The Professionals Know: Nikon Technology in their own words

Danny Ellinger
Quick, sharp and accurate, Nikon's autofocus system is like my sixth sense. It is always faster than my own eyes, often finding and focusing on my favorite subjects — fast-moving birds — before I can. If a shot is lost, it is because I missed it, not my Nikon.

Erwin Windmuller
Nikkor lenses excel in almost any light condition. I am frequently surprised at the excellent results I get — even at 1/15 of a second with extremely difficult backlighting. And working with Nikon converters means working with three different lenses in one, with no compromises to quality. Three cheers for Nikon Lens Technologies!

Joe McNally
The Nikon Creative Lighting System is the latest and greatest iteration of Nikon's legendary flash system. This is smart technology. Compact, fast and dependable, it frees the photographer to concentrate on the aesthetics of the picture, and not the nuts, bolts, wires and cords generally associated with most lighting systems.

Soenar Chamid
Most of my work happens outdoors in cold weather. That's why I depend on Nikon for durability. Even in harsh conditions, I know I can accomplish 500-800 exposures a day for as long as I need. When I'm on the road, my D2x and five SB-800 Speedlights give me studio-quality portraits no matter what the situation. No other camera maker gives me such consistency.

⚠ **WARNING**	TO ENSURE CORRECT USAGE, READ MANUALS CAREFULLY BEFORE USING YOUR EQUIPMENT.

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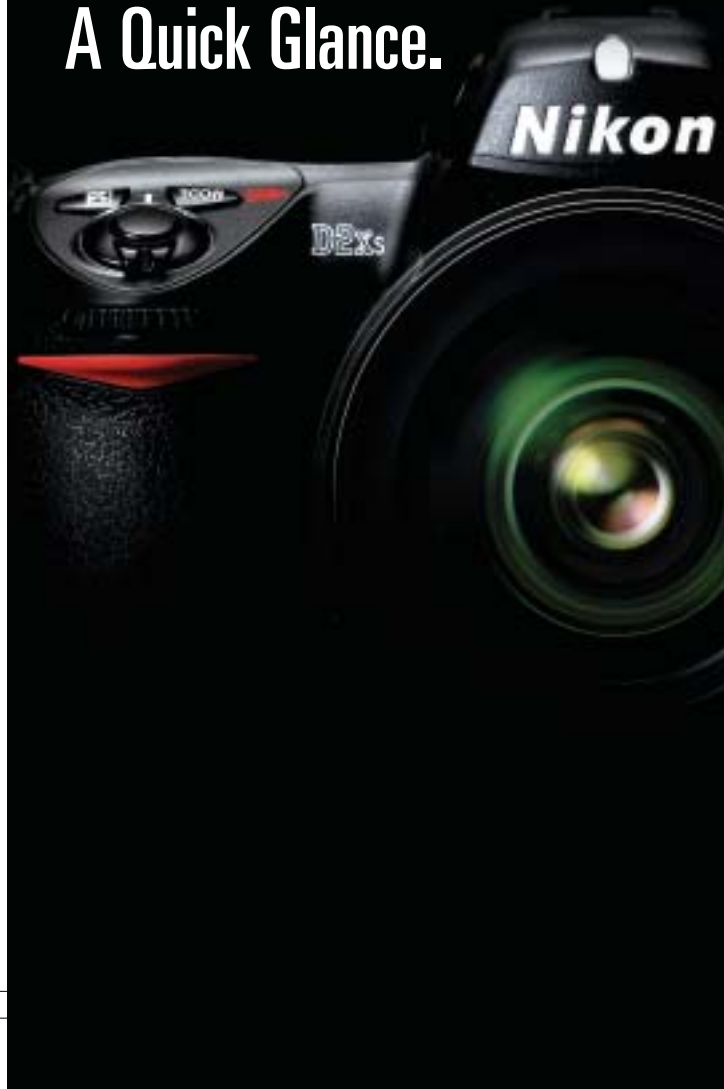
Nikon

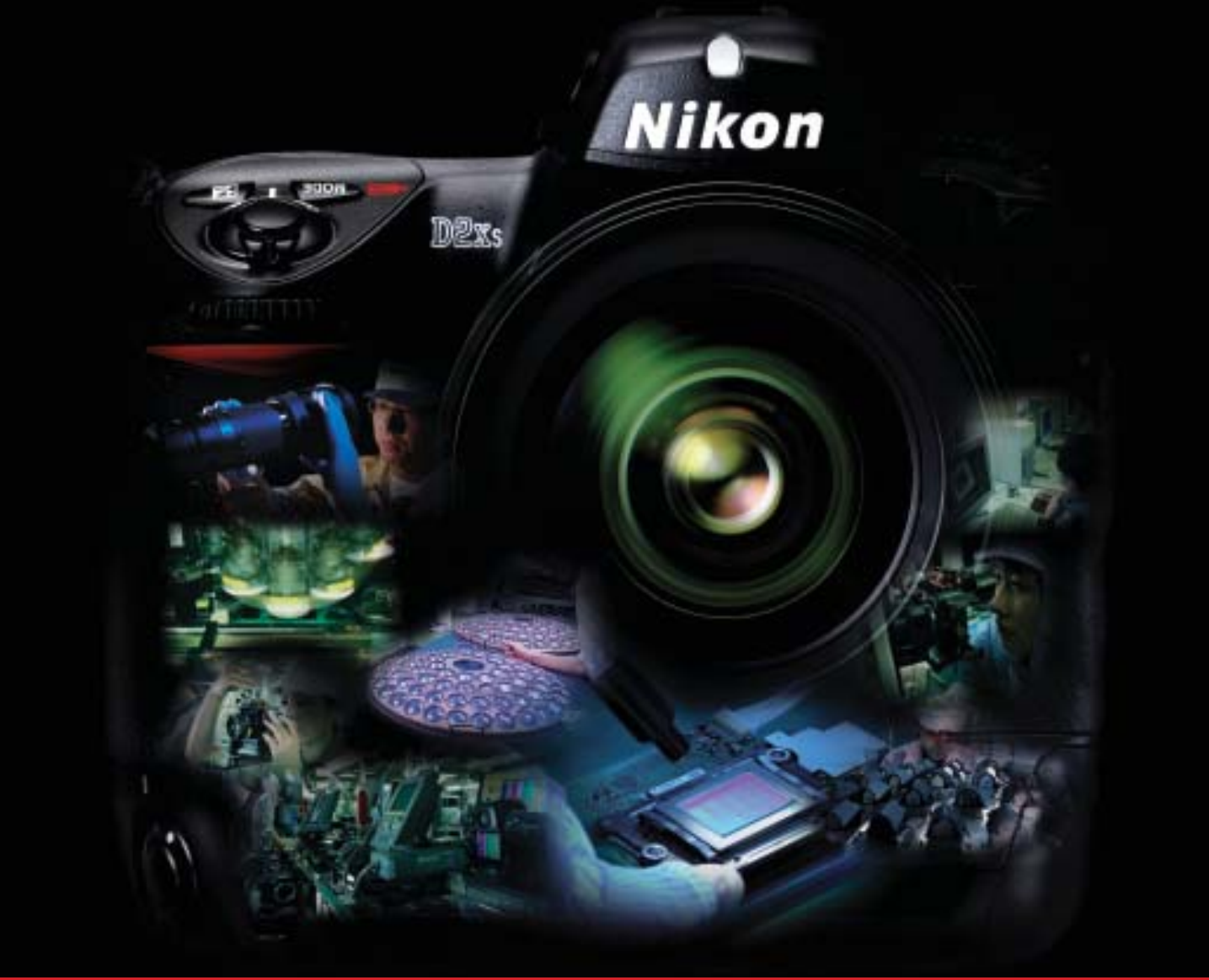
At the heart of the image

NIKON TECHNOLOGY GUIDE

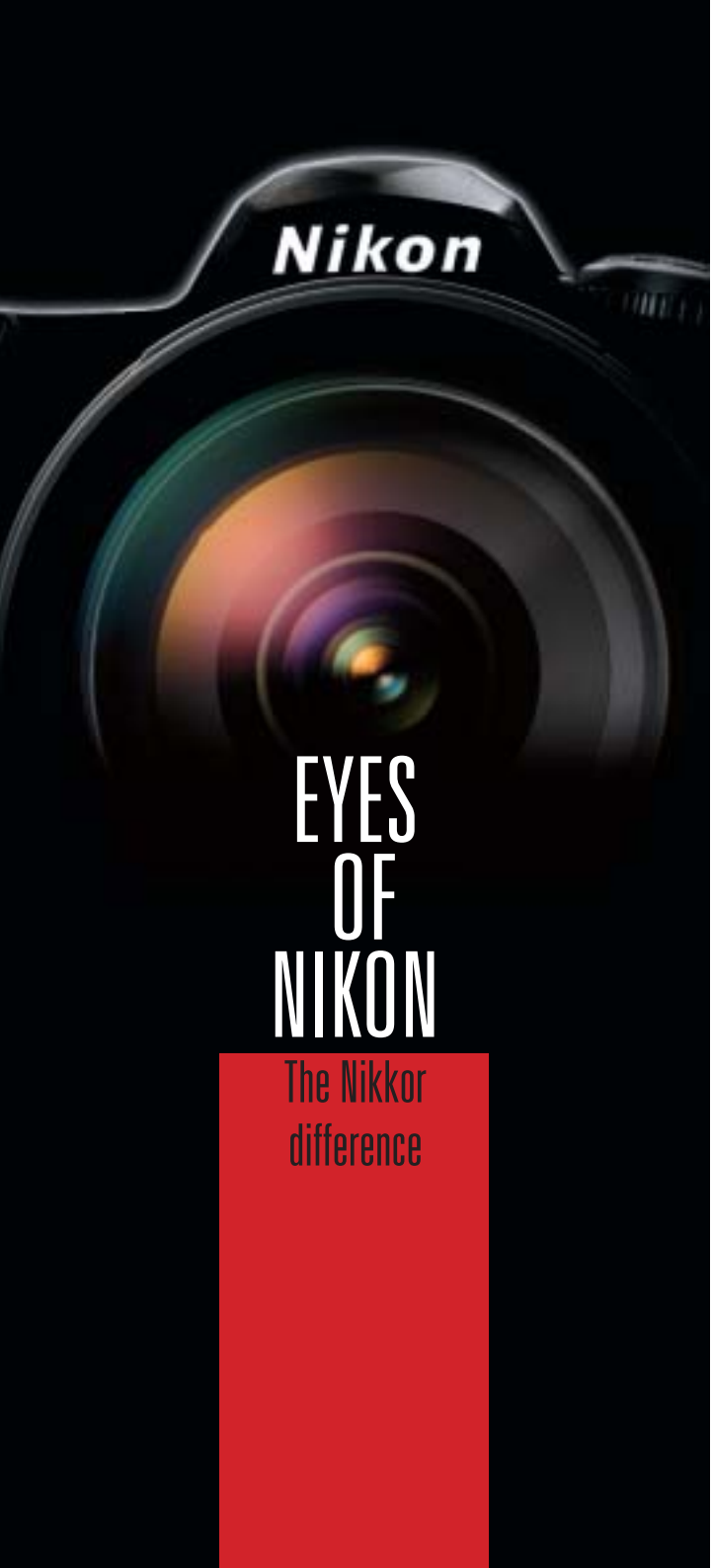
Why Nikon? A Quick Glance.



Nikon Technologies — Creativity without compromise



No bells. No whistles. No hype. This is the nature of Nikon photo technologies. Nikon's engineers are just as passionate about their pictures as you are about yours, so they test equipment in the field as well as the research laboratory. Why? Because they know that is the only way to make a camera system as flexible, practical, integrated and forward-looking as the Nikon SLR system. Each Nikon SLR is created to give you the results you want, when you want, without compromise. Professionals depend on it. Enthusiasts take it for granted. So can you.



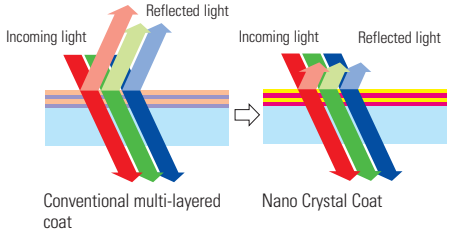
EYES OF NIKON

The Nikkor difference

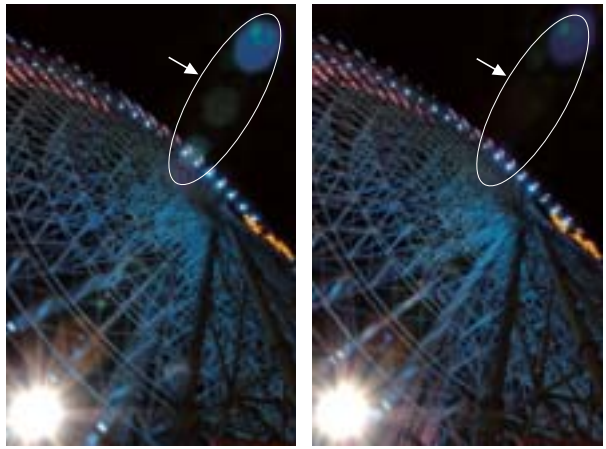
Super Integrated Coating and Nano Crystal Coat

The lens is arguably the most important part of any camera. Quality lenses make quality pictures. But for digital imaging, new standards needed to be met to manage reflections caused by the imaging sensor, which can produce image-degrading effects such as flare and ghost. Nikon understands that lens coating technology is an integral part of any quality lens and makes an immense difference to the quality of the final picture. That's why since the late '90s, Super Integrated Coating has been applied onto all Nikkor lenses. More recently, Nikon introduced Nano Crystal Coat to further reduce the effects of internal reflections. This new technology originates in the optics used in the microscopic manufacture of semiconductors (or processor chips), where precision is crucial. This outstanding extra-low refractive coating uses ultra-fine crystallized particles of nano scale (one nanometer = 1/1,000,000 of a millimeter), to minimize ghost and flare, especially in backlit situations, to give you more clarity under more demanding conditions than ever before.

Nano Crystal Coat for high light transmission with less reflection



Nano Crystal Coat ensures a sharp, crisp image



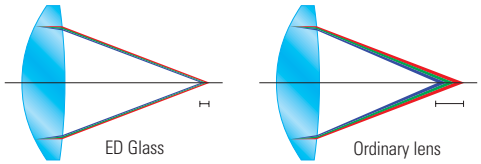
Conventional multi-layered coat

Nano Crystal Coat

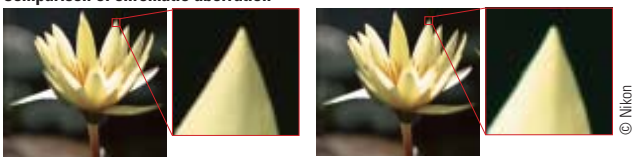
Super ED Glass

When light rays pass through optical glass, their varying wavelengths cause color dispersion, resulting in what is known as chromatic aberration. One way to prevent this unwanted effect is to use calcium fluoride crystals, but these fragile elements are sensitive to temperature changes, which in turn can affect proper focus. Instead, Nikon invented an alternative glass manufacturing technology called ED (Extra-low Dispersion) glass. Because of its special production process, ED glass was initially the exclusive preserve of the professional, but today it is available in numerous more affordable Nikkor lenses — including all DX Nikkors. Ongoing improvements have now resulted in new Super ED glass that offers increased control over color aberration.

Secondary spectrum amount



Comparison of chromatic aberration



ED Nikkor lens

Non-Nikkor lens

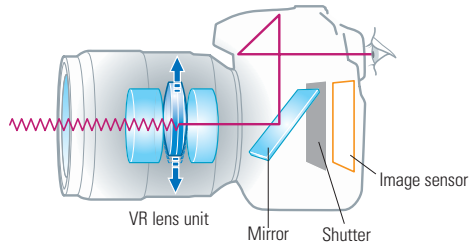
Aspherical Lens

Nikon first introduced Nikkor SLR lenses incorporating aspherical lens elements in 1968. Aspherical lenses virtually eliminate the problems of coma and other aberrations, even at the widest apertures. Based on decades of aspherical lens processing, Nikon is able to provide a variety of optical solutions for a diverse range of customer needs. In particular, Nikon has developed exclusive Precision Glass Molding (PGM) techniques for larger-diameter aspherical lenses used in today's high-performance optics. This ongoing commitment to improvement is synonymous with the Nikkor brand.

Vibration Reduction

Of all the recent innovations in digital imaging and optics, Vibration Reduction (VR) has arguably received the most attention. And while the technology of minimizing blur from camera shake is important, it is equally important to know how — and where — it works. Nikon's VR technology stands alone in terms of real-world usability, originating in the lens, not the image sensor. In this way, algorithms optimized to the individual lens attached can be applied. Another advantage of lens-based VR is that a separate algorithm confirms the effect when you press the shutter release button halfway, giving you the freedom to compose your image more easily. The system can also detect the use of a tripod or recognize panning, as well as options such as addressing the specific shake caused by the ongoing vibration patterns produced when shooting out of a boat or bus. Nikon engineers have taken tens of thousands of test shots in real-world conditions to ensure that it works for you in any given situation.

Vibration Reduction via activating lens (conceptual image)



With Nikon's VR system, you can confirm the vibration reduction effect in the viewfinder.

Different types of VR lens units are used to maximize each lens' performance.

Silent Wave Motor

Nikon's AF-S technology is another reason why so many of the world's best photographers trust Nikkor. The Silent Wave Motor (SWM) uses ultrasonic waves to focus internal lens elements. This high-torque motor system is extremely powerful, driving auto focus elements instantly after start-up, while stopping with exceptional precision for accurate focus. The result: superb total response. And because the lenses are driven directly by internal SWM power, there is virtually no gear noise or associated power loss compared to conventional lens designs. Autofocus operation is almost completely silent. Originally developed for professional telephoto lenses, this technology is incorporated into most autofocus Nikkor lenses.

M/A Mode

Nikon believes that even the best autofocus in the world should be complemented by smooth, integrated manual focus option. That's why AF-S Nikkors feature Nikon's exclusive M/A mode that allows you to switch from autofocus to manual operation with virtually no time lag — even during AF servo operation and regardless of which AF mode is in use. In challenging low-light or backlit situations, you can still quickly override to manual focus just by rotating the focus ring.

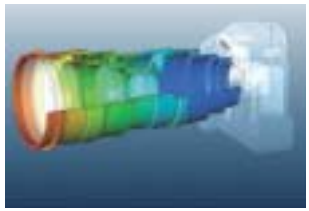
Protection

Nikon's professional digital SLRs like the D2 series have superior protection against dust and moisture. Similarly, Nikkor lenses such as AF-S VR Zoom-Nikkor 70-200mm f/2.8G IF-ED and AF-S DX Zoom-Nikkor 17-55mm f/2.8G IF-ED have extra rubber sealing around the buttons and mount ring in order to provide added assurance against the harshest of elements.

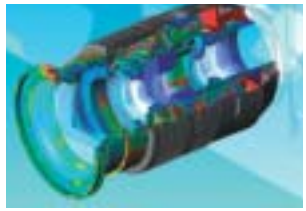
Reliability

Literally every single Nikkor lens has been inspected and fine-tuned to perform before it reaches your camera. Once it is in your hands, you can be sure that the Nikkor engineers have tested the design against some of the harshest shock, humidity and temperature durability standards in the industry.

Alignment of each lens element is inspected.



This computer graphic shows a simulation of how much a lens can be deformed by its own weight.



Simulations such as this are used to determine lens damage — where, and to what extent — caused by shock.

Responsibility

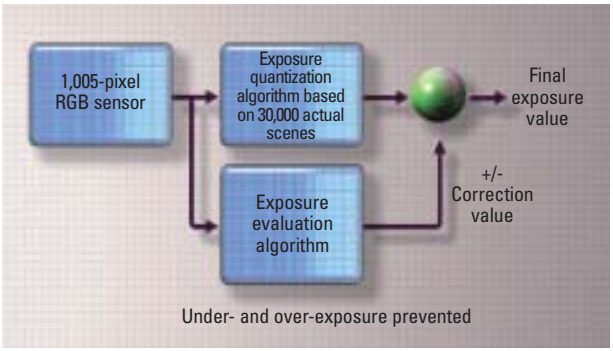
All of today's Nikkor optics adhere to the most stringent environmental standards. The result of extensive long-term efforts to remove the use of hazardous chemicals and heavy metals in the design and production process means Nikkor lenses still deliver the performance customers expect without harming our environment.

SMART CONTROL

Accurate and intelligent

3D-RGB Matrix Metering II

This exclusive Nikon feature not only evaluates brightness and contrast but also color. The results will astonish you. What once took professional experience to determine is now literally at your fingertips. Data from more than 30,000 actual scenes are stored in the camera's database, with algorithms that are continually added. The RGB Color Matrix Meter can even tell if tungsten or fluorescent lighting is in use. Once the camera receives scene data, its powerful microcomputer and database work together to provide unequaled exposure control. Nikon's 3D Color Matrix Metering II also uses special exposure-evaluation algorithms optimized for digital imaging that detect highlight areas and calculate appropriate exposures. It even gives proper exposure values when shooting white subjects in cloudy conditions, a near-impossible situation for most cameras.

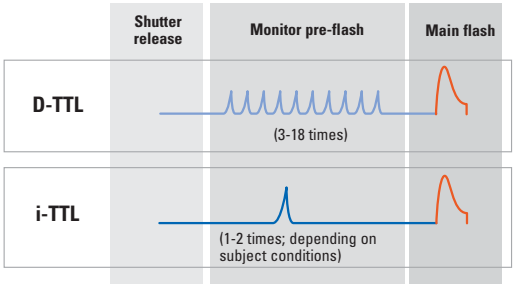


© Gordon Nash

i-TTL Flash Control

Natural-looking flash exposures are easily influenced by ambient lighting, so it was long assumed that a flash system could never work consistently, especially if a scene's ambient light was changing. Nikon's i-TTL system, however, meters every new exposure, tailor-making new output levels before every image — something no one else can claim. Milliseconds before the main flash, Nikon Speedlights such as SB-800, SB-600 or SB-R200 emit a monitor pre-flash, which reflects off every object in the frame, sending the five-segment i-TTL flash sensor and RGB sensor data such as available light and shadow, subject distance, reflectance and color temperature. This information, along with data from the Matrix Metering system, is analyzed to adjust flash output for the most balanced background/foreground exposure possible. All of this complex processing happens in a fraction of a second before each exposure, underlining why Nikon's flash control system offers unprecedented levels of precision and performance.

Comparison of monitor pre-flashes with i-TTL and D-TTL



With i-TTL, high output pre-flash fires in a short period of time for efficiency.

© Joe McNally

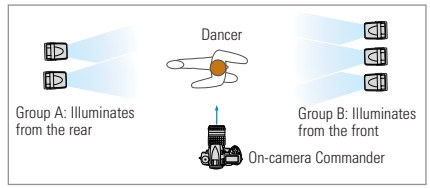
Even in backlit situations, i-TTL flash control achieves pleasing light without washing out the main subject — something that frequently happens with other flash systems.

Creative Lighting System

Beautiful pictures start with the right light. The Nikon Creative Lighting System — available in Speedlights such as the SB-800, SB-600 and close-up lighting system R1C1/R1 — combines studio-quality lighting with the intuitive simplicity and freedom of wireless capability. With i-TTL at its core, the system gives you consistently accurate exposures in even the most difficult lighting situations. Moreover, being wireless means you can set up as many Speedlights as you like, anywhere you like. On the ground or on the ceiling, i-TTL makes it work, every time. And what truly separates the Creative Lighting System from all other camera makers is the ability to make remote adjustments to individual Speedlight groups. It's as simple as pushing a button on the commander. Complex, professional-looking results, made simple.

© Joe McNally

Equipment positioning to take the above photo.



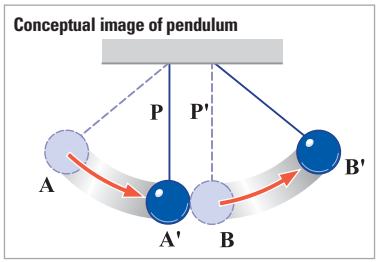
Control the settings of each individual group from the commander unit.

REFLEX ACTION

When every millisecond counts

Shutter Mechanism

When any SLR takes a photograph, a mirror inside the camera must raise and lower itself during exposure. This happens very quickly, and can cause camera vibrations often called “mirror bounce.” Nikon’s exclusive mirror balancer mechanism can be found in many of their high-performance SLRs. It keeps mirror bounce to a minimum while maintaining the shortest blackout time and quietest operation in its class. This advantage is particularly beneficial during long exposures and when using Macro lenses. Utterly sophisticated, this elegant mechanism is yet another reason why you can shoot as high as 8 fps with the utmost accuracy. And at Nikon, shutter units are tested under the same conditions as actual pictures are taken: with the unit intact and inside the camera body. The world’s best photographers take it for granted, but when we say that the D2x shutter is tested more than 150,000 times, we mean it.



Nikon’s unique mirror balancer can be explained using the pendulum in the illustration above. Pendulum P swings down to Pendulum P′. When these two meet, Pendulum P stops still exactly at position A′. This is similar to how the reflex mirror and the mirror balancer work in Nikon cameras.

Conceptual image of mirror balancer.

Minimized Shutter Time Lag / Start-up time

If you’re ready, your camera should be, too. Why? Because a millisecond can make the difference between capturing a moment and missing it. With the D2 series cameras, start-up time is near zero, and shutter lag is the world’s shortest at a mere 37 milliseconds. Now you really can capture the action — just as you saw it.

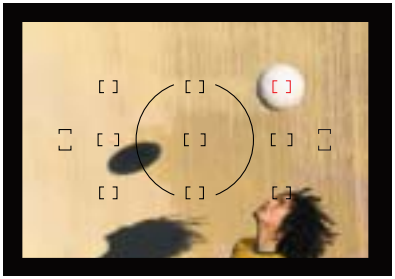
37
milliseconds

SHARP AND FAST

Responsive and flexible focus

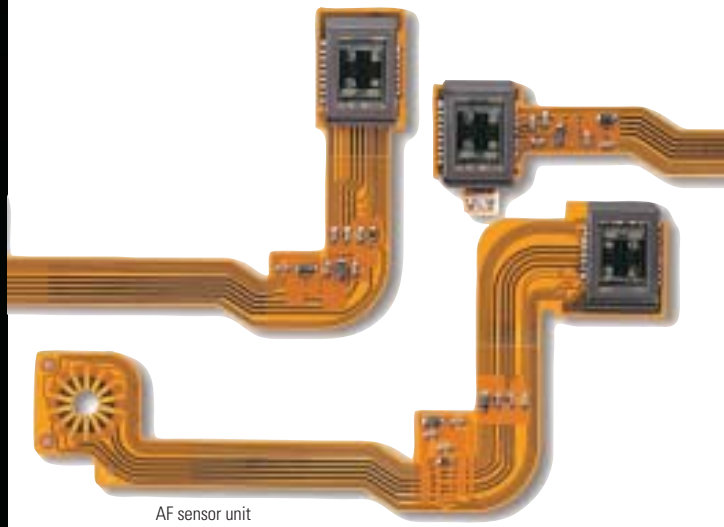
Multi-CAM 2000 Autofocus Sensor Module

Nikon's Multi-CAM 2000 AF sensor module has an 11-area sensor for the most practical coverage. Its nine cross-type sensors are spread wide across the frame, as opposed to being bunched in the center. No matter how fast your subject moves one of the sensors is sure to track it. All nine cross-type sensors are fully operational with any AF Nikkor lens — a big advantage for photographers. These sensors are also superior in defocus detection, allowing the camera to assign appropriate focus points quickly and efficiently.



© Chase Jarvis

Most AF systems use only one CCD, but the Nikon system uses three to extract the utmost precision from each of the nine cross-type AF sensors.

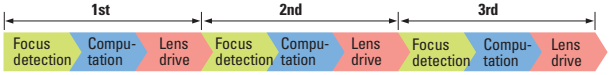


AF sensor unit

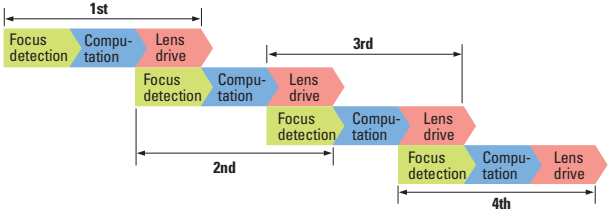
Overlap Servo Autofocus

Some subjects move too erratically to be tracked by many autofocus systems. In order to have the best chance to capture your subject, one needs continuous focus detection until the last possible moment. In Continuous Servo AF with Focus Tracking, the Multi-CAM 2000 AF sensor continues focus detection even while the lens is in motion (lens driving). As a result, the focus is constantly being tuned and retuned during a burst of pictures. The result: sharper shots of moving subjects than any other system.

Conventional servo autofocus system



Nikon's overlap servo autofocus system



Focus is detected more frequently than conventional systems within the same period of time, ensuring consistently sharp focus, frame after frame.

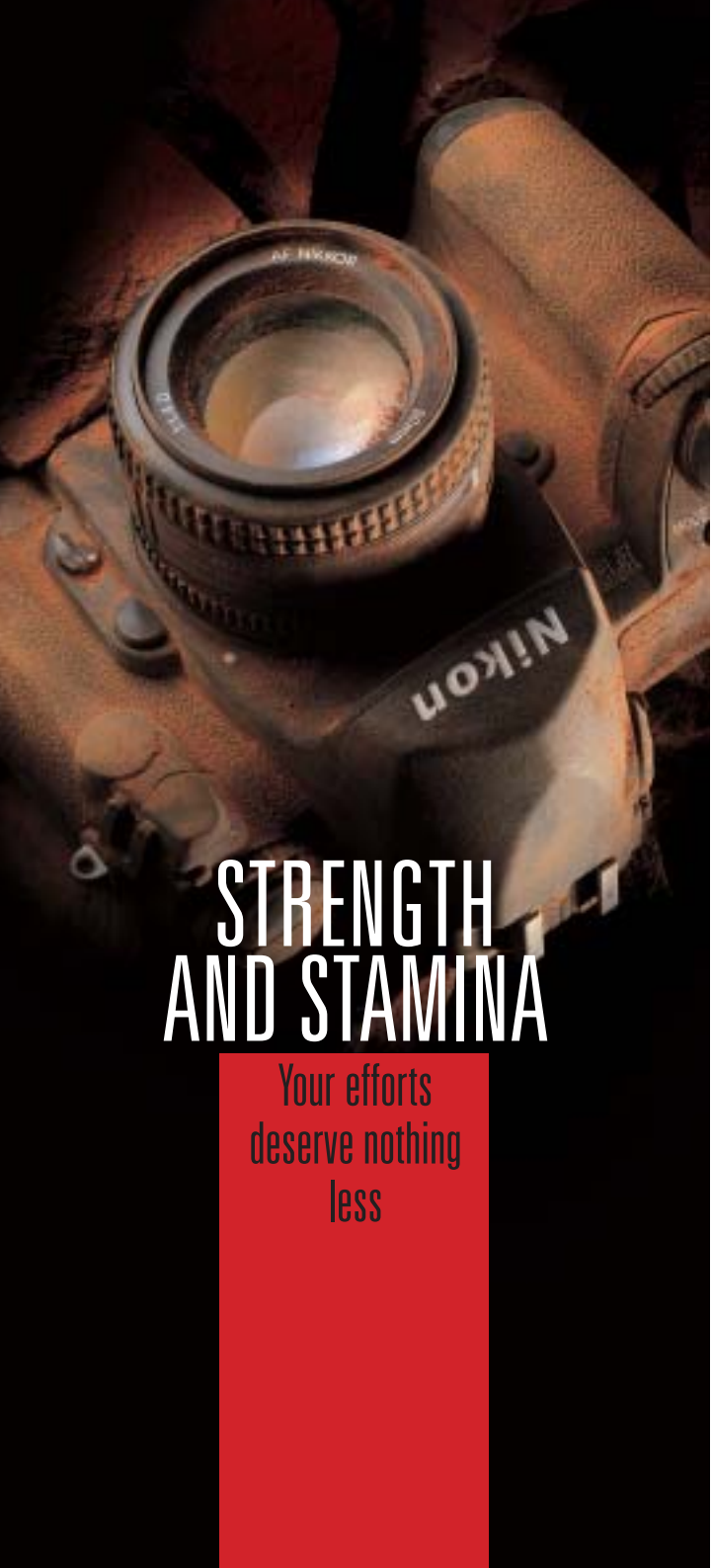
Overlap Servo captures a focused image of even fast-moving subjects.

© Foto Natura

Focus Tracking with Lock-On

Once the camera detects a moving subject, the autofocus system activates Focus Tracking so it can better anticipate subject movement until the moment of exposure. (Shutter release time lag is also considered.) Even if focus detection is momentarily interrupted — if your subject moves out of the focus area or if another object comes between the camera and the main subject — Focus Tracking with Lock-On will continue to track the subject, maintaining sharp focus for each subsequent frame. And with the latest Nikon D2xs and D200, one can even adjust the length of time Focus Tracking will stay locked onto your subject, should it be momentarily obscured.

© Noriyuki Yuasa



STRENGTH AND STAMINA

Your efforts deserve nothing less

Reliability

Whether in Antarctica or their own backyard, photographers must be confident that their gear will work. True reliability, however, extends beyond a magnesium alloy body. It is much more than anti-humidity protection and anti-dust sealing. It is about confidence: confidence that you will bring home pictures, wherever you go, whatever the conditions. That is one reason why NASA has long used Nikon professional cameras and lenses for numerous space projects.
This reliability and durability is a cornerstone of Nikon's approach to photography.

© Foto Natura

Battery

The most advanced technology means nothing if there is no power to run it. Power management and stamina are crucial to digital imaging. In addition to an easy view of your battery's overall status, the fuel gauge function in D2 series cameras gives you the exact percentage of charge remaining and confirms the precise number of shots taken since last charge.

© Foto Natura

INTUITIVE INTERFACE

Simple and consistent

Viewfinder

Photography is all about vision, so shouldn't a camera offer the best view possible? Because photographers need an intimate perspective on their subjects, Nikon provides a superior viewfinder. One example is the D200's clear and bright 0.94X optical viewfinder. Nothing comes closer to your vision. Its vivid information display puts you in total control, so you can concentrate on capturing the moment without ever having to move your eye from the viewfinder.

© Soenar Chamid

Operation System

For some camera makers, ergonomics seem like an afterthought. For Nikon, they are an integral part of camera performance. That's why photographers in the know praise the superiority of Nikon's ergonomics. They understand that in the field, ergonomics can make the difference between a winning shot and a shot missed. With Nikon, you can operate the camera without moving your eye from the viewfinder, with key buttons and dials placed for instinctive feel, even when you are wearing gloves. And with a consistent operation system across the range lineup, you can operate other Nikon cameras as if they were your own.

GLOBAL REACH

Pioneering solutions wherever you go

Wireless Transmitter

Nikon has pioneered image transmission technology for decades. The latest example is the Wireless Transmitter, which enables you to transmit or control your camera from a distance using the latest wireless compatible accessories like the WT-2 and WT-3. It's fast, easy, and convenient to set up, which means you can concentrate on taking great pictures.

© Foto Natura

Global Positioning System

The Nikon D2 series and D200 digital SLRs can be connected to GPS units for embedding GPS positioning information and time signals within your image data files. Yet another advantage that only Nikon can deliver to the world's most demanding photographers.

MAXIMIZE POTENTIAL

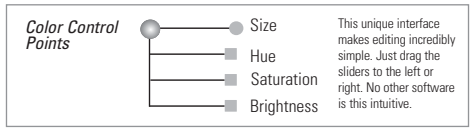
The future of photography is yours

©Joe McNally

Capture NX Software

At last: a digital post-production tool that everyone can use. No matter what your level of experience, Nikon's new Capture NX software is ready to work for you. The key is the new, patented **U-Point Technology™**. Now you can accomplish in minutes what once took hours in other editing applications. With the simple adjustment of a few sliders, you can make either radical changes or add subtle nuances to the color and feel of your pictures. The best part is that your original **NEF (Nikon Electronic Format)** data is never damaged — even after dozens of adjustments.

Nik™ Software

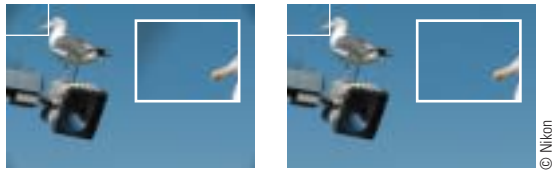


UPOINT™ TECHNOLOGY by Nik Software

Capture NX lets you execute several of lens compensation functions, such as…

Vignette Control

Correct a drop in brightness at the edges of a photograph.



Before After © Nikon

Chromatic Aberration Control

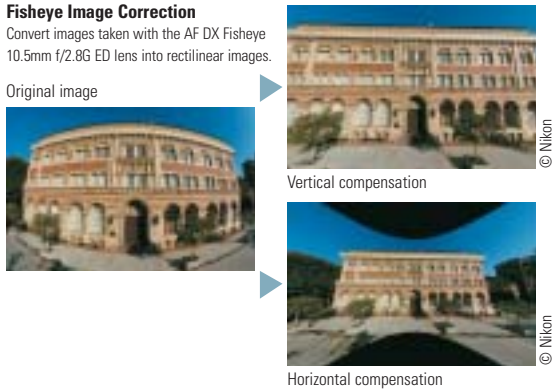
Reduce colored fringes or halos that appear near the edge of an image.

Before After © Nikon

Fisheye Image Correction

Convert images taken with the AF DX Fisheye 10.5mm f/2.8G ED lens into rectilinear images.

Original image



© Nikon Vertical compensation

© Nikon Horizontal compensation

Nikon also offers Camera Control Pro for remote control capability of your Nikon D-SLR, as well as Image Authentication Software, which proves the integrity of your original image data.