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Predicting Hose Failure in Extreme Environments

New capacitance-based sensor systems are available for low and high-pressure hydraulic hoses to detect early damage and prevent costly downtime and safety issues.

Hydraulic hoses can fail from normal wear and tear, resulting in equipment downtime and safety concerns. Sensing mechanisms can often find potential problems in hose integrity before failure, but such systems currently only exist for medium pressure hoses, which are normally structurally supported by diaxial braided wire. Adding an additional concentric layer of wire separated by rubber from the first layer allows the creation of a cylindrical parallel plate capacitor that can detect capacitance changes caused by damage to the hose. However, low and high pressure hoses cannot utilize this method because they are not supported in the same way.

Researchers at Purdue University have developed sensor systems for early failure prediction that can be used on low and high pressure hoses. Low pressure hoses, usually constructed from materials such as rubber and Kevlar, will be equipped with parallel plate capacitors composed of layers of conductive fiber separated by a dielectric layer of rubber. High pressure hoses are constructed from many layers of rubber and spiral wire. Sensors for high pressure hoses can be composed of multilayer capacitance circuits made from materials resistant to high pressure.

Advantages:

-Early damage detection

-Prevents costly and dangerous downtime caused by hose failure

Potential Applications:

-Hydraulic hose manufacturers

-Hydraulic machinery manufacturers

-Hydraulic machinery users

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Category

Buildings, Infrastructure, & Construction/Structural Health Monitoring

Robotics & Automation/Perception & Sensing

Authors

Grant Knies

Gary Krutz

Brittany A Newell

Further information

Parag Vasekar

psvasekar@prf.org

View online

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