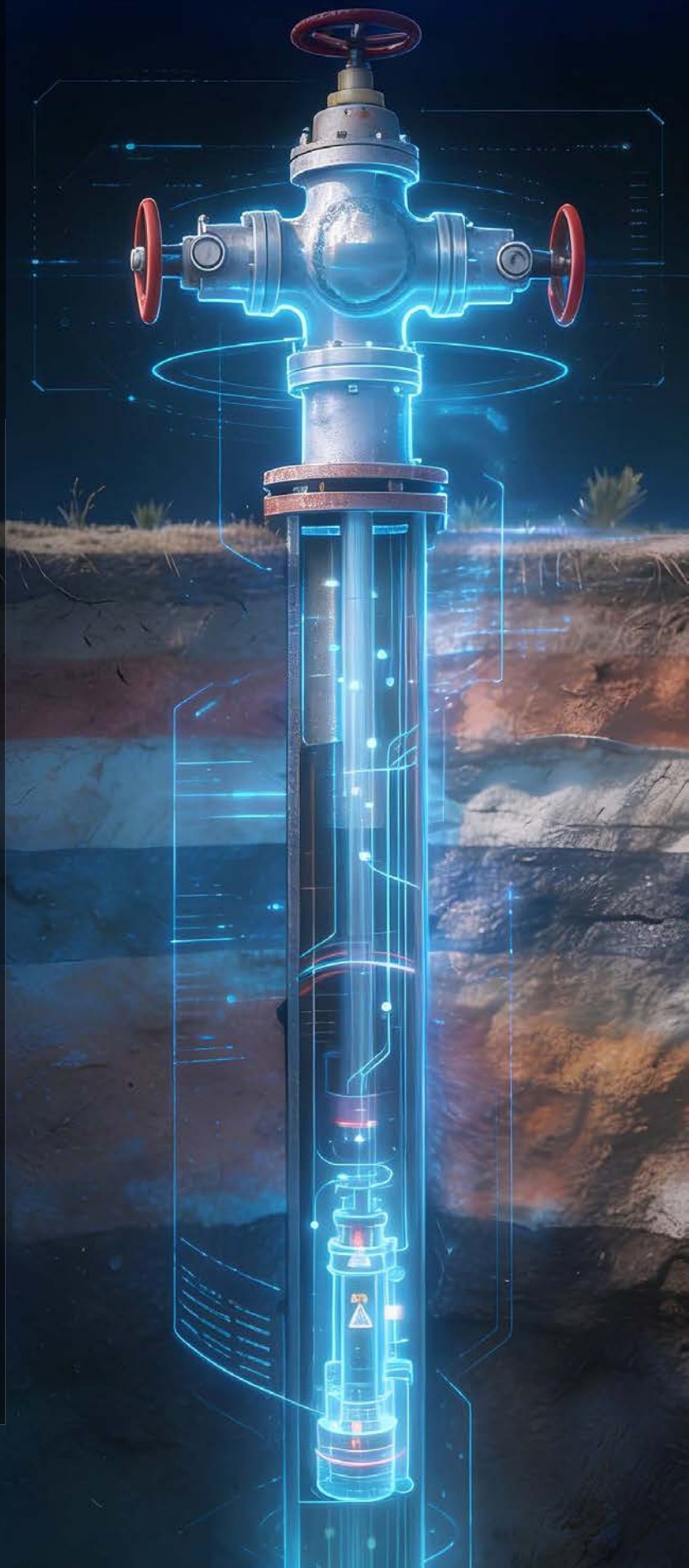
AIQ

FORESIGHT
BY AIQ

THE AI-POWERED PUMP MANAGEMENT SOLUTION



FORESIGHT continuously analyzes live ESP and well data to detect abnormal conditions and emerging failures before production is affected.

Combining AI, physics-based modelling, and domain expertise, FORESIGHT transforms raw data into actionable intelligence, evaluating operating envelopes, equipment stress, and failure indicators to enable confident real-time decisions.

www.aiqintelligence.ai

CHALLENGES

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Majority of oil wells require ESPs, however, production disruptions due to electrical faults, mechanical breakdowns, and operational inefficiencies result in an economic loss

Unplanned Failures and Short Run Life	Reactive Maintenance	Limited Visibility and Early Warning	Inefficient Scheduling
			
Disrupts the entire operations and leads to significant production losses.	Drives higher costs compared to planned maintenance	Subtle degradation signals are often missed	Poor ESP management complicates rig scheduling & inventory management

Real-time ESP failure prediction is highly challenging due to several factors such as:

~2 Millions data points vs only 2% represent failure signatures

Null values, inconsistent sensor tags, frozen signals and unavailability of crucial sensor information across different wells

Uncertainties in reservoir conditions lead to generalization issues for global models

INTELLIGENT ESP PLATFORM

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Foresight is an AI-powered platform that transforms ESP operations and is scalable to any type of pumps

Detect → **Diagnose** → **Predict** → **Act**

1 AI Anomaly Detection

Detect deviations from normal ESP and well behaviour with scalable, noise-robust analytics

2 Physics-based Model

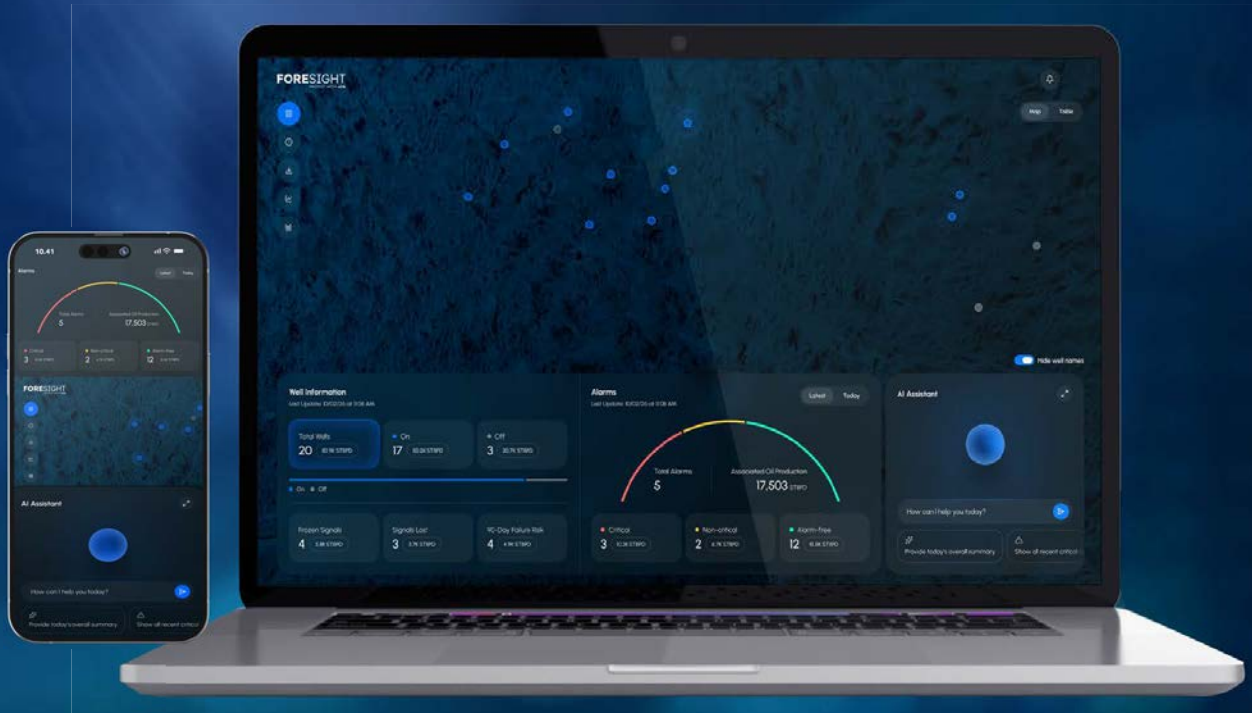
Diagnose likely failure modes behind anomalies with explainable, domain-aligned insights

3 AI-Survival Prediction

Based on degradation trends, FPI, operational conditions, and historical run-life behaviour.

4 Agentic Ai-Assistant

Maximize value from FORESIGHT - alarms, insights, and guided navigation



INTELLIGENT ESP PLATFORM

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KPIs, Alarms and Decision Support
- Prioritized wells
- Operational recommendations

Ai Anomaly Detection
- Continuous monitoring
- Early abnormal behaviour detection

Digital Twing ESP Surveillance
- Reconstructed downhole conditions
- Operating envelope and failure mechanisms

Ai-Survival and Risk Forecast
- Remaining Run life estimation
- Failure Probability forecasting

WHY FORESIGHT IS RELIABLE AND SCALABLE

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Well and Pump Configuration

Foresight delivers accurate digital twin models through structured equipment configuration, complete traceability, and robust engineering data governance.

1. Editable well and completion configuration, with updates automatically reflected in analytics workflows and digital twin models
2. Pump, motor, and cable selection tools supporting new installations and equipment replacements.
3. Full equipment history and audit trail, with role-based access to ensure traceability and controlled engineering data management

Equipment CatLog

Foresight has centralized, multi-vendor library of ESP equipment that standardizes specifications and supports accurate engineering modeling.

1. Multi-vendor ESP catalog covering pumps, motors, and cables with standardized specifications.
2. Integrated manufacturer performance curves enabling accurate modeling and analysis.
3. Flexible equipment onboarding with validation and audit trails to ensure consistent, traceable engineering data.

WHY FORESIGHT IS UNIQUE?

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Digital Twin-Driven ESP Surveillance

FORESIGHT Digital Twin reconstructs real-time ESP and well behavior to enable intelligent surveillance beyond traditional monitoring

1. Continuous downhole condition estimation with pump curve and operating envelope tracking.
2. Early detection of upthrust, downthrust, and performance degradation, even with sensor gaps.
3. Field-wide surveillance across assets with continuous monitoring of production performance and productivity index trends.

Beyond Alarms Intelligent Well Monitoring

Traditional systems detect alarms, while Foresight interprets the entire well system to reveal the true cause behind performance changes.

1. Differentiates operational events from true equipment degradation, separating reservoir effects from ESP performance issues.
2. Detects evolving failure mechanisms early, often before alarms are triggered.
3. Delivers engineering-consistent root-cause insights, enabling proactive intervention instead of reactive troubleshooting.

AI-Powered Failure Forecasting

FORESIGHT extends traditional survival analysis by integrating operational context, and fleet learning to deliver actionable reliability forecasting.

1. Advanced AI survival models generating optimistic, pessimistic, and most-likely run-life scenarios, continuously updated with operational data.
2. Predictive failure risk indicators based on degradation trends and operating conditions, with dynamic remaining run-life estimation.
3. Reliability metrics for planning, including MTTF(Mean Time To Failure) estimation, asset risk ranking, and maintenance prioritization.

WHY FORESIGHT IS UNIQUE?

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Engineering-Driven Intelligence

1. Designed by Production Engineers
2. Purpose-built algorithms for pump-specific failure modes
3. Hybrid approach: physics-based + AI for higher accuracy
4. Vendor-agnostic (works with any ESP provider).

Built for Enterprise Deployment

1. Cloud-native and scalable across hundreds of wells.
2. Integration with existing real-time historian and maintenance systems

The Complete AI-Powered ESP Platform

Delivered Operational Value

1. Deployed across 115 wells from Onshore and Offshore assets
2. Quantified ROI within months of implementation
3. Continuous improvement through machine learning

Sustained Operational Success

1. Real-time dashboards with event indicators and run-life monitoring
2. Training and change management assistance
3. Agentic Ai-Assistant

DEPLOYMENT & BENEFITS

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~115 Wells

Onshore & Offshore

AIQ, in collaboration with ADNOC, developed and deployed the Foresight solution across ~115 onshore and offshore wells. Designed to predict ESP failures in advance and unlock production gains by identifying well and reservoir constraints and enabling timely intervention.

- Achieved 88.6% accuracy in failure prediction with 91.7% precision
- Enhanced Safety
  Prevent dangerous pump failures and incidents
- Around 10 million USD were saved during pilot stage.
- Reduced ESP downtime up to 50%.
- Optimize Maintenance
  Shift from emergency repairs to planned interventions
- Improve Planning
  Data-driven scheduling and resource allocation
- Increase pump run life up to 15%.
- Maximize Uptime
  Prevent costly production interruptions from pump failures

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USE CASE: **ADNOC Offshore**

Offshore Abu Dhabi, carbonate reservoir with strong aquifer support, heavily rely on ESPs. Frequent ESP failures caused prolonged downtime, high OPEX, and deferred production. Traditional monitoring was reactive, with limited predictive capabilities.

Business Challenge

- Reactive interventions only after pump failure.
- Poor data quality: frozen or failed gauges, noise in signals.
- Limited availability of labelled failure data for model training (class imbalance).
- Variability in reservoir conditions impacting ESP performance.
- Lack of reliable run-life estimation methods.

Impact

Early warnings
90 days before failures

Run Life Extension
15% improvement

Economic Impact
~USD $2M/year saved in avoided deferment & optimized workovers

Downtime Reduction
Shift from unplanned to planned interventions

Implementation

- Data pathway: Wellhead gauges - ESP controller - DCS - PI historian - Foresight app.
- Pilot phase on selected wells, then scaled field-wide.
- Continuous feedback loop with engineers to refine thresholds and rules.

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