A novel microscopy method to evaluate screen erosion in oil and gas equipment

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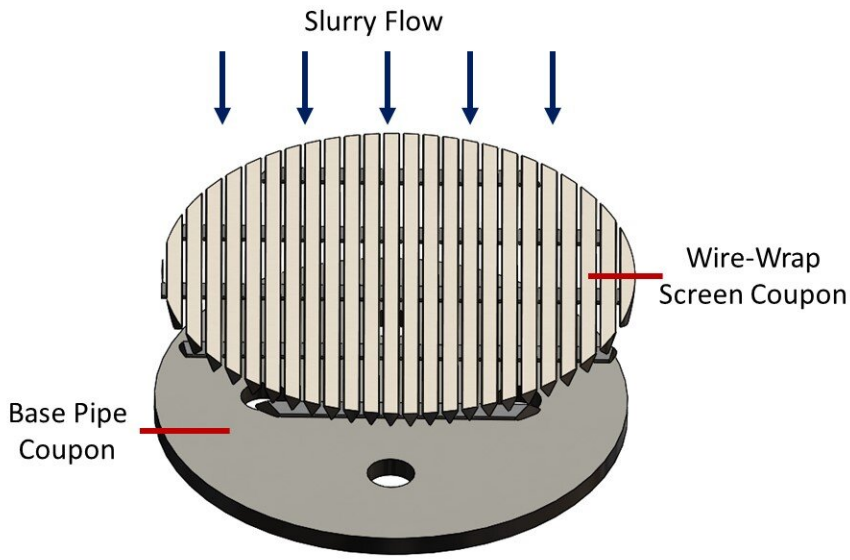
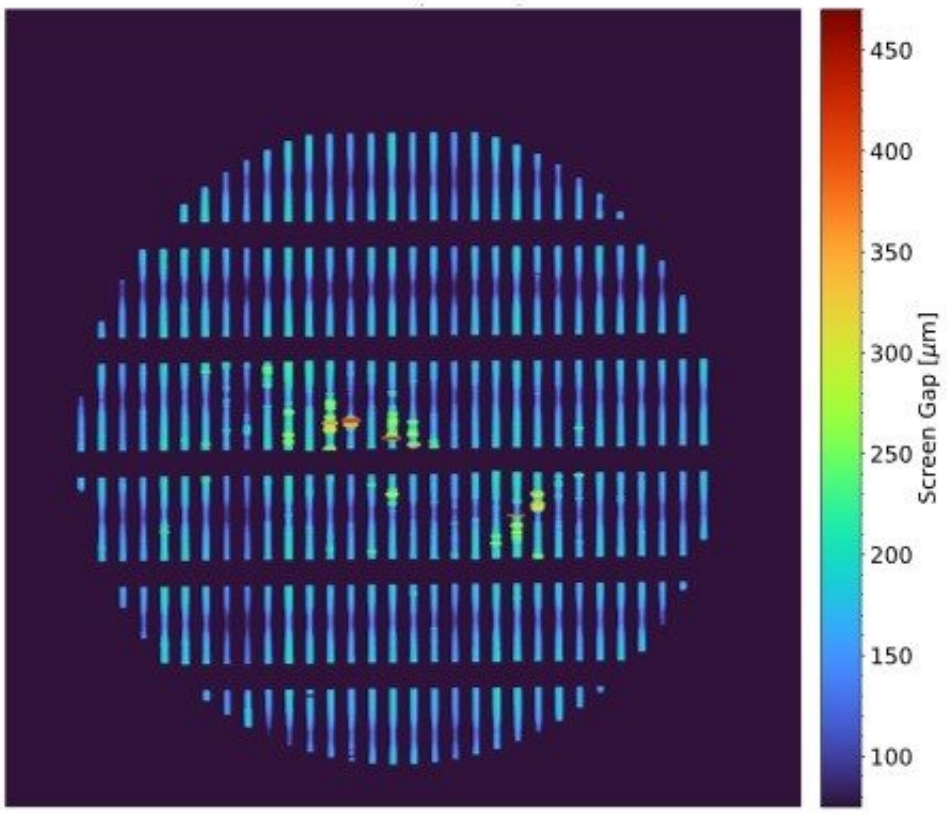


Southwest Research Institute has created and validated new microscopy methods to evaluate erosion in sand screens used in oil and gas production wells. The methods studied the effects of sand-laden slurries as they passed through wire-wrapped sand screens, particularly how the screen erodes as particles pass through the screen gaps. Credit: Southwest Research Institute

Southwest Research Institute (SwRI) has created a new, more effective method to evaluate changes in sand control screens used in oil and gas

production wells. The new evaluation method provides a more comprehensive view of where erosion occurs during accelerated life erosion testing on sand control screens, and is being expanded to evaluate other equipment in erosive environments.

In oil and gas production wells, sand screens keep formation and fracturing sand in the reservoir while allowing fluids to be produced. Fine formation sands, smaller than the screen gaps, periodically pass through the screens, causing screen erosion that can eventually lead to screen failure. Sand produced with oil and gas in a well can erode the equipment from the reservoir to the surface, causing costly production halts and well work-overs to replace damaged equipment.

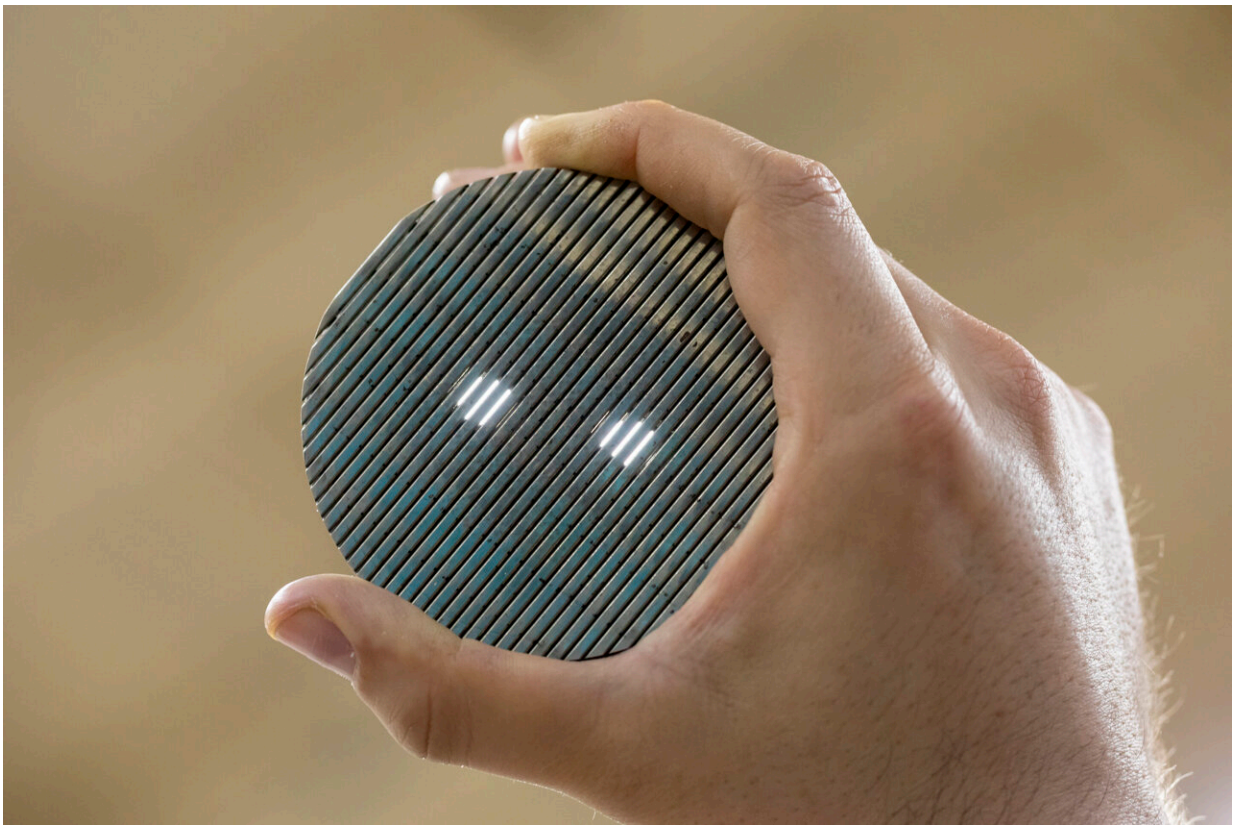


Southwest Research Institute used image microscopy to create a more effective, comprehensive method of characterizing erosion in wire-wrapped sand screens

used in oil and gas wells, with warmer colors representing larger gaps. Using the technique, the industry could more accurately predict the functional life of the screen at a particular well condition. Credit: Southwest Research Institute

"Measuring erosion in sand screens is challenging because current industry methods provide a single point value describing the erosion that actually occurs differently in various regions. The industry currently uses two methods that provide inconsistent results," said Jessica Brysch, assistant program manager in SwRI's Fluids Engineering Department. "Those methods identify only the largest gap that results from erosive flow through a sand screen, whereas our method identifies each gap."

SwRI's approach expresses the erosion in the sand screens graphically so that a more complete picture of the erosion can be understood. The method involves examining both the screen and base pipe layers with microscopic imaging equipment in order to map the material removed on both the screen layer and the base pipe layer.



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"Our method utilizes novel microscopy," said Luis Gutierrez, a research engineer in SwRI's Fluids Engineering Department. "We have developed a novel visual method that offers spatial understanding of where erosion is happening. Our method allows us to see a map indicating the magnitude and location of erosion experienced across both the screen and base pipe layers."

The SwRI erosion model expresses sand screen erosion graphically,

providing a more complete picture of the effects of erosion. This method of erosion visualization has also been extended to other types of equipment in harsh environments to quantify erosion.

"Using our technique, the industry could more accurately predict the life of equipment under specific well conditions, rather than waiting for them to fail," Brysch explained. "Considering sand screens are the primary defense against sand production, and are incredibly costly to repair, that's a considerable advantage."

More information: Project homesite: www.swri.org/fluid-dynamics-fl … -measurement/erosion

Provided by Southwest Research Institute