Lenses Mapping

- Topography maps are generally presented in Sagittal or Tangential format. Of these, the Sagittal map is most useful for designing contact lenses
- All topography machines can export the map in "Absolute" form in which the colour coded steps are 1.50D apart. This has the advantage that one can compare maps between machines, however the detail of the corneal shape can be lost. It is therefore recommended to adjust the sensitivity of the mapping to show as much corneal detail as possible.
- In Placido based topography, shadows from eyelashes should be avoided. If the patient has deep set eyes, rotating the patient's head may obtain a better mapping.
- Ensure the machine has been recently calibrated. Some machines, such as the Keratron Scout, require calibrating before every measurement.
- Placido based machines can give further valuable information. Careful study of the pictures of the ring reflections can accurately portray position of scars, levels of corneal distortion and tear film quality.

### Interpreting Topography

#### Keratometry

Steep central cone showing small corneal coverage

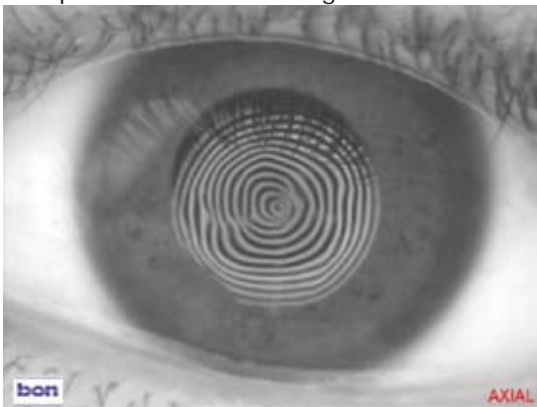


Figure 5a

#### Topography

Resultant mapping giving no real peripheral information

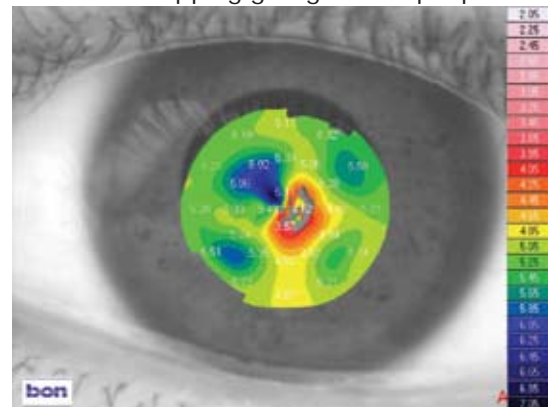


Figure 5b

Pellucid Marginal Degeneration showing wider coverage

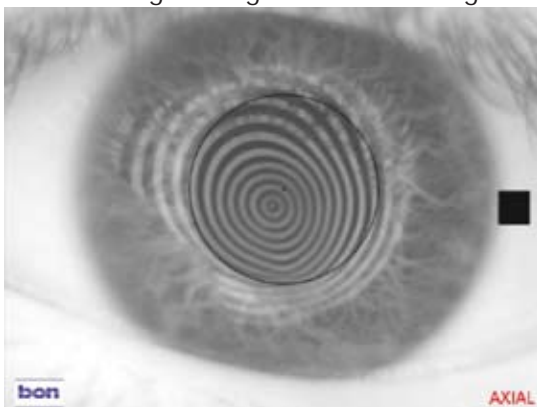


Figure 6a

Resultant mapping showing extreme superior flat area

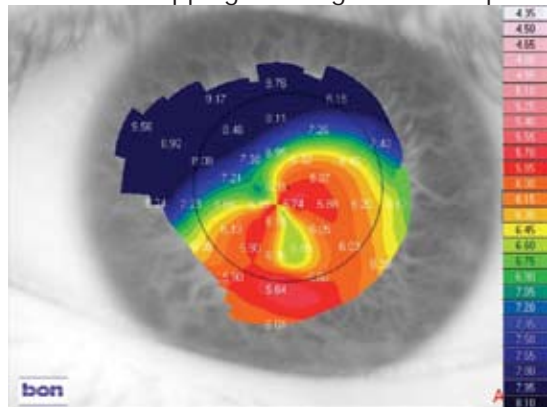


Figure 6b

### Using Topography to aid Over Refraction

Both types of topography machine will measure the astigmatism present on the cornea. Usually, this will act as a guide to the amount of cylinder and axis required for over refraction. In cases where there is significant scarring or irregularity, performing topography over the top of the fitting lens can be more accurate.

## Natural Ectasias

Topography maps of steep, central cones tend to give less peripheral detail than those of flat corneas with low cones due to the rings being reflected more closely together (see Fig. 5). It is difficult to extract any useful information as to the periphery from this type of mapping and therefore it is not possible to design a KeraSoft® IC lens solely from a topography map in this type of case. However, the topography does give a good indication of which fitting lens to try initially. The peripheries of ectasic corneas are either steep, or flatten out markedly beyond the central area (nipple cone); differentiating between these types is usually possible on slit lamp examination or is often visible to the naked eye.

Low cones and Pellucid Marginal Degeneration (PMD) tend to be much flatter centrally and a wider coverage of the cornea is mapped. However, these mappings are usually not well interpreted by the software. Topography will often indicate extremely flat areas opposite to the cone (see Fig. 6) and this can be misleading. In such cases, it is best to base initial fittings on the average corneal curvature measurements as indicated by the green areas on the map and be prepared to fit much steeper than would normally be indicated by the superior topography.

## Post Refractive Surgery Cases

### Keratometry

Post Radial Keratotomy (RK)

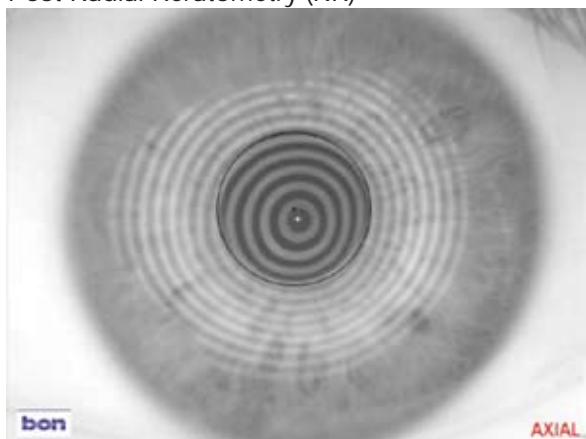


Figure 7a

### Topography

Mapping shows flat central area, compared to periphery

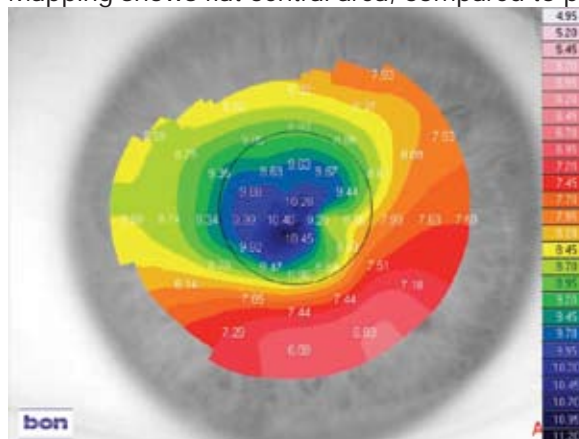


Figure 7b

Post LASIK Ectasia

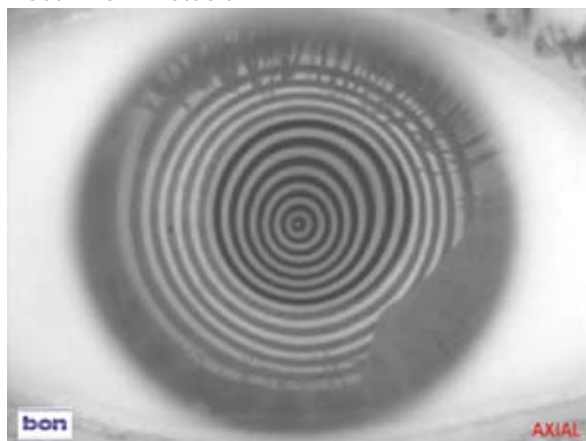


Figure 8a

Mapping can show extreme variations in corneal shape

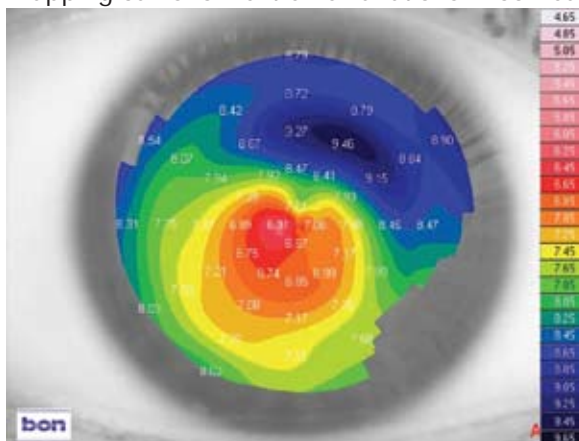


Figure 8b

In myopia reduction, the resultant topography tends to be flat centrally compared to the periphery and once again, topography can be misleading in suggesting the central areas are much flatter than perhaps is the case. Curvatures as flat as 10.50 can be indicated, yet fitting according to those measurements can lead to lenses being too flat. In the case of Fig. 7, Post RK, the central curvature is 10.40, mid periphery 7.90 and steep areas 6.80. Flat lenses slide off the eye and the correctly fitting lens is 8.20/15.00.

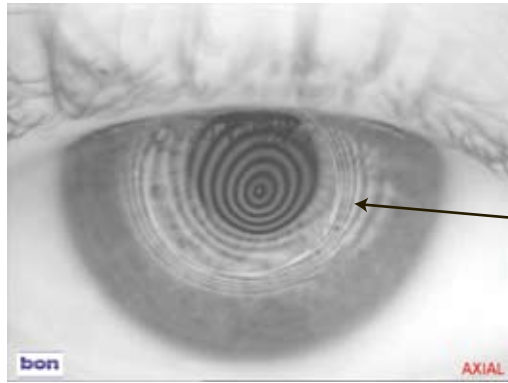
### Post LASIK Ectasia

Post LASIK ectasias (Fig. 8) are complicated because the corneal shape is probably the most divorced from a "normal" configuration and possibly is the least likely to be correctly interpreted by topography software. Due to the ectasia, surrounding areas appear much flatter than those in simple post LASIK cases. This may disguise the fact that the periphery can still be relatively steep. Such corneas with central ectasia may benefit from lenses that flatten peripherally and those with lower cones may benefit from lenses that steepen peripherally, i.e. reverse geometry fits.

## Other Surgeries

### Keratometry

Keratoconus with INTACS



INTAC  
Positions

### Topography

Mapping can be distorted

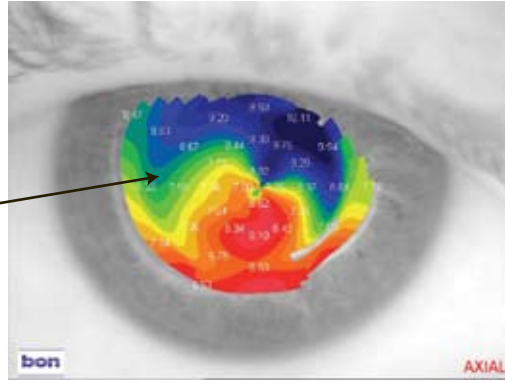


Figure 9

INTACs are rings inserted into the cornea to reduce myopia and astigmatism. They distort the topography mapping, therefore fitting should be initially based on the mid periphery readings.

### Discussion

It can be seen from the above that topography is only a guide to fitting, however it does show corneal type and shape very effectively. Scanning topography produces thickness maps which also aid in understanding the overall shape, as the thinnest areas tend to be the steepest and vice versa.

Topography can indicate the initial fitting lens, but thereafter, the assessment of fitting characteristics will provide more useful information. Movement, rotation, over refraction and visual acuity stability all input into the fitting process.

If sending topography information to UltraVision as an aid to design, please note the following:

- Topography images should NOT be FAXED as they will be in black and white and therefore the mapping cannot be interpreted.
- Topography maps should be emailed to UltraVision as picture files and not the machine's own export format. Most topography maps CAN be exported as picture files.
- All scanned images should be clear as full colour is needed to interpret the map properly.

Any other information would be extremely helpful and includes:

- Spectacle refraction
- Best fitting trial lens, over refraction and visual acuity quality
- Any rotation of the lens
- Any other relevant information