

# BOSCH MIC PTZ

Bosch's MIC IP Starlight 7000 HD is a special video surveillance camera that puts huge power into the hands of operators. It's flexible, easy to drive, has a quality camera and lens, does well against backlight and in low light. There are particular applications in which it's likely no other camera will do.



**P**TZ cameras are fun to review because they are so flexible in their capabilities and the flexibility of this Bosch MIC PTZ made it the most fun of all. This is a strong surveillance solution, offering operation in layers. It's tough as an old boot but there's no scrimping when it comes to the camera system. There's no scrimping when it comes to the lighting system, either, but more on that later.

The specification runs into pages. In the hands, this 6.7kg baby is a real beauty - tough and well made - a testament to Bosch as a manufacturer, not just as an electronic security maker. The design, the construction, the coatings, the finish - it's simply flawless. It's fully sealed and rated to immersion. The core camera aspects are a Bosch Starlight 1080p HD camera engine running at 60ips and supported by a 30x optical zoom and an integrated combination of IR and white light arrays with a range of 300m. With the illuminator accessory, the dimensions of the camera are 217.75mm x 439.91mm x 178.33 mm. It's not a small camera but it's not huge, either. On large sites, the MIC will be quite discreet but it certainly has a purposeful appearance.

The MIC Starlight 7000 HD camera 1080p 60ips PTZ has a 1/2.8-inch Exmor R CMOS sensor offering 1945 x 1097 pixels and has a 4.3-129mm motorised zoom lens with a variable aperture - F1.6 at the wide end closing down to F4.7 at the long end - this lens offers a field of view from 2.3-65 degrees. The housing window is tempered flat glass and the front element of the lens looks to have a quality coating.

Best minimum scene illumination unsupported is 0.0077 lux at F1.6 in colour at 1/30th of a second and 0.0008 lux in monochrome. These numbers are good and the low light performance of the camera is solid even unsupported by an illumination system so compelling you'd be silly not to deploy it, especially if you're going to be spending any time at the long end of the focal range with aperture closed down. There are a bunch of camera settings that handle gain control, aperture correction, electronic shutter speed, dynamic range is 90dB at 60fps and 120dB at 30fps; signal to noise ratio is greater than 55dB. There's backlight compensation, auto white balance, and loads more.

When it comes to physical specs, the Bosch MIC complies with IP68 against weather and dust, NEMA 6P and IK10 against vandalism and

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About 6.5mm



Around 11mm



24mm - look at detail deep in



Faces in cars at 24mm



This is 4.3mm with 76,000 lux WDR

**AT WIDE ANGLE, THIS IS A STRONG SCENE, WITH PLENTY OF DETAIL, NO SIGN OF DIGITAL ARTEFACTS OR SMOOTHING IN SURROUNDING WALLS. CONTRAST IS GOOD, DISTORTION - I CAN'T SEE ANY.**



Not full zoom...



12x optical at around 70m - plates



Faces at 13x optical in 76,000 lux

IEC60068 against vibration and shock. It can handle a temperature range from -40 to 60C, MIC's cast aluminium body is rated to ASTM B117 against corrosion, has intelligent defog, an integrated wiper system, a window de-froster, and the mounting options are flexible to suit any application in industry, marine and ports, mining, road/traffic surveillance and tunnels, public and city surveillance - the list goes on. There's also image stabilisation. Power demand if you go with the lighting module is 95W (60W without illumination).

This day/night camera has a 30x optical lens (there's 12x digital), and the PTZ function offers 360-degree pan and 290-degrees of tilt. Top speed is 120-degrees per second for pan and 90-degrees per second for tilt and you can pan in increments of .02 degrees. AutoScaling gives proportional zoom while AutoPivot automatically rotates the camera.

The MIC has 256 pre-positions and 4 separate guard tours. A standard preset tour has capability for up to 256 pre-positions, with a configurable dwell time between pre-positions. A custom preset tour has capability for up to 64 pre-positions that can be programmed in any order with a configurable dwell time between pre-positions.

There's a field-installable combination IR and white light illuminator with a range of 300m that is operator selectable and responds almost instantly - the unit we tested has this lighting solution attached. There are 5 pre-programmed and configurable user modes when it comes to camera setup - general, motion (traffic), low light, indoor (airports or industrial, vibrant (high colour and contrast) and illuminator (mining). The MIC is also designed to be able to colour balance in the presence of ubiquitous sodium vapour lamps.

With 24 individual privacy masks with 8 possible in each scene, there's rules-based alarm logic, content based imaging technology to improve image quality in variable lighting, advanced noise reduction intelligent video analysis, intelligent tracking with 3 modes, H.264 encoding, advanced quad streaming and ONVIF conformance. The camera has sensors and will send warnings if camera health is compromised. The diagnostics log records the events such as low voltage, high temperature, low temperature, high humidity, high vibration, total hours of camera operation and illuminator aging history.



4.3mm with white light on



Zoomed...



Zoomed more...

We're testing the MIC on a Dell Optiplex 9020 with an i7 processor and 8GB of RAM, and we're bringing the camera onto the network with a NetGear 108SP PoE switch and a 95W Bosch midspan PoE injector. Given the camera's 1080p resolution, there's no processing latency on this rig. There are no other cameras on the network during the test.

### DRIVING THE BOSCH MIC

This is a special camera in many ways. It's hard not to fall in love with it during the process of unboxing and after a bit of technical advice from the Bosch team, the camera is up and running with no dramas. The only change I make to camera settings, which appear to me to have been optimised towards low



light, is to set the bottom end shutter speed to 1/30th of a second. Even this is too slow for many applications - 1/60th is preferable if you have movement.

Happily, Bosch delivered the MIC with a huge and wondrous tripod mount and this allows me the best possible base for the test. My first instinct is to take the camera out the back where there's serious depth of field - up towards 2000m to Sydney Tower on the northern skyline. It's the same old busy district scene regular readers are familiar with, but with the Bosch MIC I see things I've never seen before, and in surprising detail.

The MIC has a 1080p HD sensor - on a 1/2.8-inch sensor this increases pixel size and enhances low light performance. It impacts on image sharpness at the wide end too, but only a little - the wide end of this big zoom is a relatively wide 4.3mm and it extends to 129mm - that's the equivalent of 928.8mm on a full frame camera. This level of optical zoom is wonderful and it makes the camera a very flexible surveillance tool. But there's more to MIC than a long focal length. The automatic autofocus is seamless enough to be practically undetectable during normal operations.

Because it's long there's light falloff at the long end as aperture closes down from F1.6 to F4.7. The effects are obviously greater at night where they lead to some amplification noise in extreme conditions but the lighting system on this camera is so good - IR and white light - that it's always going to be tough for an operator not to just hit one of the light buttons and take a proper look at the scene. The lens has indiscernible barrel distortion but there is some chromatic aberration at the wide end. As you reach in, CAs reduce but they are still present in harsh conditions, even at full tele.

Colour rendition is strong, sharpness is good,

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too. Noise levels are very low, which you expect with Bosch cameras. Something I do notice when I move the camera out the front is that very strong exposure on the sunny side of the street makes for some shadows on the shaded side in the morning - as the sun moves, this variation melts away - I think camera settings are the cause.

You can drive the MIC using Bosch Video Client or the camera browser and I use both, but wind up using the simpler browser because it suits my requirements better. Both options have an integrated digital joystick but I find myself using the mouse pointer instead. After a couple of days with the camera, that's pretty much all I use unless I want to tweak settings. Driving the camera like this is easier out over the back lane. When I move the camera to the front, it's harder to manage in the cluttered street, especially at longer focal lengths - but that's to be expected.

I spend a lot of time out the back just wheeling the camera around and drilling into the scene. This is a great surveillance tool, I think to myself for the 50th time in 5 minutes. It's not only about the lens but this camera is defined by its optical capability. There's digital zoom, too, but with a 1080p camera, you don't need to push far to go beyond the value point. What this quality 30x zoom does is allow you to put your 1080p of resolution wherever you need it. In applications like this, that makes the camera enormously powerful.

I spend a lot of time at longer focal lengths keeping an eye on the traffic going up Albion Lane. I can get my wide shot and then zoom in to watch the tools bouncing around in the back of delivery vans turning up the lane - and this is at 12x zoom - at 30x I'm getting 1080p snapshots of number plates.

At wide angle, this is a strong scene, with plenty of detail, no sign of digital artefacts or smoothing in surrounding walls. Contrast is good, distortion - I can't see any. There are a couple of little yellow ghosts being provoked in the internal elements of the lens from the direct sunlight to which the camera is exposed. I notice the propensity to focus on the darker elements of the scene at the expense of bright sky, which is what you want. There's a big van across the lane at about 18m from the lens and I get a wide view and then swoop in on the number plate.

Next, I look up the lane to get a sense of WDR performance. It's rock solid. I have no trouble with faces at all at this distance from the lens. After a



World Tower skyline at 4.3mm



Zoomed...



Sydney Tower under the streetlight



And here's the zoom - note the CAs around branches.



Night performance at about 5.5mm



Ghosts and a little blooming



Yellow tones don't remain



Colour in 2 lux at lens

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while, I get bored of being able to see everything in the lane and turn the MIC towards the World Tower at 1000m, grabbing a wide and a 30x digital shot. This is the strongest performance I've had from one of these big PTZs out here. It's very impressive. If there were people wandering about on the roof of the WT, I'd be able to identify their clothing. I have image stabilisation turned off and I notice some movement of my platform at 30x. It's not a big deal but it's a reminder you need a stable mounting point for a camera like this one.

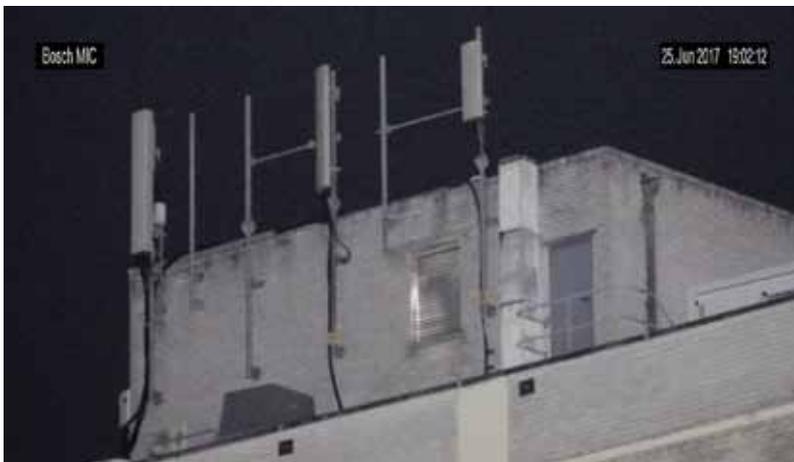
My toughest WDR test with the MIC is a shot of Sydney Tower - the sun is in the frame in the wide view and the intensity of the light provokes CAS along branches in the field of view but it's a great image - again the best image I've got of Sydney Tower with a surveillance camera. I spin out of the light and reach up to the top of a building out front of the office to take a look at a shrub on the balcony - another great image from the MIC. Next I take a look at the neighbour's garage - the wide view, a 6-7mm view of the plates, then a 19x zoom into the back window of one of the cars to snare a reflection of the MIC over the road peering down. A car goes up the lane and I grab the plate with no trouble at full wide and then twirl the PTZ around a bit more. It's impossible not to try new things with this camera - operators are going to love it.

Night time performance is a real eye opener. I expected the MIC would offer a nicely graded transition from light into dark and that's exactly what it does do. Colour tone alters, there's a little blooming around streetlights but it's mild. There are a couple of aperture ghosts set off in the lens elements by an overhanging low-pressure sodium street light. When I zoom in to follow a pedestrian walking up the lane, the closing aperture pushes the MIC over into night mode. A car comes up the lane and there's blooming from the headlights - shutter speed is probably the culprit here.

Next, I have a play with the light array. I start at wide with no light, then zoom in on some chimney pots at around 35m away - then I add IR and zoom in further. It's great performance. I flick from IR to white light and the camera flicks over to day/colour mode without drawing breath. Nice. Pulling back, I can see the light spread is considerable - it's not the full angle of view - it looks to me like about 30 degrees at 35m. Next, I illuminate the lane - starting at 20m and then going all the way up to Albion Lane to illuminate the



This is night 200m with white light



And here's the close up...

no stopping sign 70m from the lens. The white LED array could definitely push further than this.

My next test it to peer into the structure of an apartment block being built up the street using the IR array - it's around 70m away, too. Next, I point the white light array at an office block half-way down the hill - this must be 125m from the lens and I focus on the microwave array on the roof, noticing stars in the background. I hit the white light and the camera returns soft colour at this distance. Turning off all the lights, I spin back over the lane - I'm in colour at 4.3mm and it's a nice image - I can see how well the camera handles 1800k sodium street lights. A pedestrian comes down the lane and zoomed in to about 45m, I get good detail of clothing but not a face. Something I notice with the MIC's night performance is very low levels of noise.

The following day I undertake a WDR test in the lane and am impressed again at how well the MIC does. Later I take the camera up to the front balcony and take a look at the street. This is a busy scene and the MIC is simply too much camera for the job. I'm getting face ID from people turning the corner off Albion St at close to 100m and I'm not at 30x zoom. In this light, plates are a snap at any focal

length but performance is better at longer focal lengths where there's less apparent movement in the scene. The performance with plates is not the sharpest I've seen but that may well be down to settings.

Night performance out the front is solid, too. There's more light out here and the MIC revels in it, though I lose moving plates as light gets low - this is par for the course - we've never had moving plates out the front of the office in sub 7 lux unassisted before. But recognisable faces are no problem and the ability to wriggle into a scene - 100m into a scene - and snaffle static plates and other details is nothing to be sneezed at. And if you want moving plates, and the camera is mounted behind the traffic flow, you can hit the white light in real time...

## CONCLUSION

The Bosch MIC is an excellent video surveillance camera. If you need a camera capable of offering excellent performance in the toughest environments, this is the camera for you. It might seem like overkill but I think this camera would shine installed externally in stadiums, as well as in industrial applications. It has the ability to burrow into a scene and get face recognition of the highest quality and the capacity to illuminate a scene with white light and IR is a real strength, too. The Bosch MIC is one of those cameras you wish you owned yourself. It's genuinely rugged, powerful, intuitive to drive and thoroughly fit for purpose. Highly recommended. ■



### FEATURES OF THE BOSCH MIC 7000HD PTZ INCLUDE:

- 1080p HD at 60ips, quad streaming
- 360-degree PTZ, 270-degree tilt
- 4.3mm (F1.6) to 129mm (F4.7) motorised lens
- IP68 immersion rated, IK10 vandal rated, etc
- White light and IR ranges up to 300m
- 24 privacy zones, up to 8 per scene
- Cast aluminium body, tempered flat glass window
- De-fog, de-frost, integrated wiper.