

Industry	Oil and Gas
Use Case Title	Predictive Maintenance of Compressors
About the Customer	Petroleum Development Oman is an Oil & Gas exploration and production company. A local IT company in Oman partnered with us for the Data & Analytics solution development
Business Problem	<p>Compressors are used in the process of production of oil and gas. Currently they are monitored by the maintenance team using real time sensor data which requires 24x7 manual work. Also, due to multiple components in each compressor is tedious and prone to human error. Customer is looking for a solution which will:</p> <ul style="list-style-type: none"> <li>• Automate the monitoring</li> <li>• Identify the specific component failure</li> <li>• Generate alerts for maintenance team before compressor failure.</li> </ul>
Solution	<p>AI based solution was developed to fulfil the customer requirements. The overall solution approach is described below.</p> <p><b>Stats</b></p> <ul style="list-style-type: none"> <li>▪ Around 150 sensors per compressor</li> <li>▪ Generate results every 30 minutes daily</li> </ul> <p><b>Deployment</b></p> <ul style="list-style-type: none"> <li>▪ On-premise servers.</li> </ul> <p><b>Approach</b></p> <ul style="list-style-type: none"> <li>▪ Deep learning based anomaly detection to monitor the condition of each compressor</li> <li>▪ Auto encoder model trained on normal data and learns to reconstruct the input so that the error between the input and output is low</li> <li>▪ When trained model is used for inference, error is low when input is normal data. When abnormal data is fed to model, error is high and we can label the input as abnormal.</li> <li>▪ Unfortunately, no metrics or benchmark was used to measure the performance of model due to unavailability / technical difficulty in generating labels by technical team.</li> </ul> <p><b>Implementation</b></p> <ul style="list-style-type: none"> <li>▪ Research, finalization and implementation of solution took around 2 months.</li> <li>▪ Once implemented for single compressor and tested, solution is now being scaled to other compressors with duration of 2 days per compressor.</li> <li>▪ Some improvements and changes are also ongoing based on feedback.</li> </ul>
Outcome	<ul style="list-style-type: none"> <li>▪ Maintenance team can now receive alerts for each compressor. These alerts types are low, medium or high based on severity.</li> </ul>

- Also top-10 anomalous sensor for each alert are also shared so that maintenance team can inspect and repair specific components.
- Maintenance team can now get the real time alerts for all the compressors on a single dashboard and can take data driven actions. Data Science team is now working with technical team to improve the number and category of alerts.