KEY ATTRIBUTES FOR HIGH-SPEED IMAGING

SPEED
How fast is the subject moving?

The faster the object moves, the higher the frames-per-second (fps) needs to be to allow for effective imaging. Some examples are:

- **Wind Tunnel Testing.** Depending on the subject, speeds up to 20,000 fps are typical.

- **Mechanical Testing.** Speeds of 5,000 to 30,000 fps are used for both compliance and R&D work for landing gear, brakes and safety equipment.

- **Materials Analysis.** Special techniques, such as DIC, impact testing, and stress analysis are performed at 5,000 to 300,000+ fps.

- **Destructive Engine Testing.** "Blade off test" and "bird strike test" are two common engine tests usually recorded between 20,000 and 100,000 fps.

SIZE & RESOLUTION
What level of detail is needed?

Speed and resolution are always a tradeoff. As speed goes up the pixel resolution (active sensor area) goes down. If you need to record a small object within a large area, or if the subject has intricate detail, choose a Phantom camera that can provide adequate pixel resolution for the event.

ILLUMINATION
How much external light is needed?

Sufficient lighting is critical to high-speed camera work, as the higher the frame rate the less light each image receives. Considerations for high-speed lighting are flicker and intensity, and the best solution is often found with recent advances in LED and Plasma technology. The higher the ISO rating the more sensitive the camera is and the less extra light is needed, but keep in mind that most of the time some sort of supplemental lighting is needed.

PROXIMITY
How close must the camera be from the subject?

Often, a smaller body style is better for enclosed or specialized applications. The Phantom Miro C and N Series offer the smallest sized cameras and are often the most convenient for such experiments. If you are looking for a camera with durability, because it may end up in the fray of a high-impact event, Phantom cameras are notoriously built tough and excel in difficult environments.

EC TEST Systems Sp. z o.o.

ul. Ciepłownicza 28, 31-574 Kraków
biuro@ects.pl | tel.: +48 12 627 77 77

EC TEST SYSTEMS
drgania ◆ akustyka ◆ termowizja ◆ szybkie kamery

When it's too fast to see, and too important not to.®

PHANTOM®

PHANTOM HIGH-SPEED CAMERAS FOR
AEROSPACE IMAGING

Includes tips for getting started
phantomhighspeed.com/aerospace

VISION RESEARCH

AMETEK®
MATERIALS ANALYSIS DIVISION

ULTRAHIGH-SPEED

FLEX4K-GS

VEO SERIES

MIRO N-SERIES

The fastest 1 Mpx Phantom camera available to date is the v2512. With the highest ISO rating available, it produces the best images at ultra-high frame rates for precise and accurate data. The UHS series also includes the World's fastest 4 Mpx camera, the Phantom v2640, for extreme 2K imaging at speeds never before possible. UHS series cameras are perfect for a variety of applications, including experiments related to destructive engine testing and bird strike tests. They have also been found in NASA space studies.

v2512
- 1280 x 800 resolution
- 25,000 to 1 million* fps
- 1 µs to 265 ns* minimum exposure

v2640
- 6,600 fps at 2048 x 1920
- 12,500 fps at 1920 x 1080
- Up to 5 modes for flexibility

*with fast option, export controlled

4K pixel resolution at up to 1,000 fps and a custom 9.4 megapixel CMOS sensor with the ability to switch between global and rolling shutter modes for increased dynamic range. The Flex4K-GS is perfect for aerospace testing where the camera is at a distance from the subject, and high resolution covers a large field of view. The camera will also produce impressive results with scientific imaging techniques that demand fine detail and sharpness such as wind tunnel testing and particle tracking.

- 4096 x 2304 full resolution
- 4K (2160p) up to 1,000 fps, 2K at over 1900 fps
- Global shutter switchable to rolling shutter
- 64 or 128GB RAM
- 10Gb Ethernet downloads from CineStation IV
- Phantom CineMag workflow
- Interchangeable Nikon F/G, Canon EF & PL mounts

---

VEO L-Model has standard connections for simplified use at a lower cost point. The VEO S-Model includes on-camera controls, ruggedized connectors and CFast Media compatibility. The VEO 4K is available with an interchangeable global and rolling shutter for superior resolution. The smaller body style accommodates restrictive environments while still providing the resolution and light sensitivity needed in aerospace research. VEOs can be found in a variety of applications including material and mechanical analysis.

- VEO 710 up to 7400 fps at 1280 x 800
- VEO 4K up to 938 fps at 4096 x 2304
- 1, 4 & 9 Mpx
- Range Data Display (S-Model)
- 10Gb Ethernet option
- Untethered battery control option (S-Model)
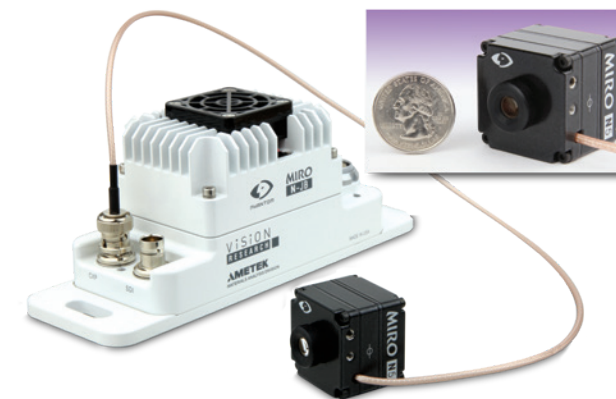
The Miro N-Series camera system is the smallest Phantom Camera available, just over a 1" (2.5cm) cube. It is built for small or destructive spaces by keeping the camera head separate from the base. Every image is safely transported to the base via a CXP cable and stored within the 128GB of flash. The tiny N5 camera head is a cost-effective means of obtaining hard-to-capture data. The N-Series can be found in auto crash testing, explosives testing and engine testing.

- 560 fps at 768 x 600
- Hi-G: 170G Shock, 20.7Grms Vibe
- Camera Head: 32 x 32 x 29 (HxWxD in mm)
- 3 interchangeable parts:
  - Miro N5 camera head
  - CXP cable
  - Miro N-JB Base

ICON KEY 🕐 HIGH FRAME RATES 💡 ISO–LIGHT SENSITIVITY RES RESOLUTION IMG IMAGE MEMORY SIZE 🔌 CONNECTIVITY LIGHTWEIGHT $ PRICE