

# WHITEPAPER

## **Comparing Triple-Speed Super Slow-Motion Camera Systems with Ultra Slow-Motion Camera Systems**

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Triple-speed and ultra-speed camera systems do not compete with each other. Both systems address different production requirements, and in many cases are both used during the same production. This document looks at the differences between the two types of slow-motion systems.

# Introduction

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Triple-speed and ultra-speed camera systems provide producers and directors with very different production techniques. While a triple-speed camera operates at 150/180 frames per second, an ultra-speed camera can operate at many hundreds or thousands of frames per second.

The Grass Valley™ LDK 8300 1X/2X/3X triple-speed camera system offers:

- A live, single-speed output which can be used as a regular camera source during a production, with both single-speed and triple-speed video coming from the same camera and camera position
- Picture quality almost indistinguishable from Grass Valley single-speed quality with the same matrix, gamma, detail, imager, etc.
- An operator control system identical to Grass Valley single-speed cameras
- Flicker-free images under any lighting condition and at any speed with AnyLight™ technology
- A smooth and continuous workflow since all images are always available for playback
- Sensitivity which is only 3X lower than single-speed cameras

An ultra slow-motion camera system offers:

- Extreme slow-motion replays of fast moving objects, such as a dart hitting a dartboard
- Flexible ultra slow-motion speed settings

However, simply because of their nature, ultra slow-motion cameras do not offer the type of customary production benefits as triple-speed cameras. These include:

- A live output
- Constant slow-motion recording onto a slow-motion system (ultra slow-motion systems are an “on-demand” system)
- Acceptable sensitivity at high speed (10X speed needs 10X more light, 20X speed needs 20X more light, etc.)
- Picture quality that is not comparable to a single-speed camera (due to different imagers, signal processing, and in some cases image size and lens selection)
- Flicker-free images in most artificial lighting conditions

Because of poor sensitivity and flicker issues, ultra slow-motion cameras typically offer reasonable image quality during bright daylight conditions.

## Why Triple-Speed?

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The choice of triple-speed for super slow-motion was purposely selected for two primary reasons:

- One-third (or 3X slower than real-time) speed is the typical slow-motion playback speed when using a single-speed camera
- Triple-speed offers the best compromise between additional motion information compared with playback time during live events (for very fast-paced events, double-speed is used as playback time is shorter)

If an event is three seconds long, it will take nine seconds to play back the event using a triple-speed slow motion camera system. However, if a 12X ultra slow-motion camera system is used, it will take 36 seconds to play back the event. That’s why productions will

sometimes make use of both systems—triple-speed for traditional slow-motion when time is critical, and ultra slow-motion for detailed analysis when time is less critical (during a time out or significant break in the action). But in most cases, when slow-motion is desired, a triple-speed slow-motion camera is called upon—very rarely will you see a production where the only slow-motion is from an ultra slow-motion camera.

While considering that a triple-speed slow-motion camera can be placed anywhere to cover the action (while providing a simultaneous single-speed output), ultra slow-motion cameras are typically placed where an event is known to happen at a specific time (such as a ski jumper at takeoff or a finish line of a race).

## Summary

Triple-speed slow-motion (or super slow-motion) camera systems are the standard for many high-end sports applications and will continue to be so through the foreseeable future. These camera systems offer image performance that is very close to single-speed cameras and can easily be integrated into a production.

Ultra slow-motion camera systems are specialist devices used in specific applications and typically in specific locations. The limited performance and poor production workflow integration are known factors and are accepted when these systems are used.



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With a rich history serving the broadcast and professional video industries, the Grass Valley name is synonymous with innovation, leadership, and performance. With a full range of products and services supporting many of the world's most high-profile live events, Grass Valley offers the most comprehensive portfolio of software, services and IT infrastructure. Customers deploying Grass Valley solutions include most of the world's leading broadcast and teleproduction IT facilities, independent video professionals, as well

as emerging content creators and distributors providers of broadband, telecommunications, and transmission services. When you're watching news, sports, or entertainment programming, whether on a TV, the web, or a mobile phone, you're watching Grass Valley at work in the connected world.

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