WECO INDUSTRIES

CUES

DUC

DIGITAL UNIVERSAL CAMERA

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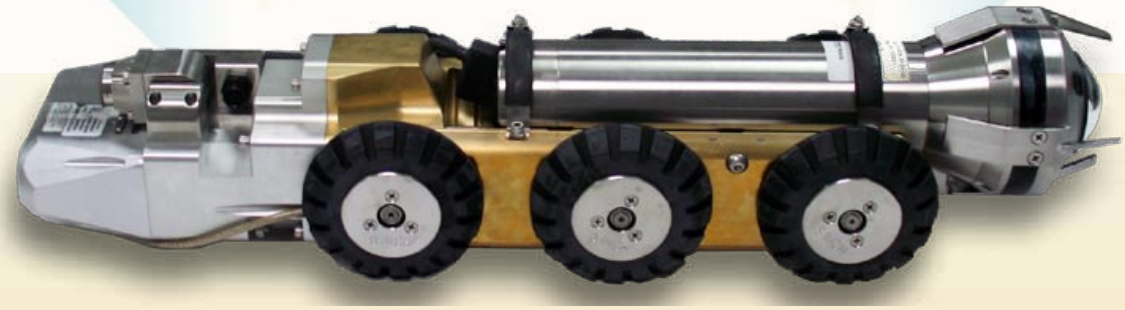
CUES

DIGITAL UNIVERSAL CAMERA SYSTEM

IMPROVE THE OPERATIONAL, ENVIRONMENTAL, AND FINANCIAL PERFORMANCE OF YOUR WASTEWATER SYSTEM TODAY!

The CUES Digital Universal Camera (DUC) is a semi-autonomous, high resolution digital CCTV side scanning camera designed for rapid and detailed condition assessment of your wastewater system. When used in conjunction with CUES asset-based Granite XP decision support software, you can inspect and assess 5000 feet or more per day, increasing your revenue, while reducing your expenses. The system can be packaged for off-road applications to minimize the costs of traffic control.

The CUES Digital Universal Camera system produces a continuous hemispherical scan of the internal pipe conditions in 6-60" pipe. The Digital Universal Camera operates at a constant speed in 6"-60" pipe without the need to stop or pan and tilt. Simply drive the unit on cruise control to the remote manhole or through multiple manholes for maximum efficiency. Reduce your labor costs while tripling or quadrupling the productivity of your existing workforce!



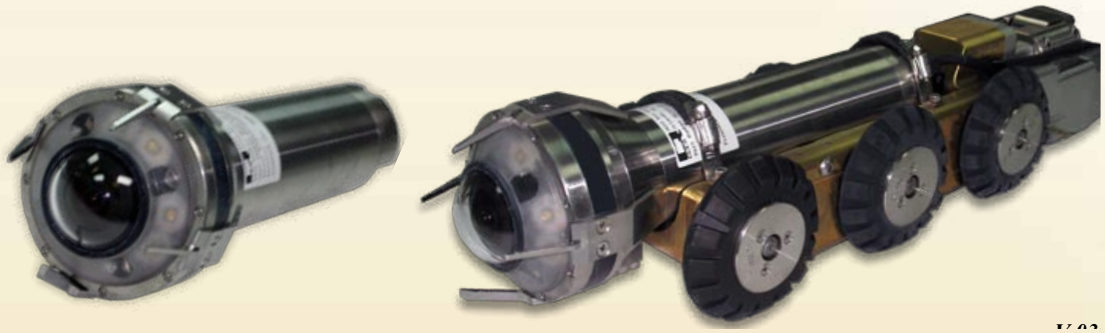
The Digital Universal Camera System will outperform any autonomous robotic system. Call your CUES representative today!

The DUC Universal Camera System facilitates the following benefits:

- Achieve proactive sewer repair and replacement recommendations with transparent justification to the public for allocation of sewer capital funds. The EPA has stated that proactive management of sewer assets can reduce total asset cost by 20-30%.
- Identify the most critical problems to address in your wastewater system. Quickly create an accurate understanding of the present condition of your wastewater system. Achieve predictive failure analysis, based on rapid, accurate, and detailed condition assessment.
- Establish a centralized system of record keeping accessible to all decision makers to assure proper, defensible spending.
- Identify short and long term concerns to be considered into your future CIP and O&M budgets.
- Establish solid priorities in order to maintain and improve services at any given time.
- Show compliance with local, state, and federal regulatory agencies.
- Maintain compliance with CMOM and GASB 34 while establishing a solid baseline to apply for various State and Federal grants.
- Protect your system from premature failure.
- Use life-cycle costing and value engineering to reduce the expense of planned investments.
- Identify, assess, and score your entire system within 12 months!

The DUC Universal Camera System contains the following features and more:

- Video is stitched via the CUES Granite XP Digital Processing Module and is available at the end of the inspection run. Virtual pan, tilt, and zoom plus a flat view of the surveyed pipe enables rapid condition assessment review-- 5-10 times faster than traditional video inspection review.
- Simply assign the observations via CUES asset-based Granite XP software in the office environment to create a high quality, uniform product.
- DUC can be used for emergency inspection requirements due to its unique ability to function as a traditional CCTV pan and tilt / zoom camera inspection system during live inspection.
- High output strobe lighting system illuminates 6”-60” lines without externally-mounted lighting.
- 3.1 megapixel high resolution camera produces unparalleled detailed images.
- One-person operation.
- Integration with CUES asset-based Granite XP decision support software and GIS systems provides a powerful tool for Capital Improvement Planning.
- Compatible with other data acquisition software systems.
- No moving parts on the camera – simply drive the unit on a CUES wheeled or tracked transporter through multiple pipe sections for maximum efficiency.
- DUC can be retrofitted to any CUES or industry standard multi conductor truck mounted system!
- Significantly more cost efficient than European digital camera systems!



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OZIII

Pan and Tilt Optical Zoom Camera

The OZIII optical zoom pan-and-tilt camera system offers built-in directional field replaceable lighting for 6" to 48" pipe to produce the highest quality image to enhance the details of your CCTV inspection. The camera is also able to provide adequate lighting for 48" and larger diameter pipe with the addition of external lights. The OZIII camera provides up to 40:1 optical/digital zoom, automatic focus, remote focus and iris control to assure the best quality video within varying pipe conditions. The robust design of the OZIII camera includes protective forks for the camera head to protect it during insertion and retrieval and to shield it from roots and other obstructions in the pipe. Get the finest detailed video inspections with the CUES OZ III (Optical Zoom) Camera!

This unit can be used in conjunction with the steerable Compact Pipe Ranger (CPR) to inspect 6" relined through 30" sanitary and storm sewers and connects directly to the CPR transporter with no exterior wires or cables. When the OZ III is installed on the CPR transporter, it produces a compact assembly with superior pulling power and the ability to negotiate difficult entry conditions and standard 45- and 90-degree sweeps and turns. An optional built-in inclinometer is also available to read and transmit pipe grade variations.

CUES "Light Enhancement Technology" eliminates the need for an external lighthead! Easy operation at the controller allows the operator to change the sensitivity of the camera at their fingertips! There's no need to remove the camera to install an external lighthead if the pipe material or pipe diameter changes! Let the CUES "Light Enhancement Technology" do it for you!

Nite Lite III

Pan and Tilt Camera

The Nite Lite III is a unique pan-and-tilt inspection camera that incorporates the latest video technology to provide up-close imaging of pipe walls and surfaces during sewer line inspections of 6" relined pipe through 48" diameter pipe. The camera is also able to provide adequate lighting for 48" and larger diameter pipe with the addition of external lights. The multi-conductor Nite Lite III pan-and-tilt camera system offers unparalleled imaging technology to produce the clarity of pictures with enhanced detail. The Nite Lite III camera is designed to pan 285 degrees and rotate 360 degrees. Remote control for iris and focus is provided to assure the highest picture quality in unusual or special conditions. An optional built-in inclinometer is also available to read and transmit pipe grade variations.

Easy Upgrade to the OZIII optical zoom camera!

The Nite Lite III can be easily upgraded to include 10x optical zoom and 4x digital zoom! Refer to the OZIII information in this brochure!

The OZIII & Nite Lite III cameras include an optional sonde to accurately locate the camera in metallic and non-metallic pipes!

OZIII Features & Benefits

- 10X optical zoom and 4X digital zoom; total 40:1 zoom capability
  - *Enhances image details from faraway distances for inspection and assessment*
- NTSC at 470 H lines of resolution
  - *Higher image resolution means sharper pictures with maximum detail*
- Sensitivity: 1.5 lux (F1.8, 1/60 s) and 0.13 lux (F1.8, 1/4 s) Electronic shutter speed: 1/4 to 1/10,000 s
  - *Increased sensitivity provides brighter pictures with reduced lighting requirements*
- 360 x 285 degree pan and rotate viewing capability
  - *Pan and tilt simultaneously while the transporter moves!*
- 4 x 5W white LED's, long-lasting & field replaceable
  - *Optional 4 x 6W Xenon incandescent lamps*
  - *Internal lights are directional with the moving camera head for optimum illumination in various pipeline conditions*
- Back light compensation
  - *No spotlight reflection blooming in image*
- Auto-tracking white balance
  - *Perfect color under all conditions*
- Auto-focus
  - *Quickly focus on an area of interest*
- Manual override of focus, iris, and shutter
  - *Flexible for unusual or special conditions*
- Pan, rotate, zoom, and focus homing
  - *Quick and easy to reorient to the current location*
- Waterproof to 50 psi
  - *Camera can be submerged in water over 100 feet deep without compromising integrity*
- 360 degree rotation optical viewing angle; 331 degree pan viewing angle range
  - *View minute defects and voids around the entire diameter of the pipe wall*
- Can be used in pipelines as small as 5" in diameter
- Optical-grade sapphire camera window
  - *Helps prevent image distortion*
- Includes an internal diagnostic system
  - *Continually monitors camera functions, including run time, serial number identification, camera head temperature, humidity, light supply voltage, and camera input voltage*
- An optional built-in inclinometer is available to read and transmit pipe grade variations
- The OZIII & Nite Lite III cameras include an optional sonde to accurately locate the camera in metallic and non-metallic pipes

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OZII

Pan and Tilt Optical Zoom Camera

The OZII & Nite Lite cameras include an optional sonde to accurately locate the camera in metallic and non-metallic pipes!

Available in multi or single conductor format, the OZII optical zoom pan-and-tilt camera system offers unparalleled imaging technology and built-in lighting for 6" to 72" pipe to produce clarity of picture with enhanced detail. Auxiliary lighting is available to inspect 84" through 200" diameter pipe. The OZII camera provides up to 40:1 optical/digital zoom, automatic focus, remote focus and iris control to assure the highest quality picture within varying pipe conditions. When an obstruction blocks movement in a pipe or for quick-look inspections, details can be observed from far-away distances with perfect clarity. Get the finest detailed video inspections with the CUES OZ II (Optical Zoom) Camera!

CUES *"Light Enhancement Technology"* eliminates the need for an external lighthead. Easy operation at the controller allows the operator to change the sensitivity of the camera at their fingertips. There's no need to remove the camera to install an external lighthead if the pipe material or pipe diameter changes. Let the CUES "Light Enhancement Technology" do it for you!

Features & Benefits:

- 10X optical zoom and 4X digital zoom; total 40:1 zoom capability; *Enhances image details from faraway distances for inspection and assessment*
- NTSC at 470 H lines of resolution; *Higher image resolution means sharper pictures with maximum detail*
- Sensitivity: 1.5 lux (F1.8, 1/60 s) and 0.13 lux (F1.8,); PAL Version is also available. 1/4 s) Electronic shutter speed: 1/4 to 1/10,000 s; *Increased sensitivity provides brighter pictures with reduced lighting requirements*
- 360 x 285 degree pan and rotate viewing capability; *Detailed lateral inspection up to 250 feet without having to traverse the lateral*
- Four field replaceable lights (available with white LEDs or halogen lamps); *Internal lights are directional with the moving camera head for optimum illumination in various pipeline conditions*
- Back light compensation; *No spotlight reflection blooming in image*
- Auto-tracking white balance; *Perfect color under all conditions*
- Auto-focus; *Quickly focus on an area of interest*
- Manual override of focus, iris, and shutter; *Flexible for unusual or special conditions*
- Pan, rotate, zoom, and focus homing; *Quick and easy to reorient to the current location*
- Waterproof to 50 psi; *Camera can be submerged in water over 100 feet deep without compromising integrity*
- 400 degree rotation optical viewing angle; 331 degree pan viewing angle range; *View minute defects and voids around the entire diameter of the pipe wall*
- Compatible with up to 4000' multi-conductor cable and up to 2000' single-conductor cable; *Camera is compatible with existing CUES TV inspection systems with minimal modification*
- Can be used in pipelines as small as 5"
- Optical-grade sapphire camera window; *Helps prevent image distortion*
- Includes an internal diagnostic system; *Continually monitors camera functions, including run time, s erial number identification, camera head temperature, humidity, light supply voltage, and camera input voltage*
- An optional built-in inclinometer is available to read and transmit pipe grade variations
- The OZII & Nite Lite II cameras include an optional sonde to accurately locate the camera in metallic and non-metallic pipes

The Nite Lite camera includes an optional sonde to accurately locate the camera in metallic and non-metallic pipes!

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Nite Lite

Pan-and-Tilt TV Inspection Camera

The Nite Lite is a unique pan-and-tilt inspection camera that incorporates the latest video technology to provide up-close imaging of pipe walls and surfaces during sewer line inspections of 6" relined pipe through 200" diameter pipe. Available in multi or single conductor formats, the Nite Lite pan-and-tilt camera system offers unparalleled imaging technology to produce the clarity of pictures with enhanced detail. The Nite Lite camera is designed to pan 285 degrees and rotate 360 degrees. Remote control for iris and focus is provided to assure the highest picture quality in unusual or special conditions. An optional built-in inclinometer is available to read and transmit pipe grade variations

Easy Upgrade to the OZII optical zoom camera!

The Nite Lite can be easily upgraded to include 10x optical zoom and 4x digital zoom! Refer to the OZII information on the opposite page!

Nite Lite shown with the CUES Steerable Pipe Ranger

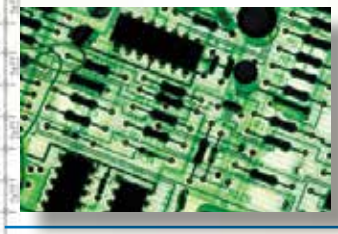
Slopemaster
Inclinometer

Improperly installed or sunken lines often results in rapid pipe failure. Failures may include the accumulation of dangerous materials, debris, early fatigue, fractures, and open joints. In water waste lines, it can also include the heavy accumulations of grease, increased levels of hydrogen sulfide gas, foul odors, increased bacterial growth, internal/external leakage, corrosion and reductions in flow.

The heart of the Slopemaster system is a vertical sensing, single axis, inclinometer mounted on a single internal circuit board. It's accuracy, rugged construction, reliability, and wide range environmental parameters meet the special requirements necessary for verification of slope measurement in industrial and utility pipelines.

The Slopemaster operates with CUES multi conductor or single conductor TV inspection systems. The simultaneous display of the grade information with the live television picture precludes possible misinterpretation of slope due to debris, offset joints, etc., which is a restriction that's often found with measurement-only type verification systems.

A CUES inclinometer-equipped camera has a tilt-angle measurement range of +/- 5 degrees with a typical accuracy of 0.2 degrees. It is mercury free and does not contain any hazardous materials. The Slopemaster can be used with many CUES data display and recording systems. Data systems are available for automatic slope data collection, display, recording, and plotting.



The new CUES Inclinometer has been redesigned to read and transmit pipe grade variations in the range of +/- 5 degrees (+/- 8.7% grade) from horizontal with an error of +/- 0.2 degrees (0.3 % grade) while providing greater stability over a wider range of conditions.

Features & Benefits:

- The system is supplied with a pipe grade verification system to detect and record variations in pipe angle from true horizontal.
- The inclinometer is able to read and transmit pipe grade variations of +/- 5 degrees from horizontal (+/- 8.7% grade) with an error of +/- 0.2 degree (0.3 % grade).
- Depending on the data system used in conjunction with the inclinometer, the data shall be able to be displayed in a numerical or graphical format, which may be printed or exported to an external database.
- The inclinometer includes a vertical sensing, single axis, precision sensor mounted internally to the camera.
- The Pipe Grade Verification System (Inclinometer) can operate with all CUES pan & tilt and pan, tilt & zoom cameras

Disclaimer:
Due to the many varying factors involved in performing an inclination assessment of a pipeline (condition of transporter, speed of inspection, pipe debris, etc.), a CUES inclinometer equipped camera is not intended to take the place of a survey tool, but to be used as a reference to identify potential problem areas during an inspection.