Technology Licensing Opportunity

UNIVERSITY OF SASKATCHEWAN

Method for Detecting Pipeline Weakness

Invention

Long pipelines are extremely common in industries that refine materials such as oil and gas, chemical production, and mining. These pipelines often contain slurries which contain water as the working fluid to transport solids such as sand, clay, and tailings. This is considered one of the most effective methods of moving solid partials over long distances in a continuous production environment.

While very effective at moving materials over long distances, internal pipe erosion is one of the main downsides of this method of material transport. Erosion is caused from the action of solid particles contacting the pipe wall and removing small amounts of material over time. As a result, the wall thickness of the pipe becomes thinner to the point where, if not replaced, a leak or burst can result. Corrosion by electrochemical means is another mechanism by which pipes weaken over time, and similar failures can occur in corroded pipes. If the pipe is pressurized, leaks could have a high flow rate leading to safety hazards to workers nearby and environmental damage. Monitoring internal defects is not an easy task as there are typically no indicators on the exterior of the pipe prior to a burst.

Applications

The global market for steel pipe was $180 B USD in 2016 and growing at a CAGR of 6.2%. Much of the demand is from the oil and gas industry, but chemicals and mining also contribute significantly.

Some of the applications for this technology is in:
1. Oil and Gas production and transportation
2. Mining and mineral extraction
3. Chemical production and manufacturing

Advantages to our solution

Long range pipeline defect detection has been a topic of relatively recent research. Guided wave ultra-sonic inspection is a well-developed method that can use either piezoelectric or electromagnetic acoustic transducers to transmit and measure stress waves along the axial direction of the pipeline. Wave reflections in the pipe material are measured and recorded, and then analyzed to determine pipeline health, and defect location. Another similar method is guided wave magneto-sctrictive inspection which works using the same principle as ultrasonic inspection, but measures stress waves in ferro-magnetic pipes by its changing magnetic induction. While these methods are effective, they are expensive and complex due to their specialized piezoelectric, acoustic, and magneto-strictive sensor technology, and thus are not in wide-spread use.

Our solution is simpler. Using a combination of impulse and frequency response from acoustic transmission. Our inventors have demonstrated that common defects such as erosion, corrosion and leaks can be detected and located by such means more cheaply and easily than with more complicated equipment.

Patent status

US and Canadian applications filed and pending.

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