

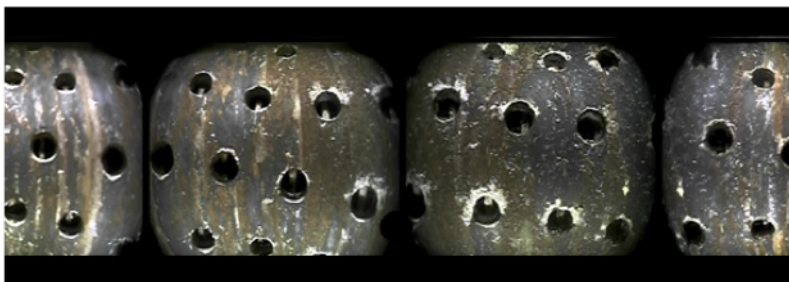
SPECTRUM® 360

VISUAL ANALYTICS SERVICE

OVERVIEW

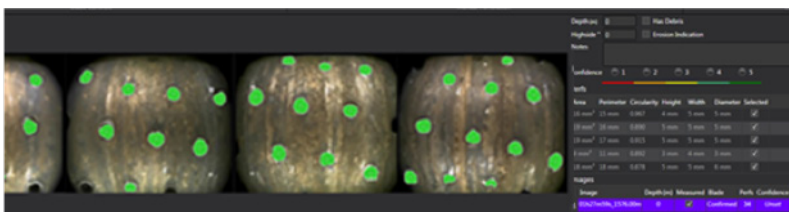
SPECTRUM® 360 visual analytics service delivers more than just a revolutionary real-time video feed; this service is also capable of providing some of the most in-depth analysis of wellbore data that has ever been made available. Several levels of data analysis are available, pending the level of detail desired for the operation.

Visuals of key inspection points can be reviewed and replayed, and basic quantitative measurements can be made in real time.



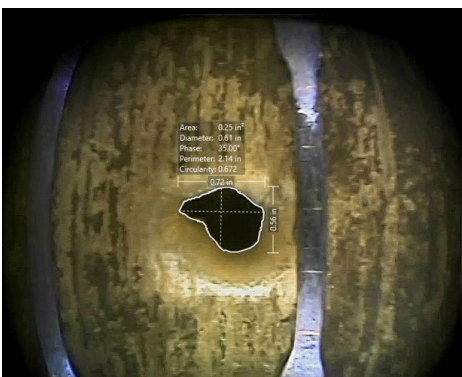
HAL1251749

Real-Time 360° Video Feed



HAL125051

Quantitative Perforation Measurement Analysis



HAL125030

Measurement Capability Detail

Visual analytics provide a deeper analysis and quantification of time-based SPECTRUM 360 images. Items of interest can be more thoroughly reviewed, such as measurements of perforation diameters or other measurements that can be derived solely from the images.

REAL-TIME VISUALIZATION

- » Four real-time, array camera video images, providing 360-degree inspection of the wellbore
- » Ability to provide live streaming of video from wellsite to remote devices or viewing facility
- » Analysis and interpretation of data points that may be directly derived from the recorded images

ADVANCED VISUAL ANALYTICS

- » Quantitative measurements of downhole geometries in three dimensions, based on video captured by the camera
- » 2D mosaic images provide intuitive visualizations of the downhole environment
- » Overlay correlations of visuals with log data
- » Compare “before” and “after” images side by side

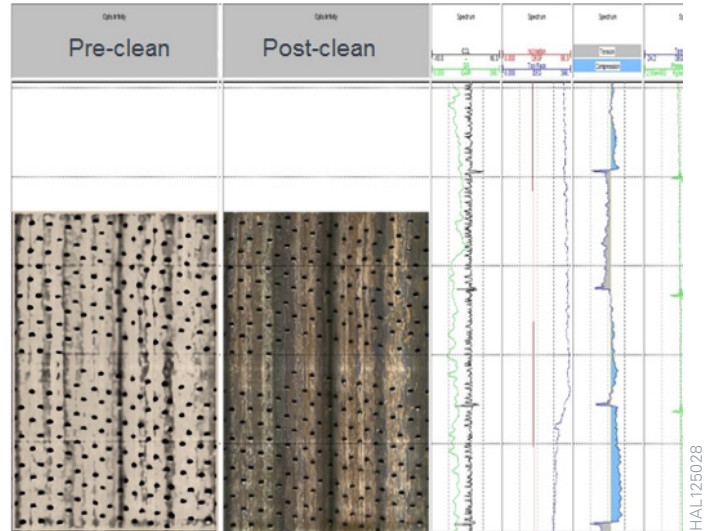
3D MOSAIC IMAGING

- » High-resolution, depth-matched 3D, 360-degree images based on video captured by the camera
- » Processed at computer center, and suitable for quantitative evaluation or comparison with engineering drawings

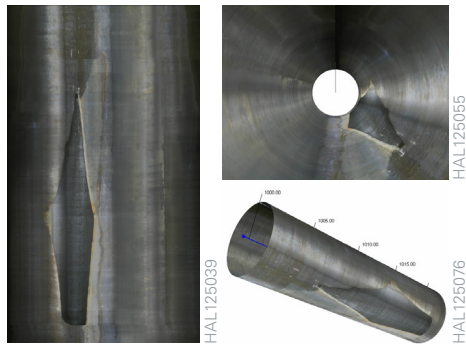
Advanced visual analytics provide additional layers of visual processing and diagnostics. Individual frames from SPECTRUM® 360 images can be stitched together into a composite mosaic image of the entire interval, or of specific zones of interest, for a more intuitive visualization of the downhole environment.

This composite image may be correlated alongside standard logging reports or other data channels recorded from the well, either from a selected run, or including images from both before and after any intervention services performed during the operation.

Example data may include, but not be limited to, pre- and post-cleaning conditions of screens; the position of sliding sleeves before and after an operation; or overlays of data, such as inclination or gamma ray, to validate the position of the visuals in the case of multilateral wells.



2D Digital Mosaic Overlay



3D Digital Mosaic

High-resolution 3D processing provides the ability to create advanced digital mosaics to illustrate wellbore sections more clearly than ever before, thus transforming the images recorded by the camera into models that can viewed from any angle. These 3D mosaics are data-matched for accurate dimensioning and quantitative evaluation.

TARGET APPLICATIONS FOR VISUAL ANALYTICS*

<p>PERFORATION Quantifying perforation geometry Optimizing frack/stimulation</p>	<p>CORROSION 360° corrosion evaluation Optimizing integrity management</p>	<p>FISHING Real-time decision making Fast, Effective fish retrieval</p>	<p>RESTRICTION Quantified evaluation De-risking interventions</p>
<p>VALVE 360° corrosion evaluation Optimizing integrity management</p>	<p>SAND Evaluating sand control Optimizing clean-up</p>	<p>WATER Pinpointing water entry Effective isolation at source</p>	<p>LEAK Locate and diagnose leaks Detailed root cause analysis</p>

* Some visual analytics applications may be optimized by pairing a down-view camera with the SPECTRUM® 360 service.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

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