



Hanwha Techwin Lens and Optical Technology

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A camera lens is one of the most important parts of a camera. A lens plays a key role in camera's performance as a camera converts light information transmitted via a lens into electrical signals to create images.

The impact of a lens' specification on a camera's performance/specification is summarized in the table below.

Lens spec	Camera performance/spec	Remarks
Focal length	Angle of view	The shorter the focal length, the wider the angle of view. The longer the focal length, the narrower the angular field of the lens.
Zoom ratio	Angle of view change (Wide angle ~ telephoto)	Wide angle provides a wide field of view, while telephoto lens brings distant objects closer.
F number	Low light feature	Low light feature enables monitoring in low light conditions without extra lighting. A lower F value allows more light to pass through the lens.
Lens size	Camera size	The camera size will decrease as the lens size gets smaller.
Resolution	Resolution	The lens must be rated for a specified number of megapixels or higher to deliver the desired resolution.

Table 1. The impact lens specifications have on a camera's performance

With the proliferation of high resolution cameras in video surveillance systems, the importance of lens and optical technologies is increasing. Lens design and development is a long and costly process that requires optical design and manufacturing technologies. To reduce production costs, many manufacturers adopt lenses specialized for video surveillance made by other lens manufacturers.



Hanwha Techwin has a long history of optical barrel and lens design expertise. This allows Hanwha Techwin to continuously develop and manufacture precision grade lenses optimized for video surveillance devices.

2. History of development

Since its development of VGA 30X zoom lens in 2004 to its' 4K F1.2 lens in 2020, Hanwha Techwin has been developing its own optical lenses and technologies featured in its cameras. Building upon its optical technologies accumulated over many years, Hanwha Techwin has launched market leading products in video surveillance. As the adoption and importance of image quality in video surveillance is increasing, we have been developing superior products with our unique technologies. We have developed some of the world's best optical technologies that deliver crisp images under any surveillance environment. The following is a timeline of some of the key milestones in our development of CCTV lenses.

Year	Lens	Remarks
2004	VGA 30X zoom lens	
2005	VGA 10X zoom lens	
2008	VGA 37X zoom lens	World's highest zoom ratio
2009	VGA 12X zoom lens	
	1.3M 6X zoom lens	
2010	VGA 3.5X VF	
	2M 20X zoom lens	World's first 2M zoom lens
	3M 2.8X VF	World's first 3M lens
2011	1.3M 30X zoom lens	Highest ratio of 1.3M
2012	3M 2.8X IR VF	
2013	1.3M 43X zoom lens	Highest ratio of 1.3M
	2M 32X zoom lens	Highest ratio of 2M
2014	2M 32X IR zoom lens	World's first IR high ratio zoom lens
	3M 3.2X CS	
	5M 2.6X VF	First 1/2" 5M lens
	6M Fisheye	First 6M Fisheye lens
2016	2M 12X zoom lens	Smallest 2M 12X lens
	2M 4.3X VF	Highest ratio 1/2.8" V/F lens
	8M 20X zoom lens	First 4K zoom lens
2017	2M F0.94 4X VF	World's smallest F number V/F lens
	2M 37X zoom lens	Highest zoom lens of 2M 1/2"
	6M F1.6 Fisheye	
2018	2M 55X zoom lens	Highest zoom lens of 2M 1/2.8"
2019	12M Fisheye	
	8M 3X VF	World's smallest 4K F number V/F lens
2020	8M 30X zoom lens	World's highest 4K zoom lens

Table 2. Hanwha Techwin's lens development history

Hanwha Techwin has proven innovation in optical technology allowing clear, vivid image capture in low light conditions and through its high zoom ratio and megapixel lenses.

■ IR-Corrected Lens for clear images at nighttime - * PATENTED TECHNOLOGY

Images captured with a traditional lens are partially out of focus in environments where infrared (IR) and visible light exist at the same time. An IR-Corrected lens retains the same focus with both IR and visible illumination to eliminating the phenomenon of focus shift and delivering clear images during nighttime. The technology is applied in high ratio zoom lenses for the world's first IR-Corrected IR PTZ (Applied in SNP-6320RH, PNP-9200RH, and others).

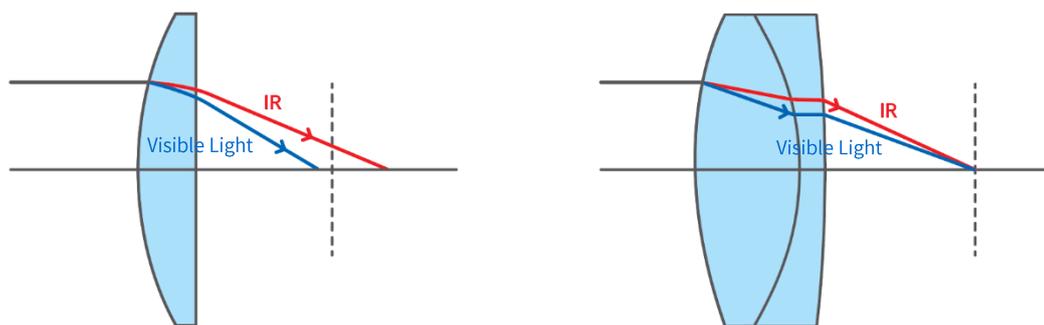


Image 1. Comparison of focus between typical lens (left) and IR-Corrected lens (right)

■ Zoom IR Illuminator optimized for IR PTZ - * PATENTED TECHNOLOGY

There is an increasing demand for IR PTZ cameras with the ability to clearly capture objects at a long range at night with the use of IR illumination. Hanwha Techwin has developed an IR illuminator that changes the area of IR illumination according to the lens' zoom ratio, allowing clear imaging of objects from wide to telephoto angles. Furthermore, a high efficiency lighting system is implemented using high Power LEDs.

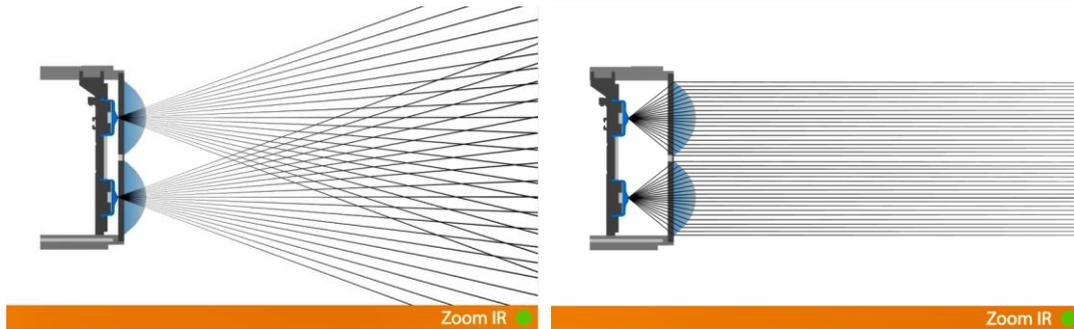


Image 2. Zoom IR Illuminator technology

(Left: Short distance wide-angle beam spread Right: Long distance telephoto beam spread)

■ **High magnification/high megapixel lens design technology to enhance the accuracy of monitoring - * PATENTED TECHNOLOGY**

High magnification/high resolution zoom lenses require an optical system comprised of multiple lenses elements and driving units.

We have developed a lens consisting of four or more driving units to meet the needs for high magnification/high resolution and launched products that have a competitive advantage.

■ **Deliver the brightest 4K lens with top-of-the-line F1.2 - * PATENTED TECHNOLOGY**

As the market for high resolution cameras is expanding, there is also an increasing demand for 4K high-resolution lenses that can offer clear and vivid images.

With the use of optical design technologies accumulated over the years, we have released the premier F1.2 4K lens, making it the brightest among 4K lenses, and allowing more light to enter for excellent low light monitoring. This lens is featured in our Wisenet7 4K cameras delivering high resolution images around the clock.

■ Patent portfolio of lens and optical technologies secured worldwide

Hanwha Techwin holds approximately 100 global patents for its lens and optical technologies across the world, including technologies mentioned in this whitepaper.

We are constantly developing new technologies for cameras and the lens and optical fields while developing our competitiveness on the global stage. Hanwha Techwin continues its efforts to achieve sustainable growth and to create mid- to long-term value with its vast patent portfolio.



Image 3. 3D modeling of our lenses

As the video surveillance industry continues to evolve, Hanwha Techwin keeps pace and spends considerable Research and Development efforts to offer products and technologies that enable quality imaging and efficient monitoring. Such efforts begin with the development of our own lens, a key component of surveillance cameras.

As the popularity of high resolution cameras and the availability of solutions continues to expand, the demand for high resolution lenses and advanced optical technologies that enable vivid monitoring in various environments is also increasing. To continue to meet the needs of the market and to offer innovation our customers expect, Hanwha Techwin continues its commitment and investment to develop the world's best optical technologies.

WISENET

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