



Leica R-Lenses

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Chapter 12: 35-70 mm lens

_ LEICA VARIO-ELMAR-R 35-70 mm f/4





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Background

The first zoomlens for 35mm cameras was introduced by Voigtländer around 1960 and named Zoomar with a focal length range from 36 to 82mm. The Zoomar was an American invention (USA Patent 2 454 686) and Voigtländer was quick to see its potential. In Germany the system was designated as Gummilinse (rubber lens) to focus on its primary characteristic as a lens with continuously variable focal length or variable magnification, which is the same idea. The design possibilities of a lens system with moveable elements were already known in 1902, when the first American patent was filed. The optical and mechanical complications are quite complex and it took a full generation before the first workable systems were introduced. Siemens was one of the first in Germany to create a zoomlens for 16mm cine cameras already before 1939, but the war made a large-scale commercialisation impossible.

The correction for optical aberrations has to very good over the whole range of focal lengths, but strictly speaking, this is only possible for one specific focal length, most often the middle position of the total range. All other positions will present some aberrations. It was necessary in the early period of zoomlens design to restrict oneself to the shorter focal lengths. The image quality will be negatively influenced when the focal lengths of the individual lens elements are short in relation to the overall focal length. The individual lens elements will have longer focal lengths if you build the lens as long as possible.

The large size of the early zoomlenses may be explained by this restriction.

Early zoomlenses had commendable performance, but could not approach the level of quality, one could get with fixed focal lengths.

The Zoom-Nikkor 1:3.5/43-86 mm initiated the breakthrough of the zoomlens as a standard lens and quickly became the favourite of the fashion photographers of the sixties. This lens displayed two remarkable characteristics: it was a high contrast lens with limited resolution and it had a high level of distortion. For optical designers it was a nightmare, but for the photographers it could unleash a new amount of creative freedom.

Leitz was quite reluctant to get involved in this area of zoomlens design. As an historical aside one may note that Leitz did have a large department for zoomlens design, but the results were limited to studies and prototypes.

The demand for zoomlenses was high and Leitz offered third-party products from Angenieux and Schneider as an alternative. Later Leitz cooperated with Minolta and offered from 1983 the LEICA VARIO-ELMAR-R 35-70 mm f/3.5 as a Leica branded lens. In 1990 Leica added the LEICA VARIO-ELMAR-R 28-70 mm f/3.5-4.5 to its lens range. This Sigma design displayed the same performance profile as the earlier Nikkor lens and as the Minolta design: medium to high contrast, limited definition of fine detail and fairly large distortion at the extreme positions of the focal range.

The Leica design team had a higher level of ambition and wanted to create zoomlenses at least as good as the Leica lenses with fixed focal lengths. To set such an ambitious goal is a formidable task, but in 1998 Leica introduced the superb LEICA VARIO-ELMAR-R 35-70 mm f/2.8 ASPH. (The first Leica designed zoomlens was the LEICA VARIO-ELMAR-R 70-180 mm f/2.8 from 1995).

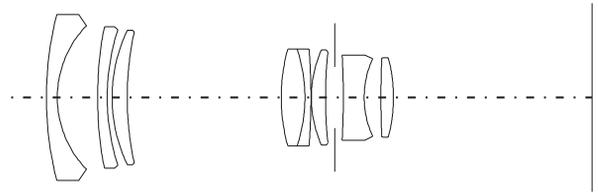
This lens demonstrated without any doubt that zoomlenses have the potential to provide image quality that is better than what can be accomplished with lenses with fixed focal lengths at comparable apertures. This is an important addition and for very high-speed lens designs, a fixed focal length is still the best solution. At least in a practical sense: it might be theoretically possible to design a very high-speed zoomlens with excellent quality, but the size and weight would be too large. The trend to digital cameras with smaller sensor sizes will present great opportunities for high-speed zoomlenses with excellent image quality.

The LEICA VARIO-ELMAR-R 35-70 mm f/2.8 ASPH. was the first lens that could substitute a range of lenses with focal lengths from wide angle lens and the standard lens to the moderate telelens without loss of performance. A very elaborate manufacturing and assembly process was required to ensure that the actual performance of the lens matched the design specifications. By now this lens has achieved a cult status within the Leica community and with reason.

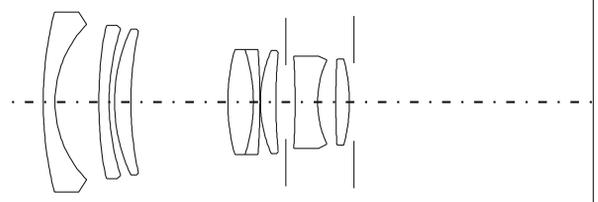
A year earlier, in 1997, Leica had introduced a lens with a maximum aperture of 1:4 and the same range (35-70 mm) that offered almost identical image quality in a more convenient package: the LEICA VARIO-ELMAR-R 35-70 mm f/4. For some reason Leica omitted the designation 'ASPH' for this lens, although it has an aspherical surface.

Optical considerations

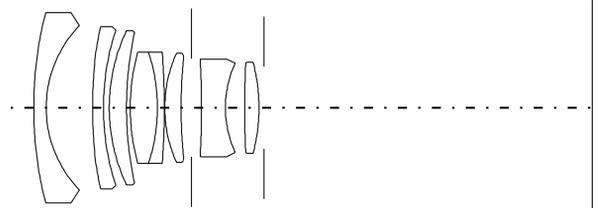
The LEICA VARIO-ELMAR-R 35-70 mm f/4 has 8 elements, arranged in seven groups. One lens element has an aspherically pressed surface. The lens diagram indicates the two main groups and one can see that the front group has a close resemblance to the front group of the LEICA VARIO-ELMAR-R 35-70 mm f/2.8 ASPH. and the second group is adapted from the previous LEICA VARIO-ELMAR-R 35-70 mm f/3.5. Casual inspection shows that the LEICA TRI-ELMAR-M 28-50 mm f/4 ASPH. is also closely related to the Leica Vario-Elmar-R, with the big difference that the M version has two aspherical surfaces.



Lens shape 35 mm



Lens shape 50 mm



Lens shape 70 mm

The comparison of lens diagrams should not be taken too far. A lens diagram gives a family resemblance and might even be seen as a lens genealogy. The most important aspects of a lens design, like the choice of glass and the employment of aspherical surfaces and the true shape of the surfaces, cannot be derived from the diagram as such.

In my report of the LEICA VARIO-ELMAR-R 21-35 mm f/3.5-4 ASPH. I have explained why current vario designs can deliver improved quality, compared to fixed focal length designs. To repeat the main points: better knowledge of the design problems, new glasses with special properties and/or with high refractive indices and the insight into the possibilities of aspherical surfaces allow the designer to create zoomlenses with great performance.

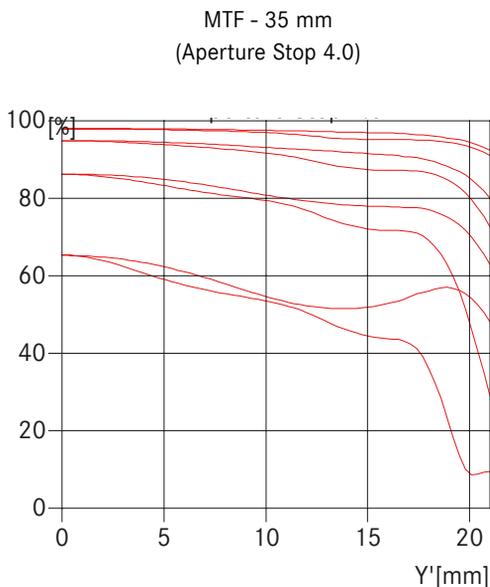
The first impression when looking at the pictures taken with the LEICA VARIO-ELMAR-R 35-70 mm f/4 with slide films or the current crop of colour negative films, is one of image clarity and pure colours. There is a hint of Matisse here with his use of clean shapes and refreshingly pure colours. The colour rendition of the Leica Vario-Elmar is subtle and powerful at the same time, and offers a good balance of saturation and finely shaded hues.

The background blur at wider apertures is quite smooth and retains its main outlines and the gradient from sharp to unsharp has a gentle curve and is not too steep.

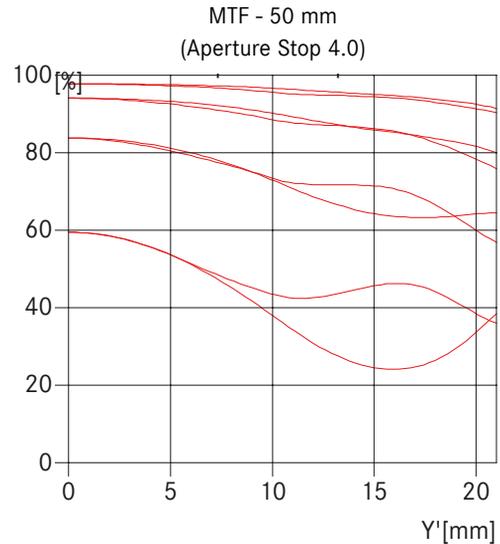
Large scale enlargements are needed to inspect the rendition of very fine detail and here the combination of really crisp outlines of main subject shapes and the clear reproduction of small changes in highlight detail and shadow detail supports the impression of a picture made with a larger format camera.

Ghost images and secondary reflections hardly occur and can only be seen in strong back light situations. Effective coating, good internal blackening of the mount and of course the smaller diameter of the lens elements contributes to this excellent behaviour.

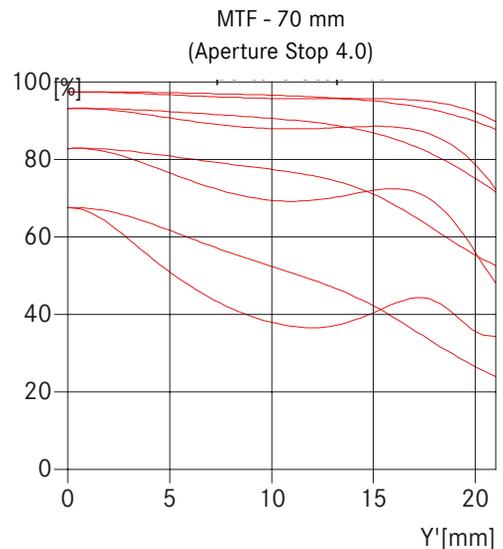
The description above is based on a visual inspection of pictures made with this lens. These aspects cannot be inferred from the analysis of MTF graphs, but these graphs are needed to provide a backup for the more personal impressions. The difference in performance between the 35, 50 and 70 mm position at the wider apertures is quite small, as can be seen from the diagrams.



LEICA VARIO-ELMAR-R 35-70 mm f/4 (35 mm)



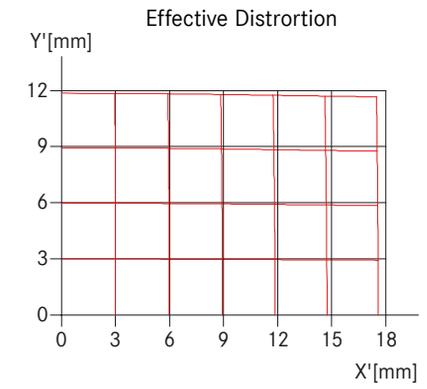
LEICA VARIO-ELMAR-R 35-70 mm f/4 (50 mm)



LEICA VARIO-ELMAR-R 35-70 mm f/4 (70mm)

A verbal description would run like this: at maximum aperture the overall contrast is high with excellent definition of very fine detail over a large part of the image frame. There is some softening of edge contrast of small detail due to some colour fringing at white-black gradients. At the edges and in the corners of the image there is a visible softening in the reproduction of fine detail, which becomes blurred.

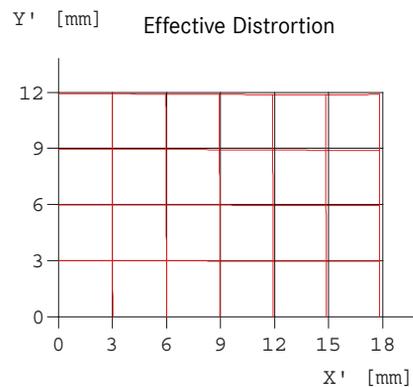
The 35 mm and the 50 mm positions offer the best image quality and the 70mm is slightly behind with a faintly softer rendition of details and somewhat lower overall contrast. The main differences between the three focal length positions are the amount of distortion. The 35 mm has a 3% barrel distortion that is visible when straight lines are reproduced at the edge of the frame. At the 50 mm and the 70 mm position distortion is not a problem.



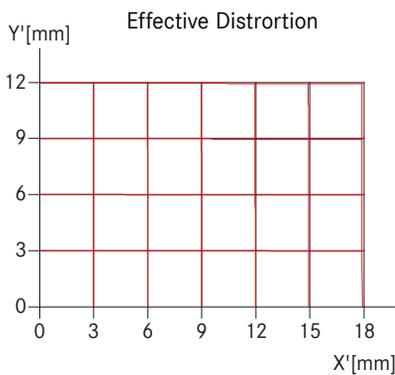
LEICA VARIO-ELMAR-R 35-70 mm f/4 (35 mm)

The now discontinued LEICA VARIO-ELMAR-R 28-70 mm f/3.5-4.5 showed a more pronounced distortion at the 28 mm and 70 mm position with -6% and 3% distortion.

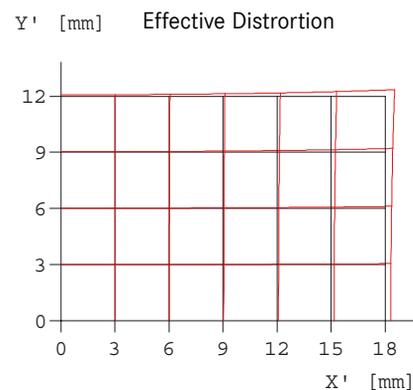
The improvement in distortion values is quite visible, but the overall performance is enhanced too. When you compare the MTF graphs, you will notice that at the wider apertures the main difference is a better definition in the outer zonal areas of the frame and especially the corners.



LEICA VARIO-ELMAR-R 28-70 mm f/3,5-4,5 (35 mm)



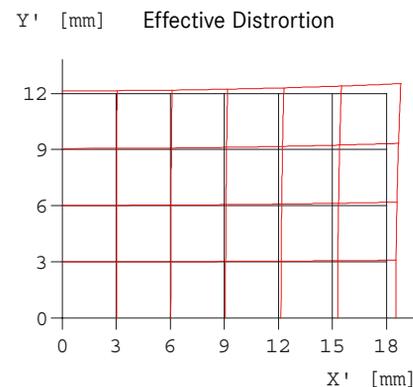
LEICA VARIO-ELMAR-R 35-70 mm f/4 (50 mm)



LEICA VARIO-ELMAR-R 28-70 mm f/3,5-4,5 (50 mm)



LEICA VARIO-ELMAR-R 35-70 mm f/4 (70 mm)



LEICA VARIO-ELMAR-R 28-70 mm f/3,5-4,5 (70 mm)

A comparison of the behaviour of the lens, when closing the aperture is more revealing. The LEICA VARIO-ELMAR-R 28-70 mm f/3.5-4.5 does not improve significantly upon stopping down, whereas the newer LEICA VARIO-ELMAR-R 35-70 mm f/4 produces a tighter image and a much crisper reproduction of fine detail.

The restriction to the range of 35 to 70 mm helps to deliver this excellent performance, but the overall reduction of the residual aberrations is the real cause of the image quality. The macro capability of the Leica Vario-Elmar-R is quite useful for normal subjects with extended depth. It is not suited for the reproduction of flat documents or paintings as the flatness of field at close range is not at its optimum.

Summary

The LEICA VARIO-ELMAR-R 35-70 mm f/4 is the first choice for a versatile standard lens for the Leica R system. In addition it covers three important focal lengths, the 35 mm, the 50 mm and the 70 mm. Its performance is as good, if not better than that of the comparable lenses with fixed focal length at the same apertures, the LEICA SUMMICRON-R 35 mm f/2, the LEICA SUMMILUX-R 35 mm f/1.4, the LEICA SUMMICRON-R 50 mm f/2 and the LEICA SUMMILUX-R 80 mm f/1.4. The topic of the maximum apertures has already been touched upon in this review and should be discussed at some length here. Leica offers lenses in the R range with maximum apertures from 1:1.4 to 1:5.6. Not so long ago, there was a

tendency to buy the lens with the widest aperture, as this would give the photographer some margin in low light situations and in creative possibilities to use the shallow depth of field as an element in composition.

Today we have excellent high-speed films that are more than capable to compensate the wider apertures of the lenses. In addition the quality of the films have been improved. The image equation of a high-speed lens and a lower quality film is now less favourable than the combination of a lower-speed lens with a high quality film.

With a few exceptions most higher speed lenses offer less performance than the current slower-speed versions. In the past, the slower speed lens was often seen as an entry-level lens with a cost/performance compromise. This is not true anymore and the current 1:4 and 1:2.8 lenses in the Leica R (zoom)range are outstandingly good examples of the current state of the art of optical design.

We should also realise that lenses do deliver their optimum performance in situations where all variables can be controlled, especially vibration and focus accuracy.

The R system is more prone to vibration (mirror movement) and accurate focussing is more demanding because of the properties of the focusing screens.

For best performance a tripod is often required and in such a situation the lens may be stopped down without adverse effects. One can select slower speeds and operate at optimum apertures for the chosen depth of field without fear of blurring or vibration due to the slow speeds.



There is a good case to make for the use of a wide aperture to reduce the visual impact of the background. But there is an equally good case to make that the background should be a valuable part of the overall composition of a scene. A study of many paintings in museums will reveal that the background blur is less common than often assumed. Current digital imagery is often criticized for its extended depth of field, picturing a scene with back- and foreground as sharp as the main subject. The truth is that this way of reproducing is the same as the human way of seeing a scene or a subject.

It may be the time for a recalibration of our notions of the language of photography and of the photographic technique.

The LEICA VARIO-ELMAR-R 35-70 mm f/4 may be the right tool to stimulate one's reflection about the state of the art of Leica R photography.

It offers excellent image quality, the range from 35 mm to 70 mm is just wide enough to stimulate the visual exploration of a scene of interest and the photographer can restrict him/herself to one lens.

