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# Occupational dispensing

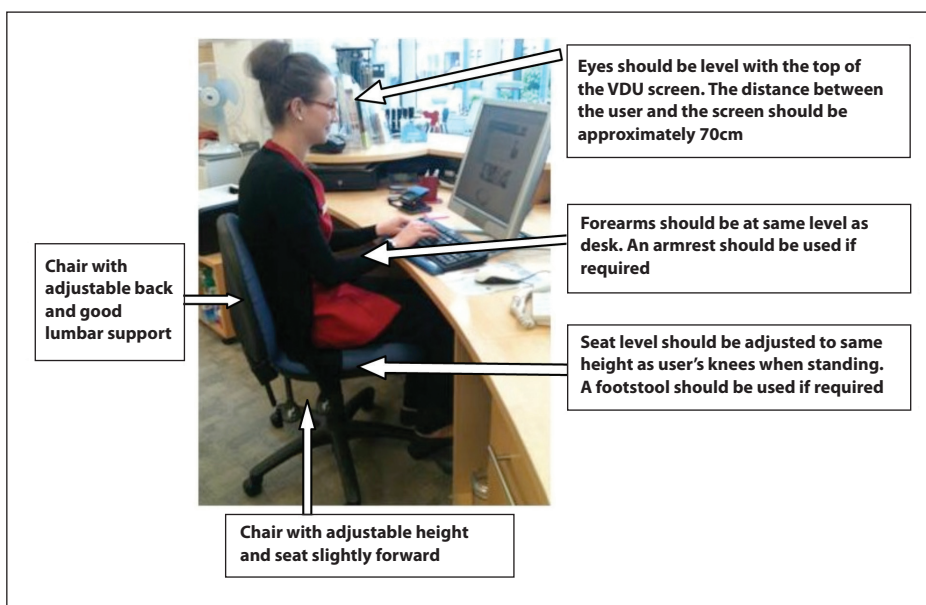
## DISPENSE WITH CONFIDENCE PART 3 C-19712 O/D

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When presbyopia sets in, a single vision correction fails to solve the problems which come with it. Unfortunately, single vision lenses do not offer correction over the range of vision required to perform both intermediate and near tasks. Therefore the dispensing optician should be capable of dispensing suitable occupational lenses to patients and so should have sufficient knowledge to do this. Occupational lenses can also be utilised in many other different facets of dispensing to satisfy patients' other occupational requirements. This article discusses the key considerations to help improve practitioners' confidence for performing such dispenses.

Occupational lenses have two important roles. The first is the correction of vision for the various working distances used by a patient. The other is not so obvious in that it enables the patient to adopt a more natural posture when working at a visual display unit (VDU) screen or performing their general working duties. Indeed, the latter is increasingly important with many more people performing their work duties in this manner. Epidemiological studies have shown

that approximately 25% of all VDU users suffer from job-related complaints, which include ocular discomfort, muscle strain and fatigue. Such ocular symptoms include eyestrain, tired eyes, irritation, redness, blurred vision and dry eye.<sup>1</sup> The Health and Safety Executive (HSE) therefore advises short breaks to give the eyes a rest and gives recommendations for the set-up of a VDU workstation (Figure 1) to prevent neck and back problems caused



**Figure 1**  
The model set-up for a VDU screen user to work comfortably in an office environment

by poor posture. People who endure such ocular and postural problems are said to suffer from 'computer vision syndrome' (CVS) and many man-hours are lost at work as a result.<sup>2</sup>

### Visual task analysis

Before spectacles can be dispensed for occupational reasons, it is important to first conduct a visual task analysis to determine the patient's specific needs. The primary details that need to be elicited are:

- Task size – consider the size of the text/task and the field of view; this will need to relate back to the visual acuity (VA) achieved.
- Working distance (WD) – this will dictate the power of the near addition and the range of distances which need to be catered for. Remember that the maximum working distance that a lens will allow for clear viewing can be calculated from:  $WD = (1/Add) \times 100cm$ .
- Lighting – accurate perception needs optimum lighting, especially when reading, writing, driving and using a VDU. If there are glare sources, this will need to be considered when dispensing lenses to minimise these effects.
- Contrast – black writing on a white background gives the best contrast so consider the patient's tasks as to whether there will be difficulty in seeing objects in the work area; consider the effects of glare here too.
- Colour vision – this is imperative in some occupations eg electrician, so lenses prescribed must be of a suitable material in order to maintain the quality of colour perception and not induce chromatic aberrations.
- Stereopsis – the ability to judge depth is vital in certain occupations eg architects, so lenses must allow comfortable binocular viewing through a lens with minimal distortions.
- Whether the task is still or moving – if the task moves, the eye may be forced into more peripheral areas of the lens, which is important to consider when selecting the type of lens to dispense.
- The position of the patient and the task – the occupation may involve moving around the working environment and so the lens dispensed ideally should cater for this or at least not cause inadvertent increased risk of injury.
- Possibility of hazards – many hazards crop

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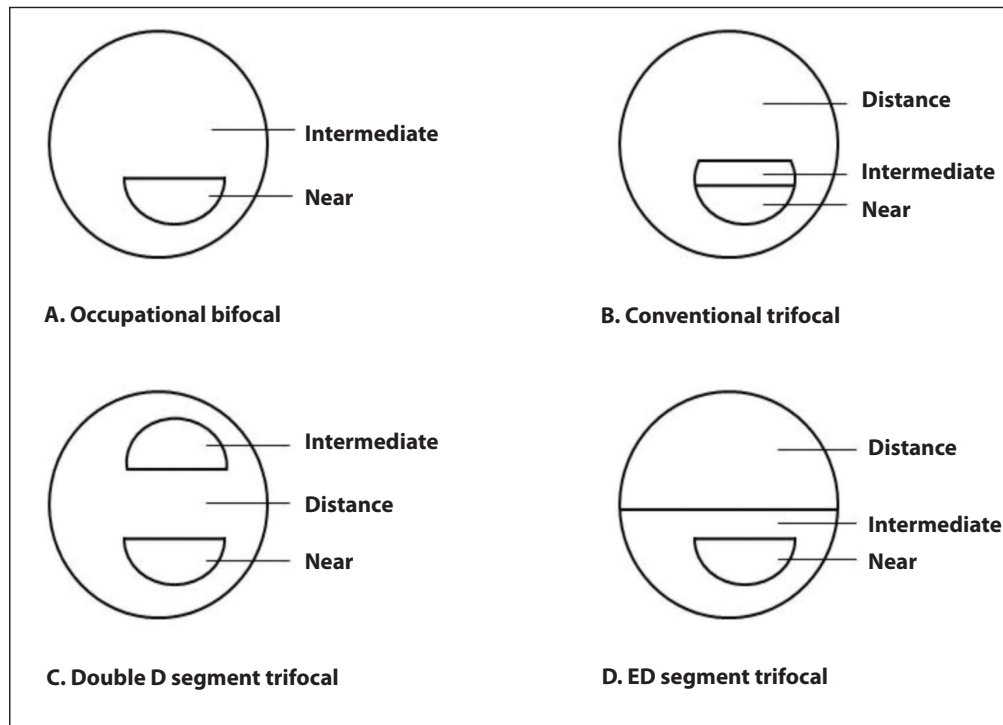
up in the workplace eg chemicals,<sup>3</sup> so the dispensed lenses must provide adequate protection.

## Occupational Bifocals

Bifocal lenses can be a good option for VDU users since two focal powers can be dispensed – one for the screen itself and one for the keyboard. The recommended viewing angle for a VDU screen is 15-20° downwards from the horizontal and this will dictate the position of the segment heights in bifocal lenses. If, however, the segment is to be used for viewing the screen, the segment top needs to be dispensed 1-2mm above the lower pupil margin so that the near addition will be in the correct position. Otherwise, the segment top should be dispensed in line with the lower limbus in the usual manner. Bifocals as an occupational lens provide the primary benefit that the segment size gives a wider field of view than occupational progressive powered lenses (PPLs), even though they are not as cosmetically attractive. A hard and multi-anti-reflection (H/MAR) coating should also be advised to help prevent glare from the VDU screen<sup>4</sup> (Figure 2a).

## Occupational trifocals

Trifocal lenses provide an intermediate focus which is especially useful for presbyopic patients whose near or habitual reading prescription does not allow for a clear focus at the VDU working distance, which then precludes the use of bifocal lenses. The distance, intermediate and reading areas are also far larger than would be permitted by PPLs. Occupational trifocals can be manufactured with considerable flexibility in terms of the segment shape and size and of the patient's intermediate/reading portion (IP/RP) ratio. The IP/RP ratio informs the dispenser as to what percentage of the reading addition



**Figure 2**

Various occupational bifocal and trifocal lenses

is required for intermediate vision, and can be calculated from:  $IP/RP \text{ ratio} = \frac{\text{Intermediate Add}}{\text{Reading Add}} \times 100$ . A higher IP/RP ratio will ensure a closer intermediate working distance than if using a lower IP/RP ratio.

There are three groups of occupational trifocals, these being:

- Conventional and large segment trifocals
- Executive trifocals
- Unconventional trifocals

Disadvantages which accompany trifocal lenses explain why they are less commonly dispensed than PPLs or bifocals. Standard trifocal lenses are fitted with the segment approximately 3mm above the lower limbus and in this position the segment can interfere with distance vision. The reading vision is therefore set lower than in a standard bifocal which will inevitably cause the eyes to depress further when reading. The

intermediate and reading areas also have visible lines which produce a poor cosmetic appearance of the final lens.<sup>5</sup> From an optical perspective, there are also more likely to be prismatic effects induced and "Jack-in-the-Box" effects which can be uncomfortable for the patient.

### Conventional and large segment trifocals

The most common trifocal lens which is dispensed is the S728. This gives a straight top 28mm diameter segment which encompasses an intermediate segment of depth 7mm. An IP/RP ratio of 50% would be good for shop workers for example. Such a lens, however, may not give a large enough segment to satisfy the needs of patients who require a large field of view for their work. This, however, can be catered for by selecting a larger segment size eg S835 or S1435. Some manufacturers produce specialist



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lenses such as Rodenstock's C40 Datalit trifocal, which has been especially designed for VDU users. The curved top 40mm diameter segment includes an intermediate area which is 10mm deep. Using this lens, a 12" VDU screen can be viewed in full at a distance of 50cm. This reduces the need for the side-to-side head movement that would otherwise be required should a lens with a smaller segment be used (Figure 2b).

### Executive trifocals

Standard executive or E-line trifocals have an intermediate segment depth of 7mm. The main advantage that they offer is a maximal possible field of view horizontally, which offers great benefits to occupations such as architects. However, the thickness of the segment is governed by the near vision prescription combined with the distance prescription and so these lenses tend to be cosmetically poor. Should intermediate and near vision not be required at the periphery of the lens, it would be wiser to dispense a smaller segment, such as a S1435. It is not advisable for an H/MAR coating to be dispensed as they do not adhere to the lens properly.

### Unconventional trifocals

Perhaps the most commonly dispensed unconventional trifocal is the 'Double-D'. This

lens has an upside-down D-segment for near or intermediate vision in the top third of the lens and a second D-segment for near vision in the bottom third. The central part of the lens is usually corrected for distance vision. Depending on the lens power in the top segment, the Double-D can be considered a trifocal or a bifocal lens. DD28 trifocal lenses encompass two 28mm D-segments within the same lens. These segments are situated 14mm apart and the lower segment is fitted at the lower limbus. The IP/RP ratio for these lenses is 60%. These designs offer huge flexibility in terms of which correction is placed in which zone. A deep enough frame needs to be selected to encompass both segments and the distance area (Figure 2c). The DD28 lens is suitable for occupations such as dentists, pilots and electricians. Electricians need to see tools and other near objects and the upper segment of the lens helps them to see work on re-wiring above their normal eye-line without having to tilt their head backwards. Another unconventional trifocal lens is the ED trifocal. This special-purpose trifocal lens has an executive-style intermediate segment in the bottom half of the lens, and a smaller D segment for near vision embedded within the intermediate segment. The segment is situated either 8mm or 11mm below the distance/intermediate dividing line. The IP/

RP ratio for these lenses is 60%. The ED trifocal is an excellent choice for someone who needs a very wide field of view for objects at arm's length and also needs to be able to see clearly both close-up and in the distance. This would be a good lens to dispense to a security guard or TV producer who views a large number of VDU screens spread out in front of them and to the sides and who needs to read as well as recognise someone across the room<sup>6</sup> (Figure 2d).

### Occupational progressive powered lenses (PPLs)

As with all PPLs, the main advantage offered by occupational PPLs is the absence of distinct division lines between power zones and the provision of powers in-between near, intermediate and distance prescriptions. They also give good visual comfort and enable good posture for the patient, especially when using VDUs, thereby reducing strain in the neck, shoulders and back. The main disadvantage is that through the peripheral regions of the lenses, straight edges and lines appear curved instead, making them unsuitable for certain occupations, especially those requiring a large field of view. The corridor of vision attained is wider than in conventional PPLs, although the field of view is not as great as in bifocal or trifocal lenses. Occupational PPLs can be divided

Manufacturer	Lens name	Addition power (D)	Fitting method	Progression corridor (mm)	Minimum height (mm)	Minimum from top (mm)
Essilor	Computer3V	+1.00 - +3.50	On HCL	28	30mm overall frame depth	
American Optical	Technica	+1.00 - +3.00	PPL	18	23	12
Pentax	PA way	+1.00 - +3.50	PPL	19	14	13
Hoya	Tact200 & Tact400	+1.00 - +3.00	PPL	23	18	14
	Workstyle 200	+1.50 - +3.50	PPL	23.5	18	14
	Workstyle 400	+1.00 - +3.50	PPL	23.5	18	14
Zeiss	Gradal RD	+1.00 - +3.00	PPL	21	25	N/A
Seiko	P1-Indoor	+1.00 - +3.50	PPL	20 and 23	17 and 19	10 and 11

**Table 1**

A selection of occupational progressive powered lenses (PPLs). Fitting should be performed by measuring mono PDs as in the usual way for PPL lens dispensing

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Manufacturer	Lens name	Degression power (D)	Fitting method	Mono pupillary distance	Minimum height (mm)	Minimum from top (mm)	Minimum from top (mm)
Essilor	Interview 080 or 130	-0.80 or -1.30	BIF	Near	6 or 10	8	15
	Computer 2V	-0.55	On HCL	Near	15	30mm overall frame depth	
Rodenstock	Nexyma 40 or 80	-1.00 or -0.80	PPL	Distance	15 or 22	13 or 20	6
	impression 40 or 80	Individual	PPL	Distance	15 or 22	13 or 20	6
Norville	Continuum	-1.00	On HCL	Near	10	16	13
	Versatile Office	-0.75, -1.25, -1.75, -2.25	PPL	Distance	20	16	13
Nikon	Online	-1.00, -1.50	PPL	Distance	19	15	10
Sola	Access	-1.00, -1.50	On HCL	Near	12	30mm overall frame depth	
BBGR	Extenso	-1.00, -1.50	PPL	Distance	15	13	13
Zeiss	Business 10 or 15	-1.00 or -1.50	BIF	Near	24	16	12
Hoya	Add power	-0.75	On HCL	Near	24	10	16
Pentax		-2.00, -2.50	PPL	Distance	28	14	14
Shamir	Smart Office	-0.75, -1.25, -1.75, -2.25	PPL	Distance	20	16	7
Seiko	P-1 Computer	-1.00 or -1.50	PPL	Intermediate or near	25	25	5

**Table 2**

A selection of enhanced near vision lenses

into three different types.<sup>7</sup> These are:

- Restricted distance vision lenses
- Office lenses which correct vision from near to up to 5m distance
- Intermediate/near vision only

**Restricted distance vision lenses**

These occupational lenses correct vision at near, intermediate and also provide the added advantage of giving a shallow full distance vision correction at the very top of the lens. Such lenses include the Essilor Varilux Computer 3V,

which gives a wide field of vision at a working distance of 60cm for all power additions. The patient, if a lecturer for example, is able to view reading matter, use a VDU screen and is able to see to the back of the lecture theatre too. These lenses are not, however, legal to drive in as they do not provide enough of a distance field of view.

**Office lenses which correct vision from near to up to 5m distance**

These lenses enable vision to be corrected at near, intermediate and up to a distance of approximately

4-5m. This allows the patient to work in an office environment and to read, use a VDU screen and look across the office to speak to colleagues. For example, the Zeiss Gradal RD design is the most similar to a conventional PPL. It is designed for indoor use with the upper part of the lens being for mid-distance use (up to 5m). Zeiss add +0.50D to the distance prescription specified on the order to arrive at the mid-distance correction. Similarly, the near vision addition is reduced by 0.50D to give the near vision power and, consequently, wider intermediate and near regions result (Table 1).



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### Intermediate/near vision only

PPLs offer a greater working distance range than trifocal and bifocal lenses, but the intermediate and reading areas become narrower in size as the reading addition increases. This is accompanied by greater areas of blending in the peripheral parts of the lens, which is accompanied by smaller areas of the lens that will be free from surface aberrations. In order to avoid this, lenses can be dispensed that are to be used for intermediate and near only, without a distance prescription. These are called office occupational PPLs or enhanced readers. Designs with shorter progression corridors can work well in half-eye frames, and, as most people would find the intermediate and near combination more comfortable, this type of lens may be more appropriate for those patients who would previously have had reading spectacles. The difference (exact or approximate) in power between near and intermediate is known as the degression in power. The Essilor Interview lens was designed for office use and has a degression of either  $-0.80D$  or  $-1.30D$ . Such a relatively small change in surface power in tandem with the low levels of surface astigmatism provide a wide and relatively stable field of

clear vision throughout the lens. This results in a soft design of occupational PPL, which is accompanied by small adaptation periods for the patient. As there is such a wide field of view, the patient will be able to scan reading matter with their eyes as opposed to having to turn their head from side to side, as would be required by most standard PPLs<sup>8</sup> (Table 2).

### General considerations

It is important to remember that driving is not possible in any occupational PPL and this advice should be passed on to the patient. H/MAR coatings should always be dispensed in order to help prevent glare from the computer screen, unless the lens itself does not allow this. Decisions as to which lens type to dispense should also be based on the patient's working distance, VDU screen height (or other work task), any possible distance vision requirements and the design of any existing PPL being worn. Dispensing measurements taken for occupational PPLs are not standard and vary according to lens type, as does the prescription ordered. As such, practitioners should always refer to the manufacturer's fitting guides.

### Conclusion

When dispensing spectacles for a patient to use for their occupation, there are various criteria that need to be considered. These include: lens type, working distance(s) required, whether the task is moving or not and the size of the task. A large variety of lenses exist which can cater for a myriad of patient's requirements and it is important for the practitioner to analyse the patient's needs in order to find the best solution(s) for them.

### About the author

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### References

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## Module questions Course code: C-19712 O/D

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### 1. Which of the following does NOT need to be taken into account when carrying out an occupational spectacle dispense?

- a) Working distance
- b) Whether the task is still or moving
- c) Electrical wire hazards
- d) Lighting available

### 2. A patient has an intermediate addition of $+1.50D$ and a reading addition of $+2.50D$ . What is this patient's IP/RP ratio?

- a) 40%
- b) 50%
- c) 55%
- d) 60%

### 3. When dispensing a DD28 trifocal, where does the dispenser need to set the lower segment heights?

- a) In line with lower limbus
- b) In line with centre of pupil
- c) 2mm higher than lower limbus
- d) 1mm lower than lower limbus

### 4. Which of the following is an advantage which executive trifocals possess over occupational PPLs?

- a) Lenses must be dispensed without H/MAR
- b) They are cosmetically more attractive
- c) They have no peripheral distortion
- d) They have only three distinct working distances

### 5. The Norville Versatile Office is being dispensed for a patient with an intermediate addition of $+0.75D$ and a reading addition of $+2.00D$ . What is the patient's degression?

- a)  $-0.50D$
- b)  $-0.75D$
- c)  $-1.00D$
- d)  $-1.25D$

### 6. Which of the following is NOT a common symptom of computer vision syndrome?

- a) Dry eye
- b) Blurred vision
- c) Eyestrain
- d) Diplopia