



Leica R lenses

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Chapter 13:

LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8





___ LEICA VARIO-APD-ELMARIT-R 70-180 mm f/2.8

__General considerations

Leica products are characterised by a fine balance between innovation and solid engineering with the most emphasis on engineering qualities and performance. Leica is at its best in the perfection of novel ideas and the elegant integration of proven parts. The classical M3 camera was an excellent example of the integration of available ideas and components, brilliantly executed. Zoomlenses are a second example where Leica does improve on the work of others. The Leitz company had for a long period resisted the demands of working photographers to introduce zoom lenses.

The official statement during that period was quite firm, but a bit short-sighted. Zoomlenses could never provide the image quality of the fixed focal length lenses and certainly could not operate at the wider apertures that Leica users were habitually using. This second part of the statement is still true, but the first part is not. Modern zoomlenses are mostly based on the two-component mechanically compensated variable-power system. The designation 'zoom' for this type of lenses is now universally adopted, but

technically the optical system with a variable magnification is better designated as a variable power lens. The focal length of a lens gives a certain magnification of the object and optically speaking we can interchange focal length with the power of the lens. Leica is therefore correct, if a bit strict, to use the word 'vario' to indicate a zoomlens.

As said above, most vario systems are derivations of or improvements of the two-component mechanically compensated zoomlens. Let us recall briefly the main problem of zoomlenses: With two components (lens groups) we can only achieve exact focus and magnification (or focal length) for two positions. At all other magnifications (powers) the image will be defocused. In the past it was thought impossible to get the engineering precision to compensate the defocus by mechanical means.

The second type of compensation, the optical compensation, is much simpler to achieve, but has as big disadvantage its size, which is significantly larger than with a mechanical compensated

system. The original first generation zoomlenses were optically compensated, as can be derived from the large size of the lens. Once the engineering problem of the mechanical coupling of the movement of the two lens groups was solved, designers all over the world could focus on the improvement of the image quality. This type of design, because of its promising performance, was extensively studied and optimum solutions were offered in patent documents and during the many optical competitions all over the world. In many cases a third moving group has been introduced to optimise performance, but the basic design still stands.

Given the large amount of research into this single type of design, it is no surprise that the performance generally is quite good. The first lens that Leica introduced in the longer focal length vario systems was the Minolta designed LEICA VARIO-ELMAR-R 80-200 mm f/4.5 from 1974, quickly followed by the Minolta designed LEICA VARIO-ELMAR-R 75-200 mm f/4.5 and later by the LEICA VARIO-ELMAR-R 70-210 mm f/4 in 1984. The range of focal lengths is untypically Leica, and indicates its foreign heritage, but optically the lens has a stronger injection of Leica knowledge. This lens has a medium-high contrast and a good delineation of fine detail, but distortion is quite visible and the critical medium frequencies (15 to 25 linepairs//mm) responsible for smooth gradation and crisp detail are weak. To improve on these aspects we had to wait for the availability of new glass types and new knowledge. The arrival of Lothar Kölsch as head of the optical design department gave the impetus to create the breakthroughs in design and engineering to catapult Leica out of the fishbowl there were swimming in till that moment. Mr. Kölsch assembled a small group of very

talented young people around him and a new generation of Leica lenses was about to see the daylight.

The first truly Leica designed vario lens was the LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 and it was and it is still the lens that defied the claim that single focal length lenses could never be equalled by vario lenses. It is quite unique in its wide aperture of 1:2.8 that does not change during the full range of focal lengths. This is quite an achievement for mechanically compensated zoomlenses. This new zoomlens could not be designed overnight. Mr. Kölsch explained to me, when I asked him about the secrets of this design, that the optical calculations were secondary in designing a lens, but that the designer needs to understand the fundamental properties of a design type before it is possible to make significant progress. Once you understand the character of a lens type and its possibilities and impossibilities, you can exploit its potential. The making of the LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 took about one and a half year. But the result is a stunning lens.

The qualification of what is better optical performance must be seen always in context. Let us be more specific. Take the image quality of the LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 at its extreme position of 180 mm and compare this to the fixed focal length lenses of Leica. The vario lens is significantly better at all apertures than the LEICA ELMARIT-R 180 mm f/2.8, but not as good as the superb LEICA APO-ELMARIT-R 180 mm f/2.8. The same relation holds for the 4/100mm and the 2.8/100mm, but again this last lens can be trimmed to a very high level. Even the LEICA ELMARIT-R 135 mm f/2.8 is surpassed by the vario lens.



__Size and handling of the lens

The optical performance is indeed quite impressive, and the size of the lens has to be taken into consideration. There is no question that it is possible to stretch the focal length to 200 mm, but then the front diameter will be excessively large. For the 180 mm focal length the diameter is now 88mm and the extension to 200 mm would enlarge the diameter proportionally and this increase is not worth the limited gain in focal length. It is really imperative to understand that a lens design starts and ends not with the optical internals, but with the given physical dimensions. Leica's choice for an all-metal focusing and compensation mechanism implied weight and size. This is the strong side of the Leica competence. They have the expertise and knowledge to match mechanical engineering to optical performance. It is by the way not necessarily the case that metals are always superior in manufacturing. The modern plastics or polymers (this name is to be preferred as 'plastics' bears a cheap annotation) can be of very good quality. The choice between metal and polymers is a matter of batch size and cost. The cost of moulding tools to create the shape of a polymer component is extremely high and only economically justified with large production runs. There is no need to be negative about a product that has some plastic components incorporated into its assembly.

It is evident that a lens with a complicated mount needs to be assembled with the utmost care to ensure a smooth movement of all moving parts. The LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 has a weight of about 1900 grams a size of roughly 20 cm long by 10 cm thick. This is just the limit for handheld photography. The aperture of 2.8 is quite helpful as it is fully useable and allows for higher shutter speeds. When testing the lens, one of the aspects was to analyse its potential for handheld shooting. I used the lens constantly for three hours with ISO200 slide film (to get some extra speed) and have to say

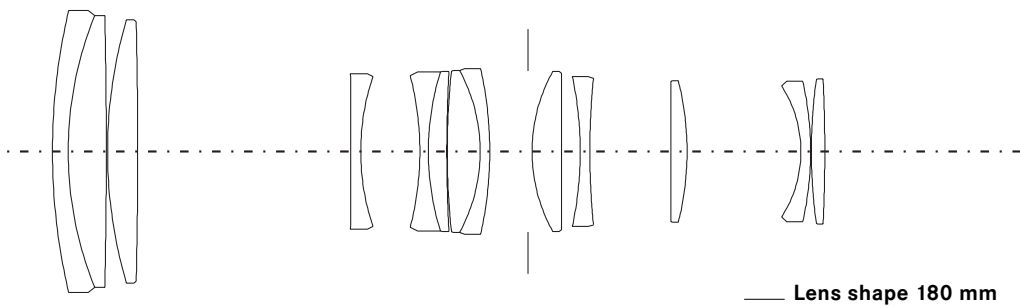
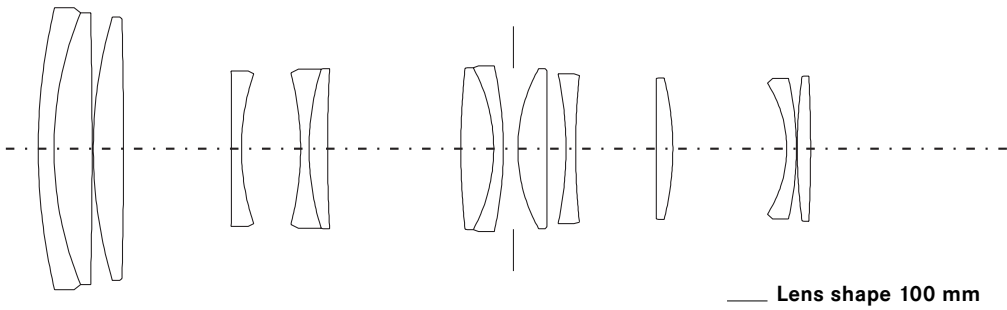
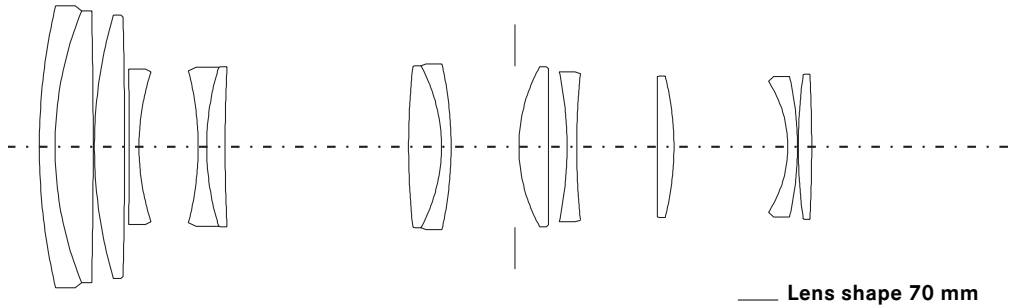
that the shots at the end of the day were as crisp as at the beginning, an indication that physical fatigue does not reduce the quality of the pictures. Current styles and trends in photography favour the wide angle lens and wide angle zoomlens, and the longer focal lengths are put in the cinderella-corner. Use of this zoomlens with its very interesting range from 70mm to 180mm shows the creative possibilities of this range in every-day shooting. Many subjects and objects will be enhanced visually by a selective focus and a selective composition. Wide open the LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 brings very crisp images and tight composition that visually draws the viewer into the picture. And for whom it is interesting, the bo-ke of this lens is very smooth and subdued. Personally I am more interested in the solidity and plasticity of the drawing of round subjects, a topic that can be discussed more objectively. The LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 is an excellent choice if you need pictures with punch, crispness, clean colours and visually pleasing definition of round subjects. My favourite film for this lens is the Kodachrome 200 whose characteristics match the lens in a nice artistic way. But pictures with any good quality slide film will benefit from the capabilities of this lens. I cannot wait to test this lens with the new LEICA DIGITAL-MODUL-R for the R8/9 system.

The closest focus of the lens is 170 cm. Good enough for the range from 135 mm to 180 mm, but a bit limited when using the 70mm to 100mm. The throw of the focusing ring is quite large and a bit of pre-focussing will help to catch the correct focus with a short movement. Otherwise the focussing movement will destabilise the handholding.

The performance of the lens is at its optimum when used on tripod and the lens mount can be easily turned for horizontal and vertical pictures. It goes without saying that a heavy tripod and careful focussing and mirror lock up is necessary to extract every ounce of performance from this lens. When you are able to use shutter speeds above 1/500, however, handheld shooting will bring exquisite results.

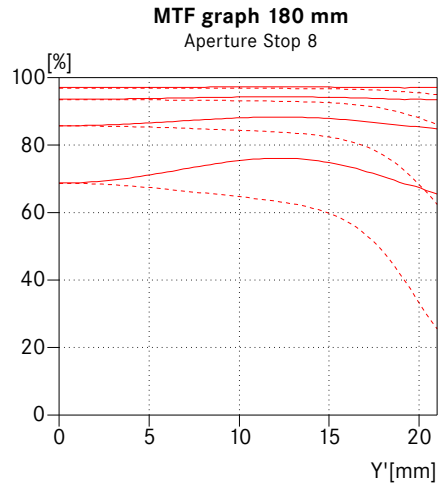
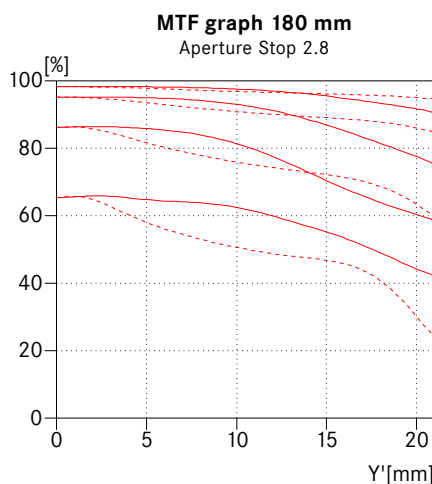
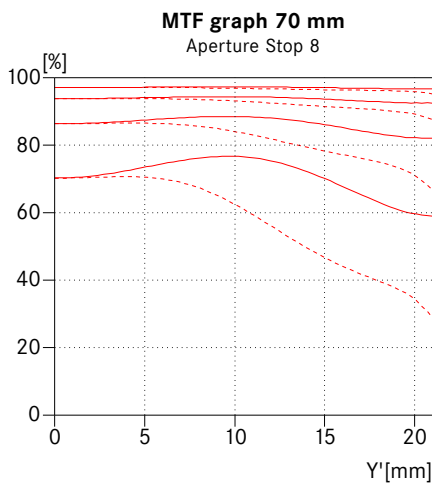
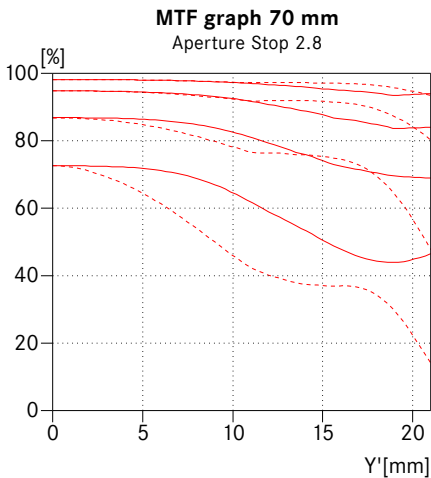


__Optical considerations



The design with 13 elements in 10 groups is a bit complicated to analyse, but the drawing can be divided in two main groups: the stationary group behind the aperture location and the moving group before the aperture. Here we see the classical two-component design, with the first component (Vario Gruppe 1) also functioning as an internal focussing movement. It is not necessary (nor is it possible) to discuss every possible focal length position and the behaviour at every aperture. It is possible however to draw a larger picture.

Generally the lens is already outstandingly good at the wider apertures over the whole range of focal lengths. The MTF graphs are quite clear in this respect.



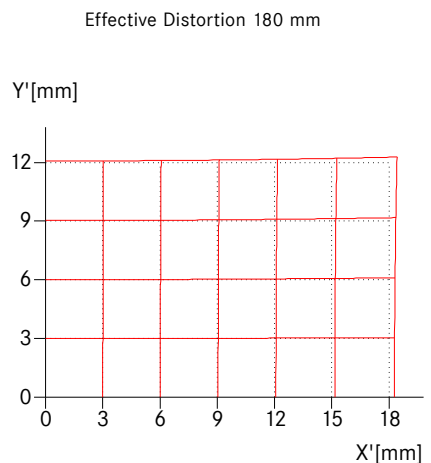
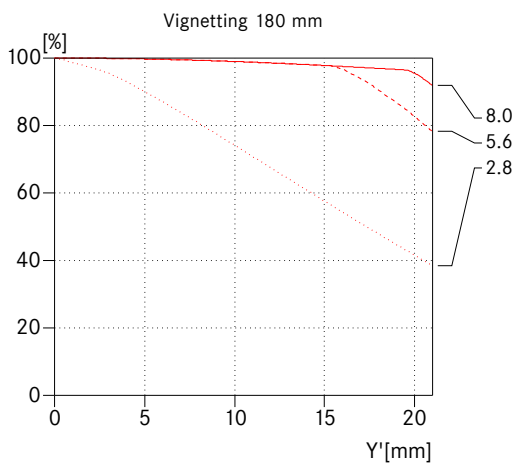
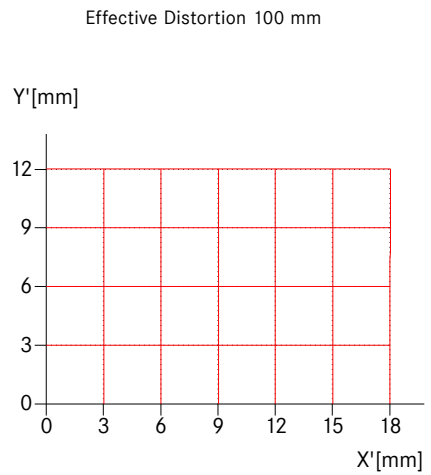
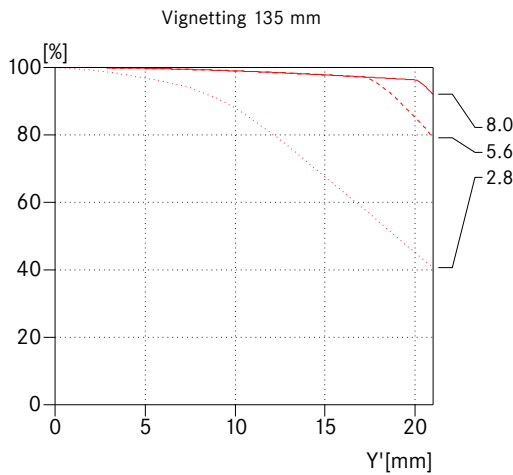
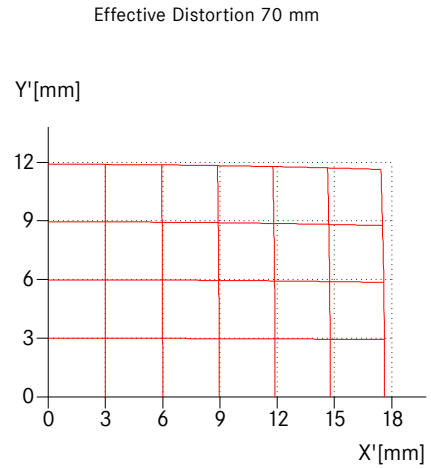
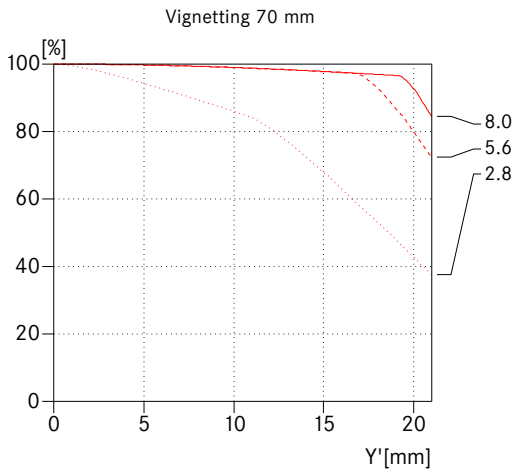
Note that there is hardly a difference in performance between the apertures and the focal lengths. The general behaviour on stopping down is a crispening of the detail definition at the corners of the image and an improvement of micro contrast at the rendition of very small detail. The 40 lp/mm are important for stationary and tripod based photography. For most situations it is best to look at the performance of the 20-30 lp/mm. This is around 90% overall at all apertures and focal lengths.

If you wish to be very critical one can note that the range from 80mm to 110mm delivers optimum performance at a level only equalled by the LEICA APO-MACRO-ELMARIT-R 100 mm f/2.8. A verbal description of the performance would be as follows: at full aperture overall contrast is very high with an even performance over the whole image area, with the exception of the extreme corners where contrast drops slightly. Very fine detail is rendered with excellent micro contrast and is defined with crisp edges and smooth gradation of subtle differences in hue and light intensity. Exceedingly fine structural elements are captured till the limits of the recording capacity of the film emulsions, where detail is mashed with the grain structure and becomes invisible.

For most intents and purposes the LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 is free from flare and exhibits excellent internal flare reduction. At the maximum extension (180mm) we can detect some flare when strong light sources are obliquely entering the front surface of the lens.

Vignetting is acceptably low with a maximum of 1.5 aperture stops. In most situations a one stop difference is hardly visible as long as the darkening in the corners is smoothly progressing. For really critical work and with very evenly lit backgrounds it may become visible.

Distortion in the medium positions (focal lengths from 90 to 135mm) is very low, but inevitably in a zoomlens, the extreme positions show the familiar barrel and pincushion distortion figures. The photographer should be aware of these characteristics and act as needed or intended.



__Artistic considerations

The great danger of the zoomlens is its flexibility in changing focal lengths. The selected focal length does not only define the magnification, but also the depth of field, the relative sizes of background and foreground objects and the depth impression of the scene. These aspects are different for every scene and should be defined and considered before you start with the actual shooting. The zoomlens allows for the fine-tuning of the composition and the framing of the scene. The zoomlens should not be used to try to improve a bad composition by varying the focal length over the whole range in the vain hope of finding a good composition.

The functional advantage of the zoomlens is the provision of a range of focal lengths in one package, thus reducing the need to travel with a number of individual lenses. In the case of single focal lengths, the photographer would decide on using only one or two lenses that are appropriate for the shooting session he has in mind. The same approach is best when employing a zoomlens.

The focal range from 70 to 180mm predestines the Vario LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 for a large range of assignments in the world of nature, reportage and fashion/portrait photography. You can still hear the claim that a lens may be too sharp for portrait photography and the LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 is indeed very exacting in its reproduction behaviour. One should however not forget that it is the photographer who makes the picture, not the lens as is. High definition is always accompanied by a very smooth gradation of subtle hues and illumination differences, characteristics that give a portrait a very good depth perspective. Photography is drawing with light and sketching with the shadows and it is the direction and quality of the light that will define the impact of the photograph. Here we can still learn much from studying the paintings of old and current masters.



__Conclusion

The LEICA VARIO-APO-ELMARIT-R 70-180 mm f/2.8 is the first zoom lens that can challenge the best single focal length lenses in its zoom range and even today is still state of the art. It is a fine example of the capabilities of the design team at Leica, Solms. It delivers outstandingly good imagery when commanding its performance profile and with knowledge of the photographic processes involved. The current Leica signature of accurate colour rendition on the verge of creamy saturation, clean and crisp definition of fine detail, a visible depth impression of solid objects and subtle gradation in highlights and shadow areas is fully preserved in this lens. Slides and large-scale prints in black and white and colour exhibit sparkle in highlights, forceful details in the shadows and extended tonality in the mid range of luminance values or grey areas.

