

# RUGGEDIZED CAMERA AND IMAGING SOLUTIONS FOR AEROSPACE APPLICATIONS

**CURTISS-  
WRIGHT**

CURTISSWRIGHTDS.COM



**TRUSTED  
PROVEN  
LEADER**



## Increase Visibility in the World's Harshest Environments

Imaging solutions are needed in a variety of defense and aerospace applications, from airborne separation to flight test instrumentation (FTI) and monitoring cargo deployment from space vehicles. However, it is often difficult to find camera systems that are rugged enough for these harsh aerospace environments and easily integrate into larger video and data acquisition systems to simplify image transmission, storage, and viewing.

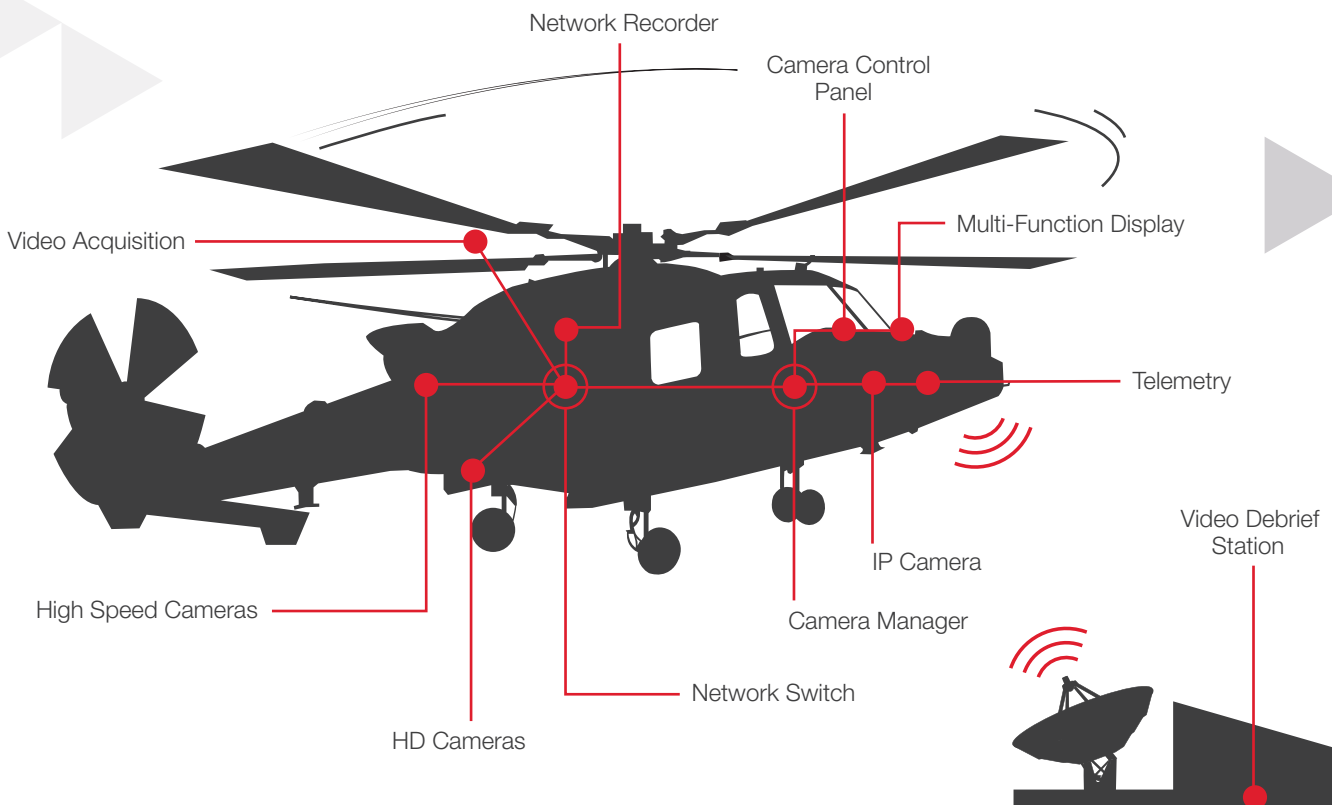
Curtiss-Wright provides a broad portfolio of field-proven camera and video acquisition solutions that address both of these challenges.

Our highly ruggedized imaging solutions efficiently and reliably capture, convert, route, transmit, record, and display images. They can be easily combined into a fully integrated and synchronized system that supports dozens of video sources and delivers industry-leading latency.

### A Complete Portfolio of Advanced Imaging Solutions

Our comprehensive portfolio of imaging solutions includes

- **High-definition (HD), high-speed, and IP cameras** that have passed extensive environmental tests to prove they can withstand the vibrations, shock, extreme temperatures, and humidity levels in aerospace environments
- **Video acquisition system components** that support a broad range of video formats, from NTSC/PAL through H.265
- **High-speed imaging solutions** that combine technical superiority in key areas, such as time synchronization in a large network of other high-speed cameras
- **HD recording systems and airborne displays** that overcome size, weight, and power (SWaP), compatibility, and interoperability challenges on defense and aerospace platforms



## Ready to Enable Any Application

With the ruggedness, technical advantages, and breadth of our imaging portfolio, you can bring new visibility to almost any application in any environment, including

- Aerospace imaging and testing
- Store separation video applications within airborne flight test applications
- Ground-based missile and range testing
- Space launcher separation, payload deployments, and performance monitoring
- Store separation and missile launches

## Ruggedized to the Highest Levels

To ensure our solutions deliver reliable performance in the harshest conditions for many years, they are tested according to the most demanding environmental standards. These vary according to the product type and application, but typical minimum qualifications include

- Operating Temperature
  - + Steady state operational: -40°C to 60°C
  - + Storage: -55°C to 100°C
- Humidity: 5% to 95% RH, non-condensing
- Random Vibration: Performance Level - 15 Grms, 20 to 2000 Hz, 10 minutes, any axis
- Shock: 100 g, half-sine, 15g, half-sine, 11 mS, 6 shocks, any axis
- Altitude
  - + Min: 15.5 psia absolute (mean sea level)
  - + Max: 0.82 psia absolute (65,000 ft or 42.71 Torr)
- Explosive Atmosphere: MIL-STD-810E, Method 511.3, Procedure I.
- Acceleration
  - + Operating: +/- 10 g
  - + Non-operating : +/- 15 g
- EMI: The EUT is required to comply with the test limits of MIL-STD-461E



# High-Definition Cameras and Video Acquisition Systems

HD cameras bring considerable value to defense and aerospace imaging applications. Crisper, clearer images are particularly valuable during flight test campaigns when video is used as a virtual witness to events. In these situations, HD image data can be combined with data from other sensors and equipment to

- Validate FTI data
- Analyze human interactions with cockpit instruments and controls
- Train pilots and operators
- Monitor cockpit instrumentation

We design and manufacture a complete family of highly ruggedized HD cameras and video acquisition system components that are ideal for airborne applications

## Create the Optimal Video System

Our HD cameras support a wide range of video formats and can be used with existing video systems, or combined with our video acquisition components for a complete, turnkey video solution. We offer

- Low-SWaP 1080p and 720p HD cameras, including a 1080p IP camera that supports 60 frames per second (FPS) and multiple video streams
- Video modules within our data acquisition units
- Multiplexers and recorders
- Cockpit units and displays
- Transmitters
- Telemetry receivers
- Ground station and debrief systems



**HDC-350-1**  
HIGH-DEFINITION CAMERA

## Leverage Advanced Technologies

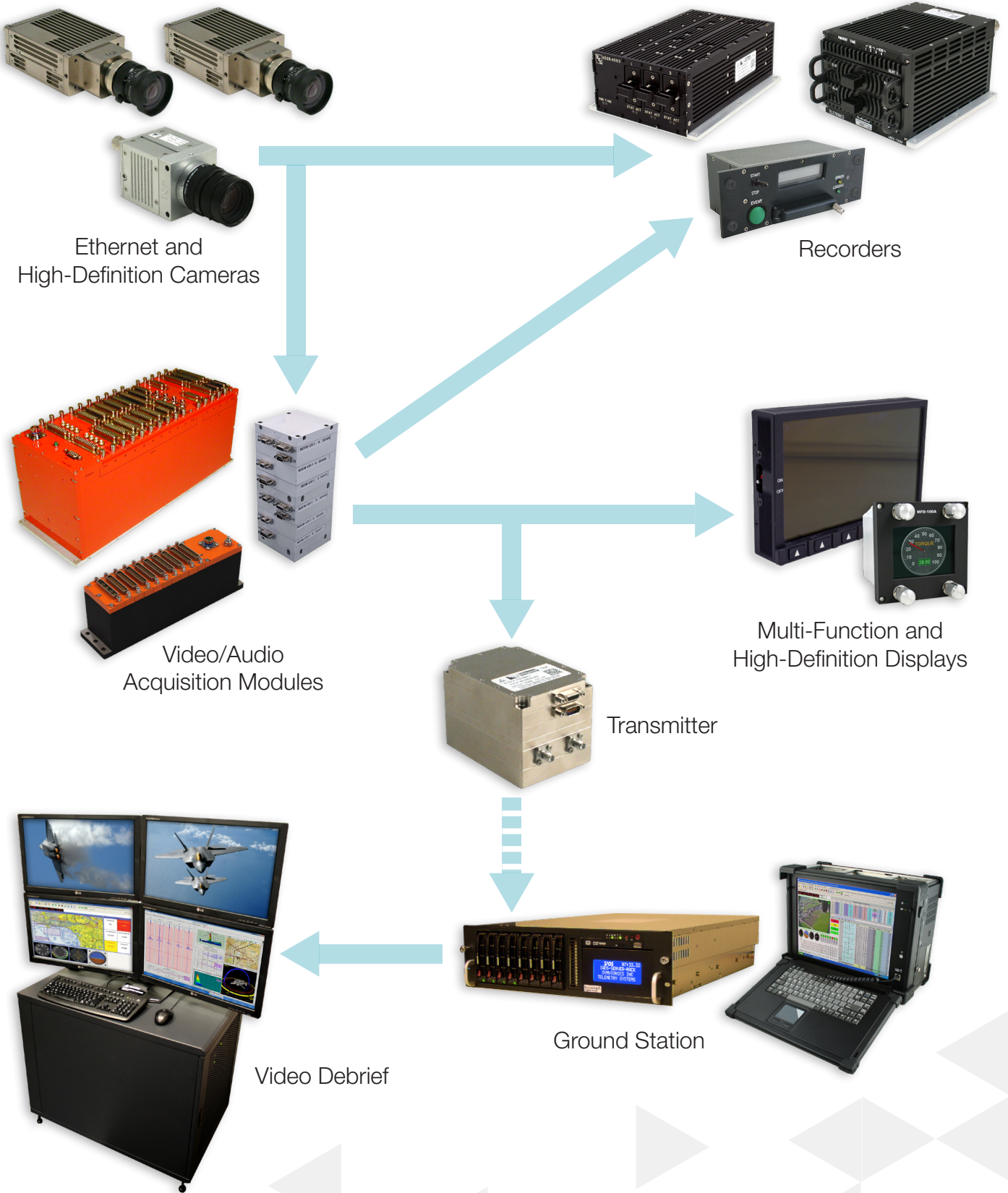
All image processing in our HD cameras utilize specific and custom logic, FPGAs, and ASIC design that deliver extremely low latency. In addition, High Dynamic Range (HDR) and Wide Dynamic Range (WDR) imaging technologies continuously adjust to changing light situations and increase high image accuracy by removing over- and under-saturated artifacts in each frame. Auto-exposure and auto-white balancing capabilities ensure seamless, perfect color balancing.

### Supporting the Bombardier C-Series Flight Test Program

Bombardier Aerospace in Quebec, Canada, is using our networked data acquisition equipment to validate the performance of its CS100 and CS300 aircraft. The system includes our

- Signal conditioning
- Digital, analog, and network-based data acquisition equipment
- Video products
- Ground-based receivers
- Software

# High-Definition Video System Diagram



# High-Speed Video Systems

High-speed video systems that enable slow-motion analysis of the smallest, fastest movements are essential for applications such as time magnification, photogrammetric analysis, and trajectory analysis.

Our complete family of ruggedized, high-speed imaging and HD video recording solutions can be combined to create a fully integrated video system that meets the most specific and challenging high-speed video requirements. Our portfolio includes

- High-speed, network-based cameras that can capture 500 FPS at 1280 x 1024 resolution and higher frame rates at lower resolutions
- Network switches
- Network recorders
- A network camera manager
- A multifunction camera control panel
- System management software

*nHSC-36-S1*  
HIGH-SPEED CAMERA



## Get the Most Precise Time Synchronization Available

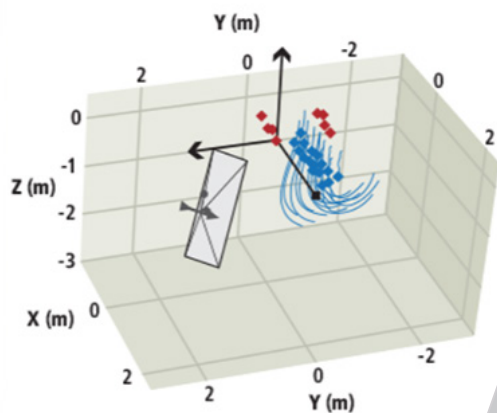
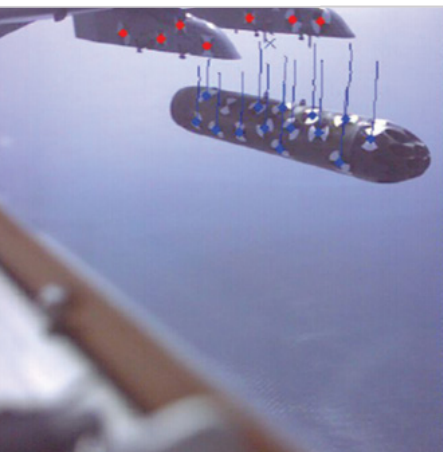
All of our high-speed cameras are engineered to meet the time synchronization requirements in the IEEE 1588 Precision Time Protocol (PTP). They provide time synchronization data to distributed clocks at sub-microsecond resolution over Ethernet and IP-based networks to ensure coherent data.

## Verifying Object Trajectory: A Real-World Success Story

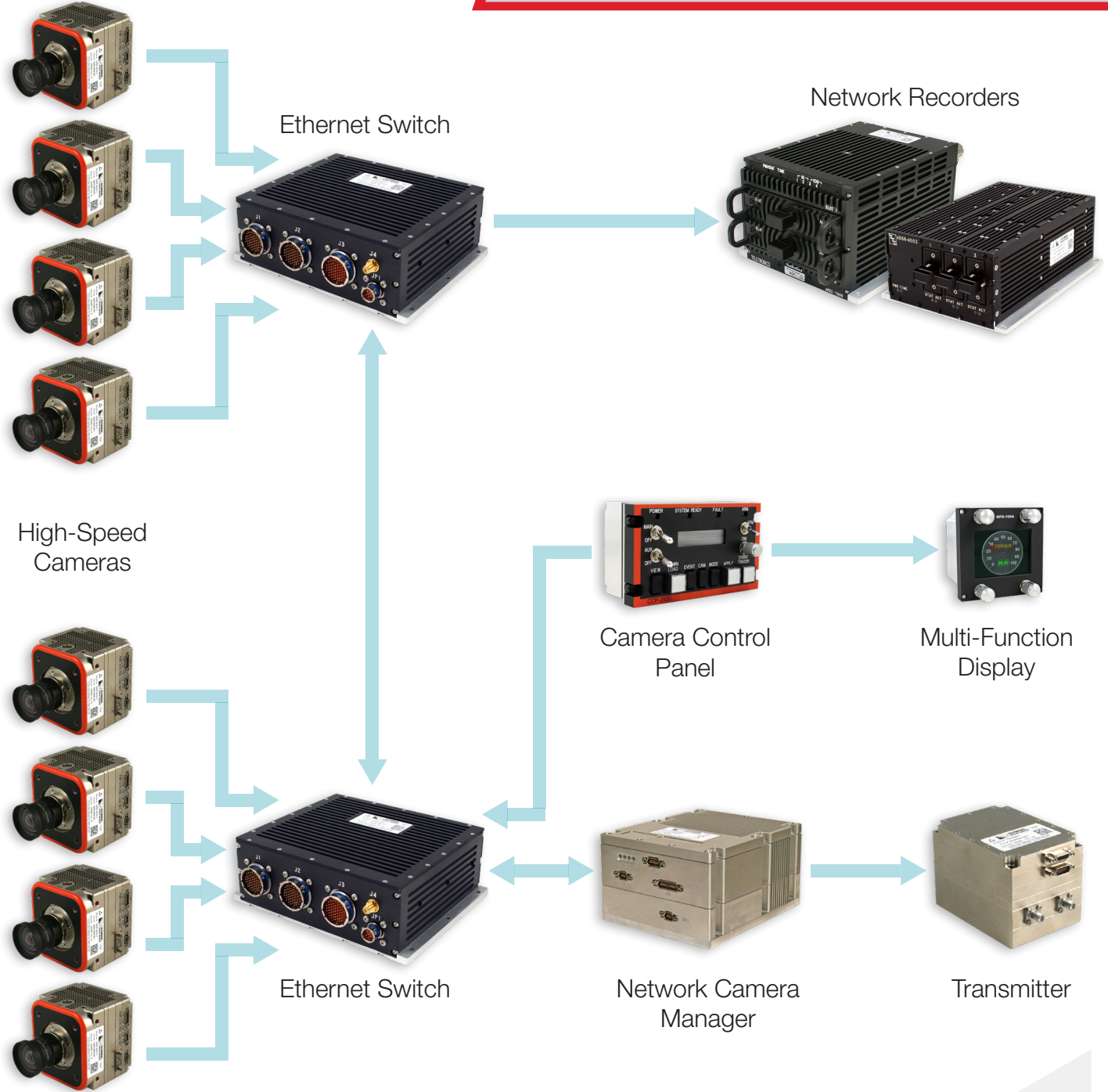
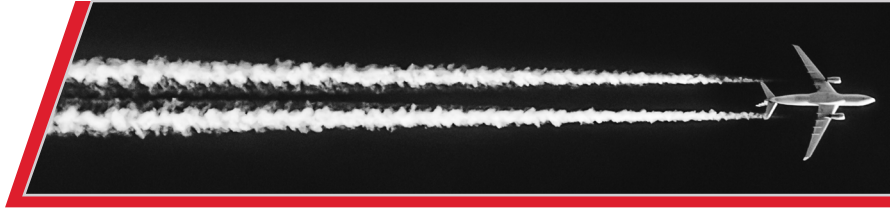
When an organization needed accurate data to confirm the position and velocity of objects during store separation testing in a harsh environment, it turned to Curtiss-Wright.

With a network of our ruggedized, high-speed cameras installed on the exterior of the aircraft, the organization was able to operate a telemetry system that allowed it to rapidly review sample images during the flight.

The Curtiss-Wright cameras performed extremely well despite the adverse conditions and the organization was able to return to ground confident it had captured all necessary mission data.



# High-Speed Video System



## HD Recording Systems and Airborne Displays

It's often difficult to find imaging solutions that combine the right SWaP characteristics, cutting-edge technologies, and interoperability. Our ruggedized and flexible HD recording systems and airborne displays overcome the significant SWaP challenges on defense and aerospace platforms and bring new image clarity to existing video systems.

### Capture Crisper Images in Smaller Spaces

Our ruggedized HD recording systems for highly SWaP-constrained applications are ideal for test engineering applications.

With their miniaturized size, the 1080p and 720p HD cameras can be mounted in virtually any location in the most space-constrained airborne, automotive, and ground-based test environments. They feature fast exposure that quickly adjusts to changing light conditions and WDR imaging that removes over- and under-saturated artifacts to ensure high image accuracy.

The cameras are designed to work with our specialized Advanced Data Server and Recorder (ADSR), which captures the video and transforms it to H.264 format for recording and serving applications.

### Display Native HD Images from Any Video System

Our HD displays for airborne and ground applications provide native high-resolution capabilities for unprecedented operational image clarity. They interface with industry-leading electro-optical/infrared (EO/IR) camera systems and include built-in video inputs for legacy systems to provide complete compatibility with almost any existing video system.



**LDP-070-AB**  
RUGGEDIZED LCD  
DISPLAY MONITOR



**SVDU-M**  
7" RUGGED  
MISSION DISPLAY



**ADSR-4003**  
ADVANCED DATA SERVER  
AND RECORDER





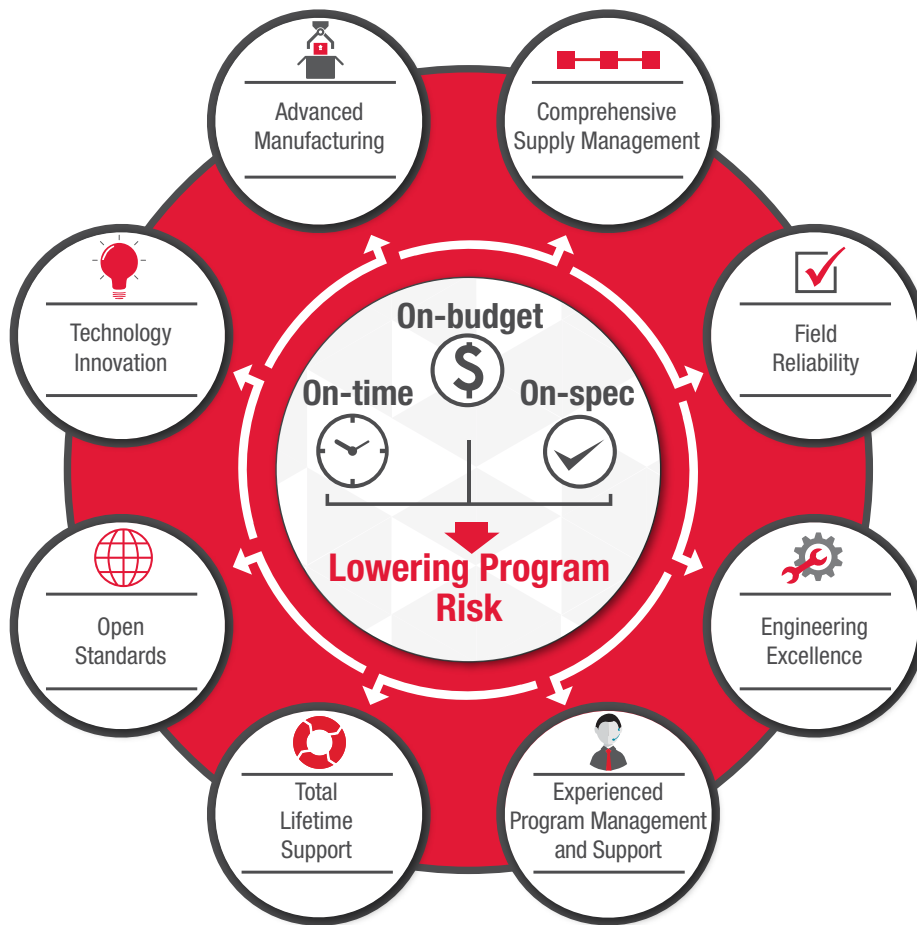
## Partner With an Industry Innovator

Curtiss-Wright has a long history meeting the unique needs of defense and commercial aerospace organizations, dating back to the aviation innovations developed by Glenn Curtiss and the Wright brothers.

With our broad experience and deep technical expertise, we understand how to deliver innovative and extremely high-quality solutions that meet today's imaging requirements while extracting maximum value from existing investments and paving the way to future technologies.

Like all Curtiss-Wright solutions, our comprehensive portfolio of imaging solutions is fully ruggedized for the extremely harsh demands of defense and aerospace environments. And, they are extensively tested to ensure long and reliable operation in the harshest airborne, vehicle, and ground environments.

Together, these advantages have made Curtiss-Wright the trusted, proven leader in defense and aerospace, and a valued partner to defense and aerospace organizations around the world.



# Selection Guide

## HD Cameras

Product	Description	W x H x L	Mass	Resolution	FPS
HDC-330	Airborne High Definition Camera	1.5 x 1.5 x 1.9" 38 x 38 x 48 mm	0.3 lb 0.14 kg	1920 x 1080	60
HDC-350-1	Airborne High Definition Camera - Global Shutter	1.5 x 1.5 x 2.4" 37 x 37 x 62 mm	0.24 lb 0.11 kg	1920 x 1080	60
HDC-430-1	Airborne High Definition IP Ethernet Camera	2.6 x 1.5 x 4.4" 66 x 38 x 110 mm	0.34 lb 0.16 kg	1920 x 1080	30

## High-Speed Cameras

Product	Description	W x H x L	Mass	Resolution	FPS
nHSC-31-S1(M)	High-Speed Camera w/Internal CF Recorder	3.4 x 3.6 x 5.2" 86 x 92 x 131 mm	3.1 lb 1.4 kg	1280 x 1024	500
nHSC-36-S1(M)	Small High-Speed Camera	3.1 x 3.4 x 2.9" 79 x 87 x 73 mm	2.6 lb 1.2 kg	1280 x 1024	500

## Camera Accessories

Product	Description	W x H x L	Mass	Resolution	FPS
ACT-1000	Stand Alone Active Camera Target	9 x 7 x 1.0" 229 x 178 x 24 mm	2.4 lb 1.1 kg	-	-
CCP-2100	High-Speed Camera Controller	3.4 x 5.8 x 2.7" 85.7 x 146 x 68 mm	2.06 lb 0.94 kg	-	-
nMGR-2000	Network High-Speed Camera Manager	4.1 x 5.0 x 3.5" 105 x 127 x 88 mm	3.4 lb 1.5 kg	-	-



**CCP-2100**

*High-Speed Camera Controller*



**ACT-1000**

*Stand Alone Active Camera Target*



**nMGR-2000**

*Network High-Speed Camera Manager*

## Video and Audio Acquisition Modules

	Chassis	NTSC/ PAL	SD RGB	ARINC-818	CVBS CH	SVideo CH	VGA	DVI-D/ HDMI	Audio CH	SDI	MPEG2	MPEG4	H.261	H.264	JPEG 2000	CH10
MCVC-101	MxDAU/MARM				1								✓			
MVID-201M	MxDAU/MARM	✓	✓		4	2			1		✓					
MVID-401M	MxDAU/MARM	✓	✓		4	2			1			✓				
MCVC-101J	MxDAU/MARM	✓			4	2									✓	
MVID-301D	MxDAU/MARM	✓	✓		1	1	1280 x 1024	1080p	1					1080p 10 720p 20		
MVID-301S	MxDAU/MARM								1	1080p 60fps				1080p 10 720p 20		
MVID-121M	MSSR-2010	✓	✓		4	2			1		✓					✓
MVID-301M	MSSR-2010	✓	✓		1	1	1280 x 1024	1080p	1					1080p 10 720p 20		✓
MVID-521M	MnHSD	✓	✓		4	2			1		✓					
MCVC-501J	MnHSD	✓			4	2									✓	
MVID-501J	MnHSD						1600 x 1280								✓	
MDVI-501J	MnHSD							1080p							✓	
MVID-541S	MnHSD									1080p 60fps				1080p 10 720p 20		
MVID-521M	MnHSD	✓			4	2			1		✓					
MVID-541M	MnHSD	✓	✓		1	1	1280 x 1024	1080p	1					1080p 10 720p 20		
CVC-101	CxDAU												✓			
VID-301D	CxDAU	✓	✓		1	1	1280 x 1024	1080p	1					1080p 10 720p 20		
CVC-101J	CxDAU	✓			4	2									✓	
VID-201M	CxDAU	✓	✓		4	2			1		✓					
VID-401M	CxDAU	✓	✓		4	2			1			✓				
VID-601S	CxDAU								1	1080p 60fps				1080P 60		
VID-304	AIM/HSAVDAU	✓			4	4			4		✓					✓
VID-302	AIM/HSAVDAU	✓			2	2			2		✓					✓
XVID-302	MUX-300X	✓	✓		2	2			2		✓					✓
XVID-303	MUX-300X	✓	✓		3	3			3		✓					✓
VID-401S	ADSR-40003								1	1080p 60fps				1080p 30 720p 60		
VID-401D	ADSR-40003	✓	✓		1	1	1280 x 1024	1080p	1					1080p 30 720p 60		
VID-200	AIM-200X	✓			1	1			1		✓					
KAD/VID/106	KAM-500	✓			3	1			2					704 x 576		
KAM/VID/114	KAM-500			✓										1080p 60		

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