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Please fill in your manuscript title.	Development of a Non-Invasive Confirmation Technique for Casing and Tubing Hanger Position Identification	
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## Abstract

### Objectives/Scope:

Objectives and Scope: This paper describes a project for the development and testing of a non-invasive casing and tubing hanger position identification system. The technology is intended to improve operational safety and reduce the non-productive time and cost associated with incorrect landing.

### Methods, Procedures, Process:

Methods, Procedures, process: The paper starts by explaining operational issues associated with incorrect casing and tubing landings in dry tree applications. The technical challenge creating a simple and easy to install instrument or system that provides reliable confirmation of success at a reasonable cost is then made clear. Initial computational modeling was performed to understand key component and system properties and responses to acoustic, electromagnetic and other effects and stimulation. Processes and results are explained, including the evaluation criteria shaping subsequent work. Following modelling, the proof of concept or “benchtop” testing apparatus and methodology is described. Tests include very accurate high frequency and low frequency acoustic responses and highly sensitive “see through steel” magnetic techniques. The methods, results and conclusions of full scale testing, including trial deployment tests conclude the paper.

### Results, Observations, Conclusions:

Results, Observations, Conclusions: Results from the computational analysis, benchtop testing and full system testing are considered, including finite element models, detailed acoustic frequency response distributions and electromagnetic sensitivity analysis.

### Novel/Additive Information:

The hanger position identification system technology and approach is novel in that no other non-invasive, simple method is known.