瀋陽工業大學
SHENYANG UNIVERSITY OF TECHNOLOGY

IP Pipeline Technology

PNEUMOELECTRIC HYBRID: NEW BASELINE SURVEY METHOD

Agenda

- PART 1. About Our Company
- PART 2. Baseline Inspection Challenges
- PART 3. Tool and Principle
- PART 4. Case Study
- PART 5. Extreme Working Condition
- PART 6. Summary

PART

1

About Our Company

About Our Company

Company Introduction

IP Pipeline Technology is a reliable company of pipeline inspection and data analysis with rich experience, based on Shenyang University of Technology Professor Yang's team.

Since its R&D in 1995, IP has provided international leading technology to pipeline owners and operators. Its world-class inspection team provides entire inspection services for onshore and offshore pipelines worldwide.

- Based on strong R&D strength and industry experience
- Focus on timely communication with customers and efficient response
- Provide stable services to customers

About Our Company

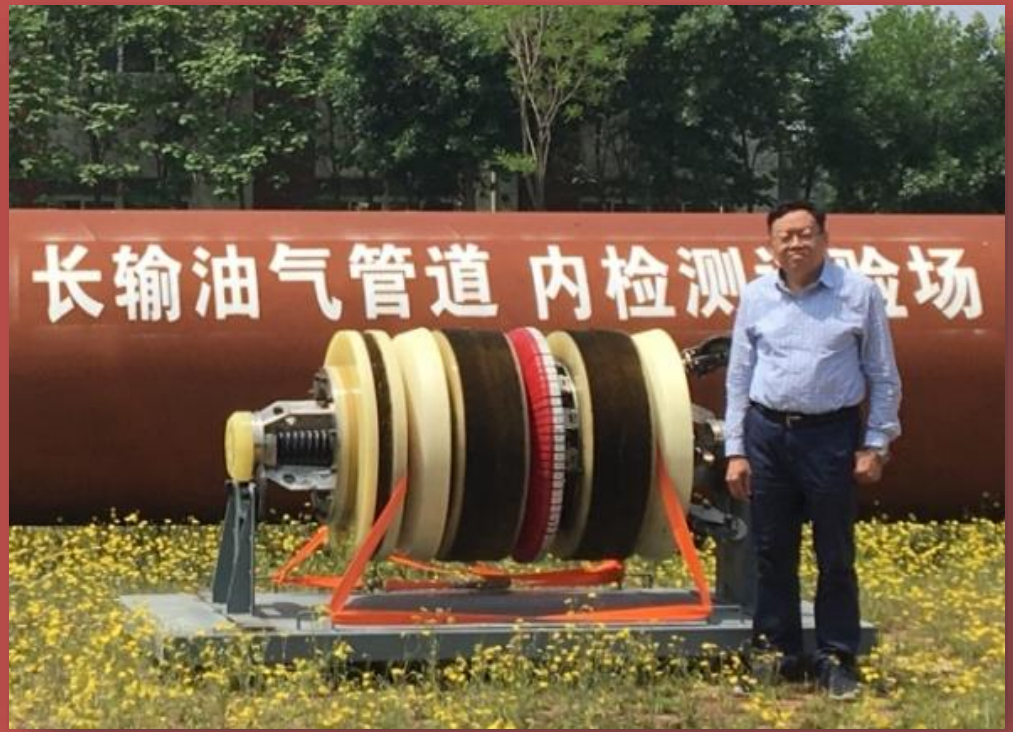
Professor Introduction

Mr. Yang Lijian. A professor and doctoral supervisor at Shenyang University of Technology.

Candidate of academician of Chinese Academy of Engineering.

Experts enjoying special allowance from the State Council of China.

NACE International Pipeline Integrity Technical Specialist



About Our Company

Team Development History

Initial Phase:

Initiated the research of in-line inspection tool in 1995.

Maturity Phase:

1. Products reached international standard in 2007.
2. Offshore pipeline tools were successfully developed in 2009.

1995

2000-2004

2005-2009

2010-2022

R&D Achievement Phase:

1. The first MFL tool was successfully developed.
2. The Chinese Prime Minister Wen Jiabao presented the Science and Technology Progress Award at Beijing Great Hall of the People in 2004.

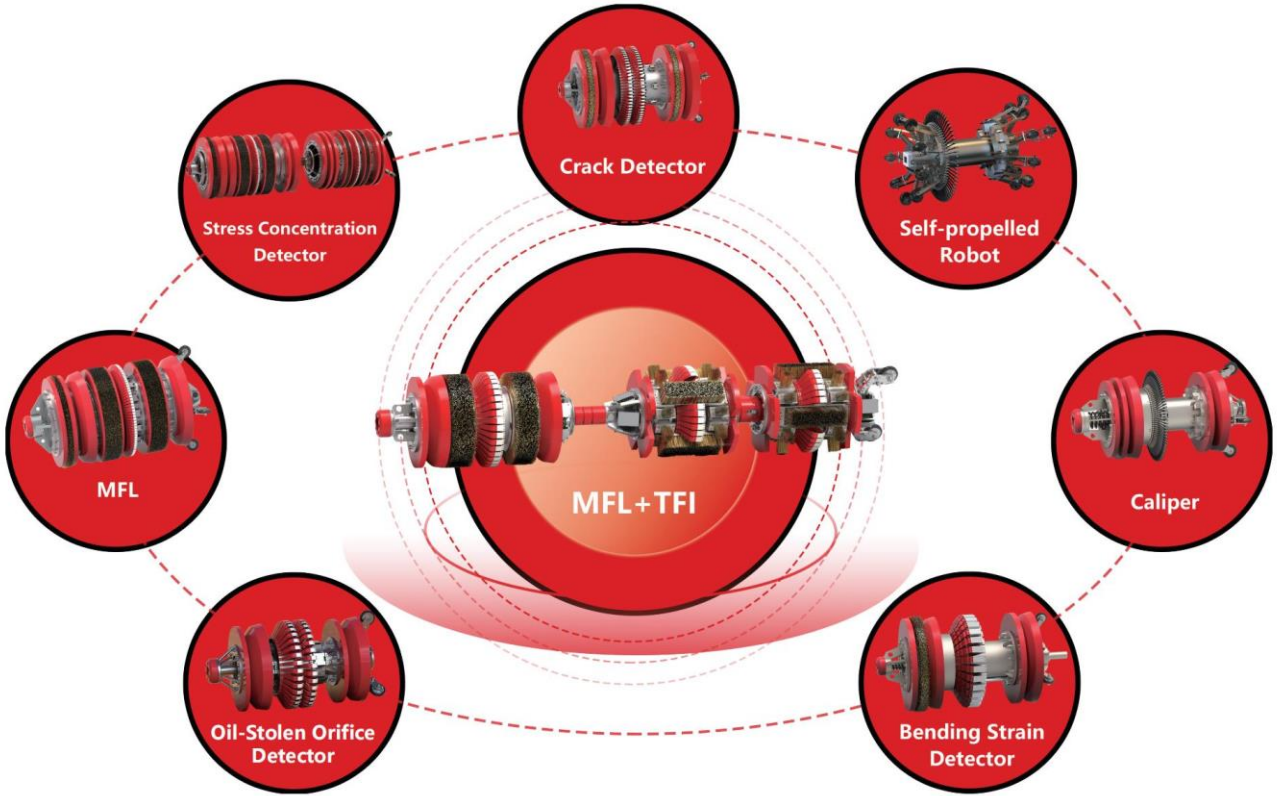
Customer Approbation Phase:

1.In 2011, it won the first prize of Technology Progress Award from CNPC and Sinopec.

2. Provided international leading technology to pipeline owners and operators worldwide.

About Our Company

Product Range



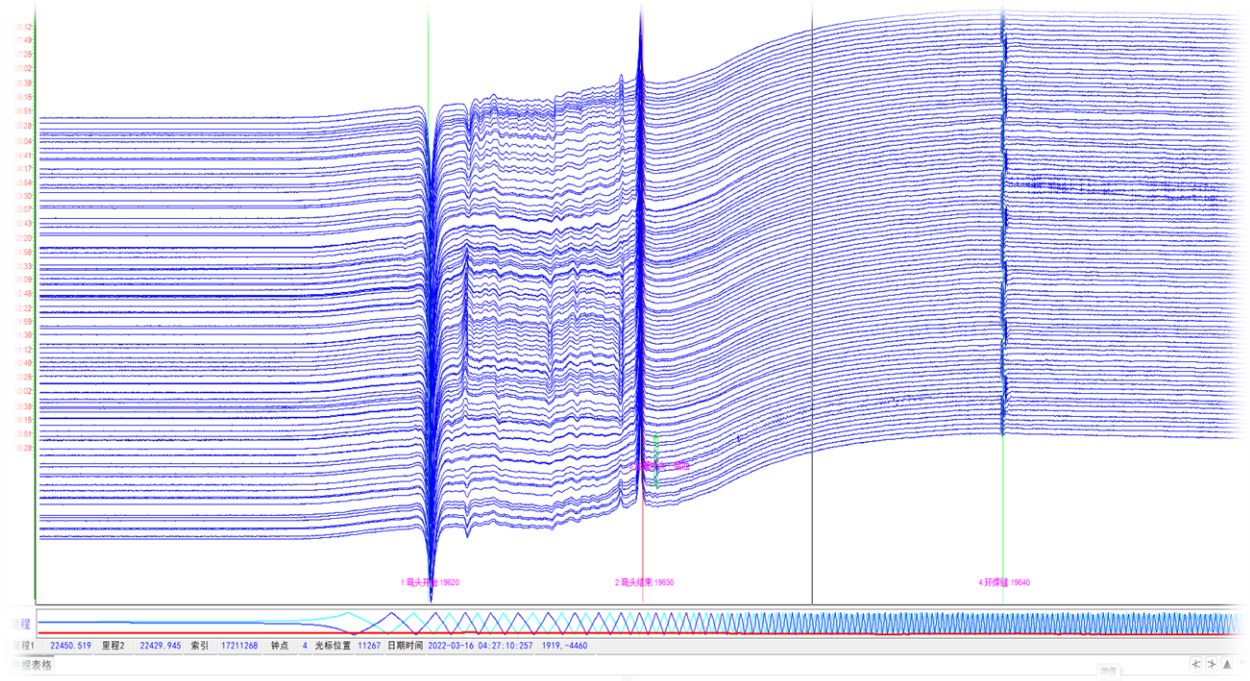
PART

2

Baseline Inspection Challenges

Baseline Inspection Challenges

The challenges



- Unstable operation
- Unsafe conditions
- Excessive cost

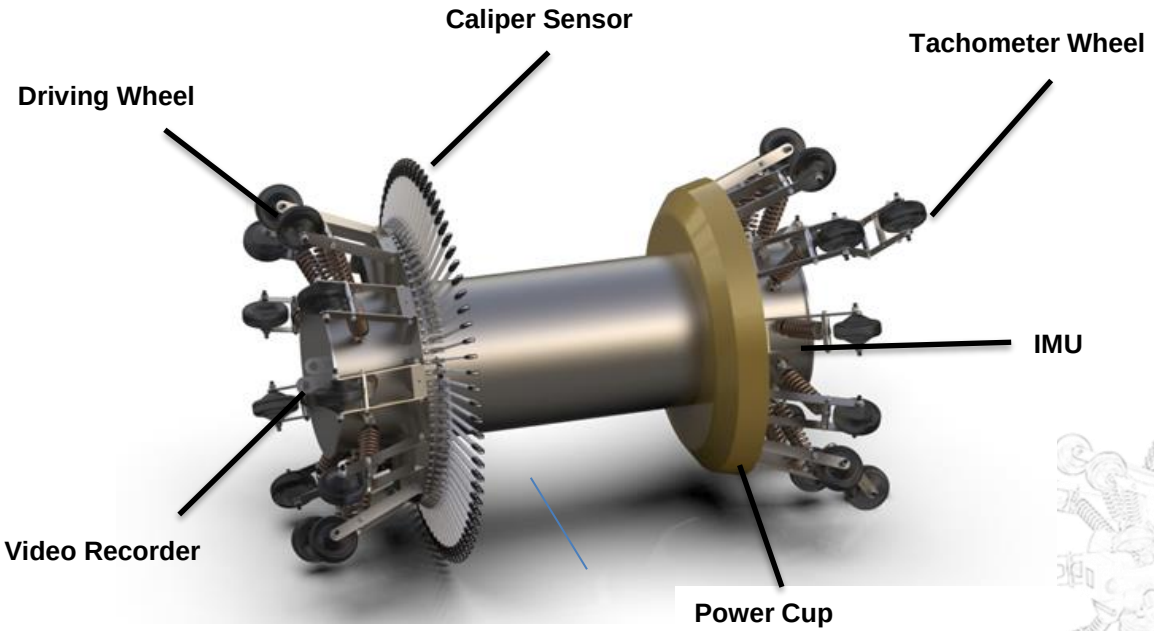
PART

3

Tool and Principle

Structure and Principle

Tool structure



Structure and Principle

Tool specification

Tool Size available	12” -56”
Pipeline product	Newly-built pipeline, Crude oil, Natural gas, water
Product temperature	0 ℃ - 70 ℃
Maximum operating pressure	10MPa
Operating speed range	≤ 5m/s
Minimum pipeline bend radius	3D
Maximum operating time	≥150h
Maximum inspection length	≥200km
Climbing ability	90° (uphill and downhill pipe section)

PERFORMANCE SPECIFICATIONS

	Detection threshold at POD=90%	Accuracy at confidence = 90%
Wall thickness	1.5mm	±1mm
Dent	1%OD	±3.5mm
Ovality	1%	±1%

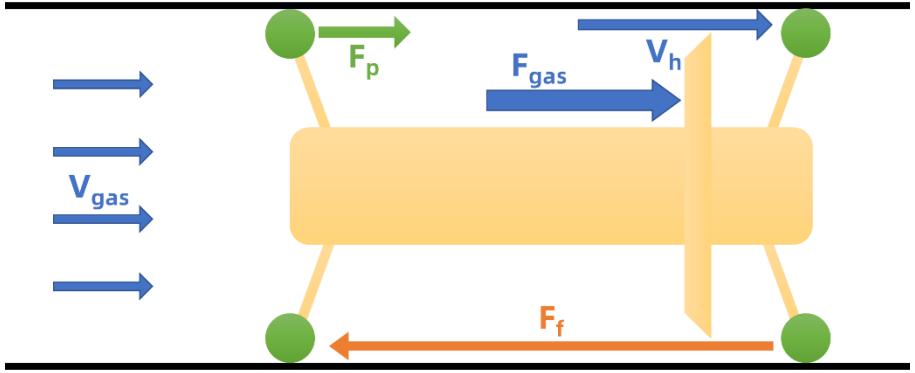
Note: OD is the outer diameter of the pipe; Ovality (%) = (maximum diameter - minimum diameter) / nominal diameter.

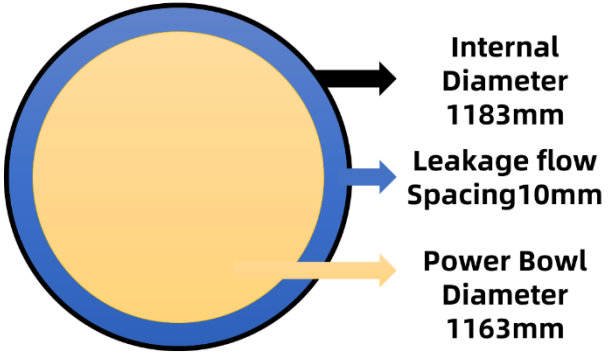
Axial positioning Accuracy at confidence = 90%	The distance error between the feature and the reference girth weld is less than ± 0.1m, and the distance error between the reference girth weld and the reference point is less than ± 1%
Circumferential positioning Accuracy at confidence = 90%	±5.0°

Structure and Principle

Pneumatic theory

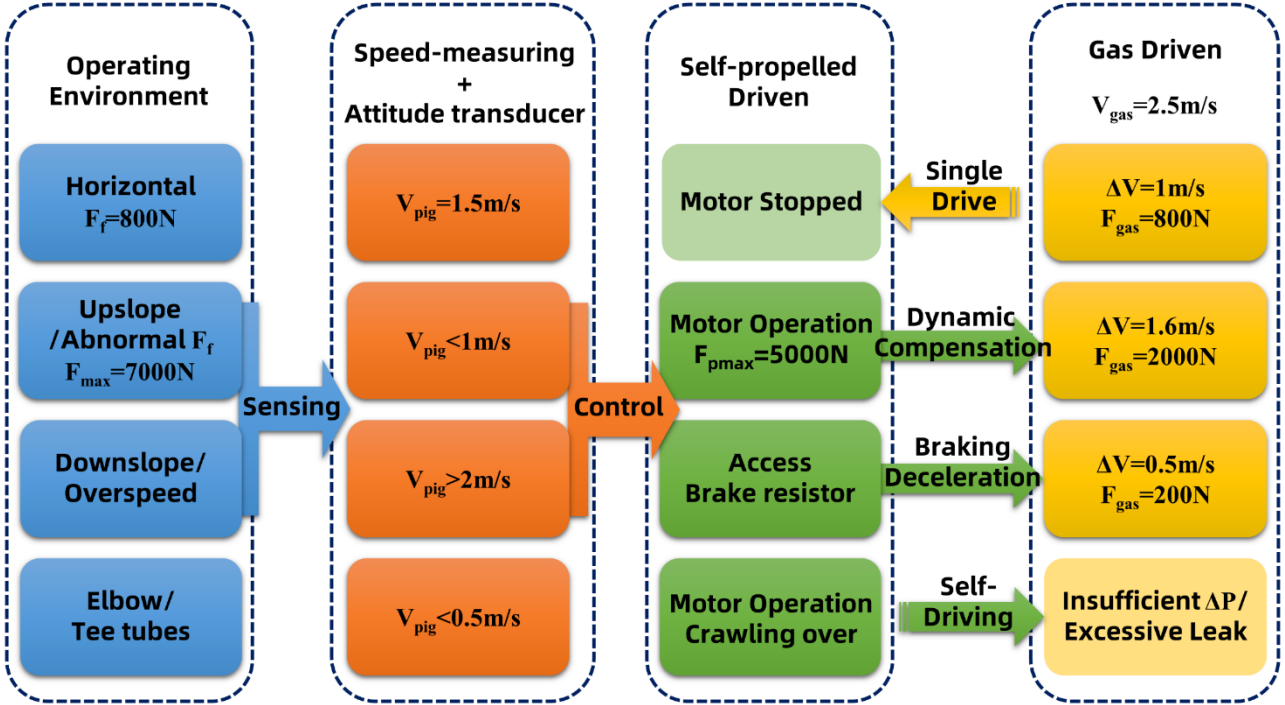
The pneumatic theory of this pneumoelectric hybrid drive detector is the phenomenon of air discharge between the power cup and the pipe wall, causing a local pressure loss.





Structure and Principle

Working mechanism



PART

5

Case Study

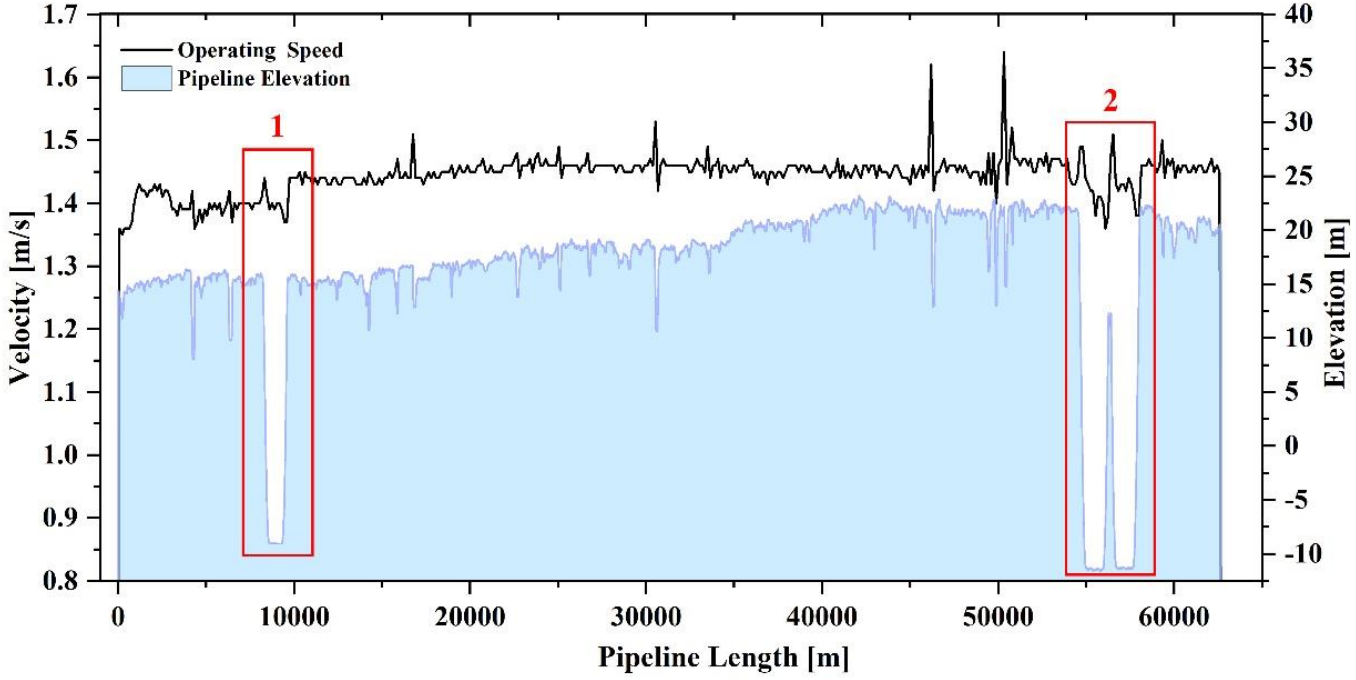
Case Study

Project Parameters

The pipeline length is 67km, and the diameter is 1219mm, six air compressors with a flow rate of 30m3/min. Gas inlet flow rate of the pipeline is maintained at about 2.5m/s, and the pipe outlet is atmospheric pressure. The inlet pressure of the pipeline is measured to be 1.6KPa under operating conditions.

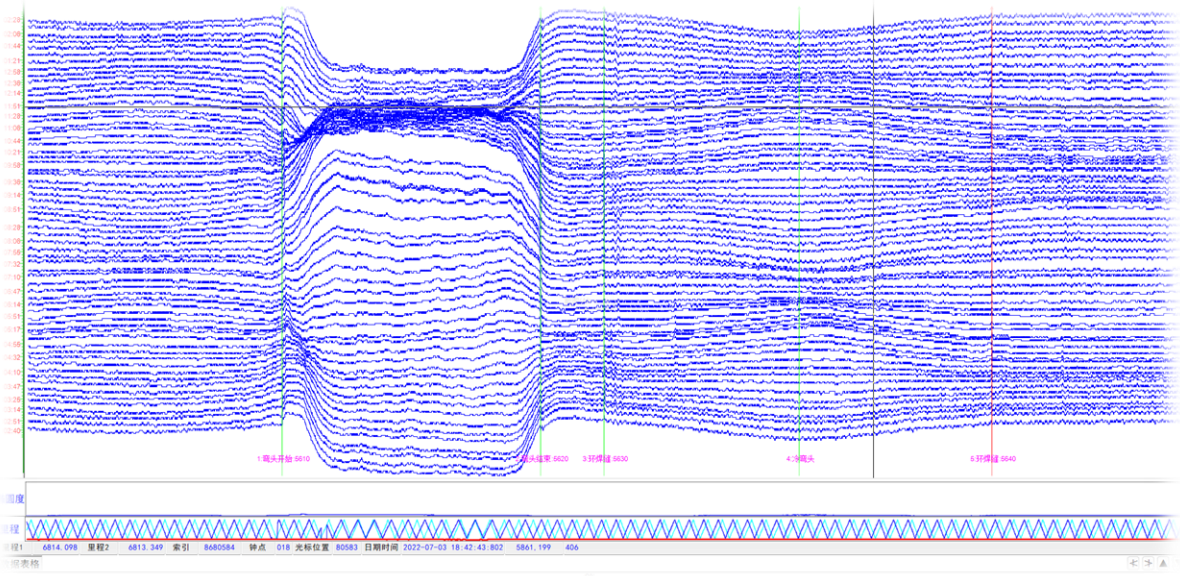
Case Study

Pipeline elevation and detector's running speed



Case Study

Conquer Challenges



- Stable operation
- Safe conditions
- Low cost

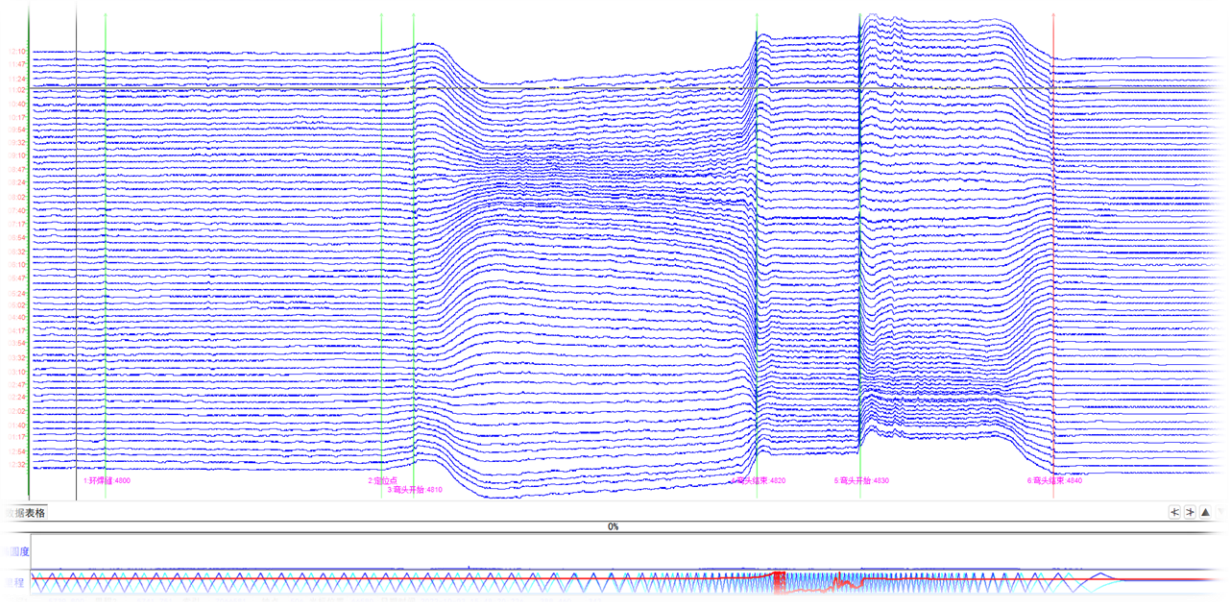
PART

5

Extreme Working Condition

Case Study

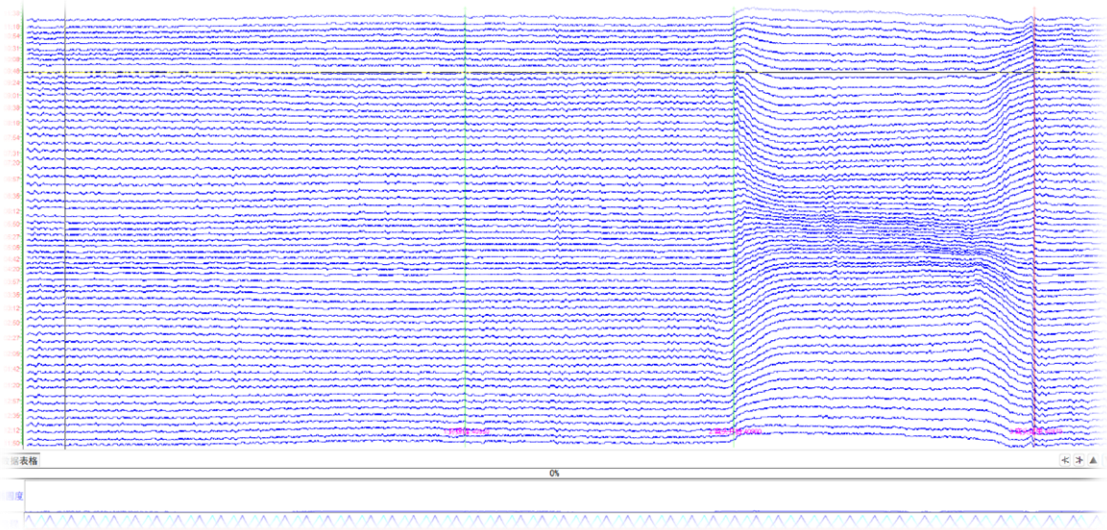
90 Degrees Downhill



- Video

Case Study

Run in the Water



- Video

PART

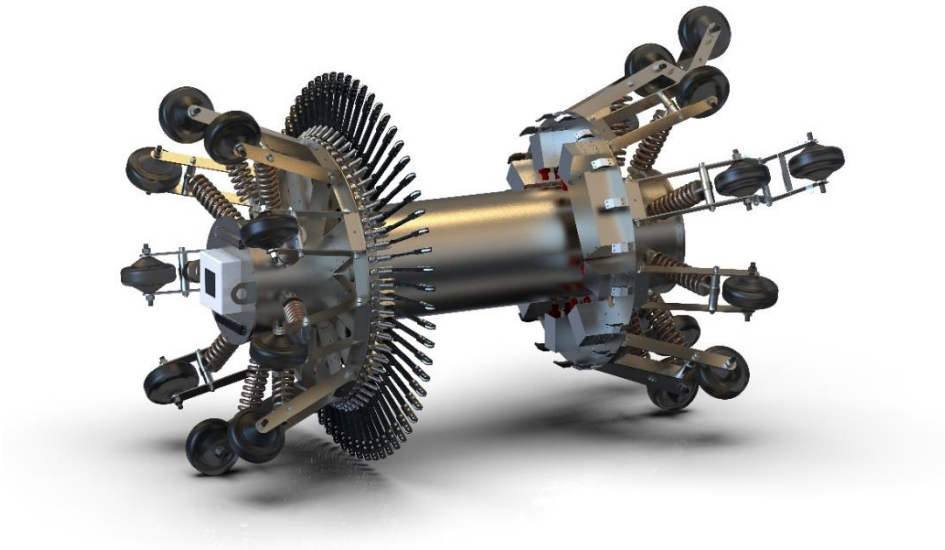
6

Summary

Summary

Combining the pneumatic drive and electric drive energy supply systems helps solve two problems for the baseline inspection.

First, the detector will not be limited by insufficient power drive when climbing, second, the pneumatic drive detector will not be prone to get stuck at the bend when passing low-pressure and low-flow pipelines.



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