HUB TECH IA

AI and IAGEN Application Use Case

Advanced Drilling Trajectory Optimization Using Artificial Intelligence in Vaca Muerta

Executive Summary – Application of Artificial Intelligence for Optimization Advanced Drilling Trajectories in Vaca Muerta

This executive summary presents a strategic application of artificial intelligence (AI) and generative artificial intelligence (IAGEN) in the energy sector, focused on Advanced drill path optimization in the Vaca formation
Dead. This initiative represents a key opportunity to improve efficiency, safety and profitability in the exploitation of unconventional hydrocarbons, in one of the most important reserves worldwide.

Use case classification

- By main resource: Oil and gas.
- By activity: Optimization of production processes.
- By technology used: Generative models, machine learning, vision artificial, data integration and intelligent agents.
- By strategic impact: Optimization of production and infrastructure.

1. Opportunities for using AI and IAGEN in the sector

Specific opportunities include dynamic adjustment of the trajectory of real-time drilling, the use of sensors to read the subsoil, the Integration with autonomous geo-steering systems, and the application of models AI to simulate scenarios, predict geological behaviors and optimize the decision-making. The ability to generate digital twins is also highlighted.

that anticipate risks and improve the performance of each well drilled.

2. Expected benefits

- Improved operational efficiency in drilling paths.
- Cost reduction by optimizing the use of tools and resources.
- Increase in drilling penetration rate (ROP) with higher precision.
- Reduction of operational risks thanks to early detection of areas unstable.
- Improved safety by minimizing human intervention in environments critics.
- Failure prevention through analytics-based predictive maintenance of data.
- More informed, faster, and more accurate decision-making in real time.
- Strengthening the competitiveness of the energy sector with technology advanced.

3. Application of AI

The solution is based on an operational flow that combines data collection in real-time, automated processing, trajectory prediction and simulation optimal drilling techniques using advanced algorithms, and autonomous execution with continuous learning capabilities. AI acts as a drilling co-pilot, interpreting geological data, recalculating the trajectory based on changes in the subsurface and monitoring risks for safe and efficient operation.

4. Proposed artificial intelligence agent

The report describes an autonomous intelligent agent that covers the entire lifecycle drilling operation: from data collection to execution real-time adjustments. It uses sensors, predictive algorithms, simulations with digital twins and continuous learning capabilities. It is designed to keep the drill bit within the productive zone, avoiding obstacles and maximizing

performance, without the need for constant human intervention.

Its main function is autonomous and immediate decision-making during the drilling, optimizing precision and reducing time, costs and risks. This agent represents a key tool for operating in geological contexts complexes such as Vaca Muerta, allowing for safer, more efficient and profitable, while adapting and improving with each operation executed.

5. Conclusion

The incorporation of AI and AIGEN into the drilling processes at Vaca Muerta involves a high-impact technological transformation. This approach promotes a smarter, more proactive and safer operation, aligned with the needs current energy sector. Companies that adopt these early technologies will be better positioned to lead in operational efficiency, cost reduction and long-term sustainability.