

1950's Stereoscopic Flash Camera

LAVAL UNDERGROUND SURVEYS

DOWN-HOLE CAMERA SYSTEMS - MAXIMIZING YOUR ROI

1980's

Mirrored Side View

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Course Objectives

- Subject:** Adding a down-hole camera to your company's tool box could positively improve revenue and profits when you understand the potential of this investment. This session will include a broad industry perspective of currently available underground cameras along with the variety of key features that can improve your diagnostic efforts. You will learn the broader use capabilities of these tools and how to strategically integrate them into your business.
- Course length:** 50 minutes
- Biography:** Eric Hadden – ehadden@lavalunderground.com
V.P. of Sales & Marketing for Laval Underground Surveys
B.A. from St. Mary's College
M.B.A. from Craig School of Business, CSU Fresno

Industry Origins



1946

- Peerless Pump hires, Claude Laval Jr., to design a camera that could withstand the pressure of a deep water environment and take photos via a remote trigger system
- Laval developed his prototype camera, which measured 9 feet and weighed 200 lbs.

Continued Growth

State of the Art Manufacturing Facility



Worldwide Customer Base

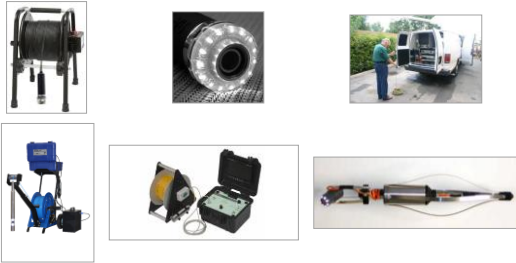


System Variations

2017



Various Cameras Available



Pan/Tilt Cameras



Mirrored Cameras



Fish Eye Camera Systems



Turn Key Systems



Vehicle Based Systems



Key Features

engineering your business/
Downhole Cameras
 How did we ever survive before?
 by Ed Sims, CE



- **Buy a system with an actual side view** (not just mirrors to reflect the vertical view) – A mirrored reflection just doesn't cut it, especially when it's coming back from a video tape. You'll thank me later, for the advice"
- **Don't skimp on the lights** – Make sure the system you're buying has sufficient lighting and power to illuminate the largest diameter of well you're planning to inspect."
- **Get an on-screen depth counter** – It's more professional and lowers your liability."
- **Make sure to get a good recorder** – The camera is of little overall use if you can't record the image."
- **Buy a 1,000 foot system** if your max depth will be 500 feet, just in case."

26/ October 2006 Water Well Journal

Additional Items to Consider

- Is this a system designed specifically for well inspections?
- Do I want a manual or powered winch?
- What is the level of technical complexity involved in operating the system?
- In the event of a breakdown, how quickly can the system be repaired?
- How difficult is the software to operate?
- Is video ready for playback, or is a conversion process required prior to sharing footage?
- Are there additional accessories available? Can I upgrade my system in the future?
- Can I use the camera with the pump in place?
- Focus on performance, not cost.

Common Applications

Identifying Obstructions



• A wire obstruction located at 710 feet

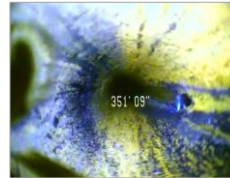


• Various pieces of debris identified at the bottom of a casing

Common Applications

Diagnosing Problems Within the Well

- Perforations above the static water level identified within the well casing



Common Applications

Quality Control

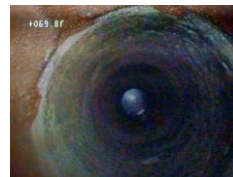


- A municipality specified stainless steel be used for the well casing in a caustic area
- A video inspection confirmed that mild steel had been used
- The municipality settled with the well driller and the casing was replaced

Common Applications

Micro-pile Inspection

- Micro-piles are shallow (about 100 feet), grouted holes that are used to shore up the ground under high-rise buildings in areas with a high water table.



Common Applications

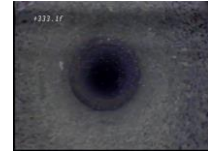
Establishing Records in Developing Nations

- Hand-dug wells and nonexistent records are a common problem in developing nations.



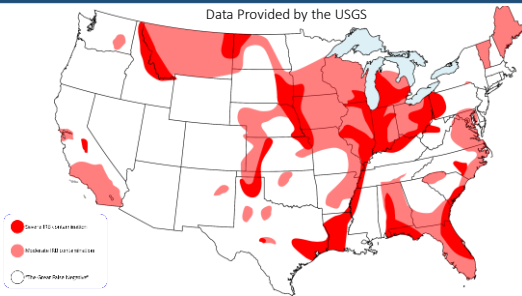
Common Applications

Every Time a Pump is Pulled



IRB Affected Areas

Data Provided by the USGS



Well Rehabilitation

Iron Bacteria

- Biofouling is a routine cause of clogged pumps and well perforations causing a decrease in well efficiency and an increase in energy costs.



Well Rehabilitation

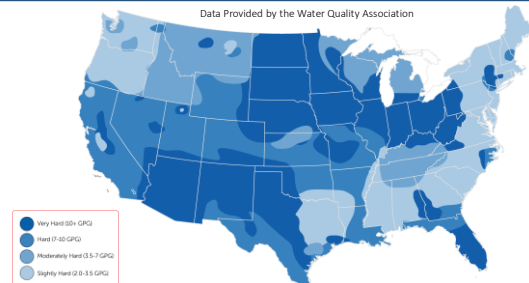
Calcium Carbonate

- Calcium encrustation is also one of the most common causes of diminished well performance.



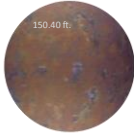
Calcium Carbonate Affected Areas

Data Provided by the Water Quality Association




Cameras for use in Well Rehabilitation

See




150.40 ft.




Perform an inspection with a Laval Camera

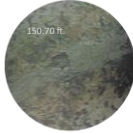
Treat




Treat the well



Verify



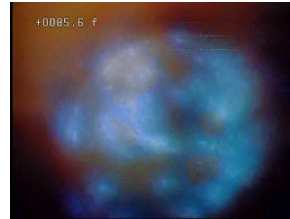
150.70 ft.



Conduct a confirmation survey

Well Rehabilitation

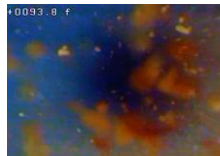
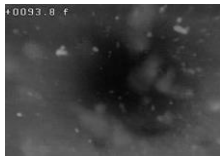
Visual Confirmation via a Camera



Well Rehabilitation

Visual Confirmation via a Camera

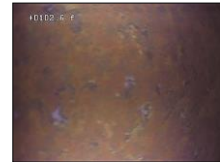
- High quality images are critical in correctly identifying the potential issue.



Well Rehabilitation

Visual Confirmation via a Camera

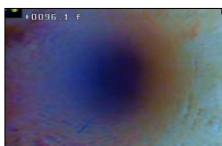
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Well Rehabilitation

Side View & On Screen Depth Counter

- Dual view modes ensure a greater level of perspective.
- On screen depth counting provides a critical reference point in ensuring troubled areas are successfully identified and treated.



Well Rehabilitation

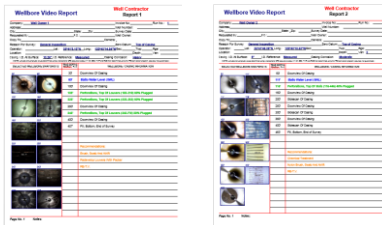
Post-Treatment Survey



Survey Reporting

Post Survey Reporting

- Provide the customer with a detailed report of your findings



Survey Reporting

Wellbore Video Report		Well Contractor Report 1	
Company	Well Owner 1	Invoice No.	Run No. 1
Address		Well Number	
City	State Zip	Survey Date	
Requested By	F.O.	Well Owner	
Copy To	Camera		
Reason For Survey:	General Inspection	Zero Datum	Top of Casing
Operator	Lat: 33°41'N 117°W	Long: 120°43'14.8"W	Sec: _____
Location		Top	Depth
Casing I.D. At Surface:	3.20" I.D. Reference	Measured	Casing Corrosion
		Blabby	
<small>NOTE: Please refer to the wellbore video report for a complete and accurate record of all wellbore data and for information regarding the wellbore video report (including any guarantees).</small>			
SELECTED WELLBORE SNAPSHOTS		WELLBORE / CASING INFORMATION	
30'	Downview Of Casing	60'	Static Water Level (SWL)
60'	Downview Of Casing	100'	Downview Of Casing
183'	Perforations, Top Of Lossers (183.210) 80% Plugged	227'	Perforations, Top Of Lossers (223.253) 80% Plugged
250'	Downview Of Casing	343'	Perforations, Top Of Lossers (343.118) 80% Plugged
400'	Downview Of Casing		

New Market Opportunity

Pricing in a Cost Conscious/Competitive Market

- Northern California Customer
 - Originally a well rehabilitation business only.
 - Identified the opportunity to create additional customer value by adding a recordings.
 - Routinely charges 20-25% more than his competition.
- Do not be afraid to differentiate your business
 - is this a purely cost driven marketplace?

Create Additional Value for Your Customers

- Combine with your existing services to create a recurring revenue stream
 - Total system cost of \$12,000
 - Avg. cost per survey of \$700
 - 1 video survey performed per month equals an ROI of 17 months
- Gain a competitive advantage by offering a unique service
- Diversify your business
- Eliminate sub-contracting and keep your profits in house
- Remove delays associated with sub-contracting

"I anticipated a one-year payback...but I'm WAY ahead of schedule...I don't have to subcontract the work out to my competition anymore, and I'm picking up a bunch of additional well rehab work" – Al Boone, Boone Water Systems, Inc.



FAQ's & Closing Thoughts

- What is the expected lifespan of a camera system?
- What is the most common wear component on a camera system?
- What is the most costly component that breaks?
- Proper maintenance is key to a rewarding ownership experience.
- Do your due diligence and find a system to suit not just your present but your future needs as well.
- Make any system an integral part of your business model.
- Focus on system performance and ROI, not the initial cost.

Downhole Visibility is Critical





Questions?

