

# CASE STUDY

## **MACHINE LEARNING INCREASES OIL RIG UPTIME BY PREDICTING VALVE FAILURES**

### **Client Background**

Our client is widely recognized as a global leader in delivering a secure, open, intelligent, and transformative enterprise cloud platform. Its technology is built on a private network and is the product of nearly 20 years of innovation in security, network architecture, collaboration, artificial intelligence, and open source software.

Our client offers a simply engineered set of tools and unparalleled technology that help bring people, insights, and ideas together. Customers across more than 150 countries trust our client to modernize their computing environment for today's digital world.

### **Business Challenge**

The oil and gas market was in need of a model that could process different types of input sensor data, extract meaning, and provide advanced analytic capabilities for particular production problems. One of the use cases is preventing the failure of valves which are involved in the process of building chemical based products.

Typically, companies experience issues during pressurization, and when a poppet valve fails, the factory has to be stopped or production paused for maintenance—resulting in lost time and revenue. Having the ability to determine if or when a valve might fail would be of tremendous value in mitigating these issues.

## Project Description

SoftServe's main objective was to determine whether machine learning could be utilized to develop an algorithm model that was capable of predicting the potential or imminent failure of a valve in a two week period based on the time-series data from over 100 sensors.

A machine learning model was built to make daily predictions for the poppet valve failures on the factory for a 10-14 day period. Some key challenges included noisy real-world sensor data, too few fails of individual components to easily extract patterns, and no clear difference in data between fail and maintenance periods. These challenges produced several errors in labeled data.

Training data included:

- Cooler, plunger, hyper section temperatures
- Plunger positions, discharger pressures, gas flow rates
- Statistics on ~100 historical failures for eight different components

Technologies used:

- XGBoost, group-based cross-validation
- Python for data processing and modeling
- GCP for data storage

## Value Delivered

During the PoC phase, delivered in four weeks, almost 5000 time series characteristics were generated each day to build an accurate prediction model. This model generates daily predictions with 0.62-0.69 test AUC (accuracy for unbalanced classes) whether a failure will happen in the next 10-14 days.

Modelling of this machine learning solution facilitates the prediction of valve failures on oil rigs and factories, and can significantly increase their uptime by through the scheduling of proper maintenance in advance.

## ABOUT US

SoftServe is a digital authority that advises and provides at the cutting-edge of technology. We reveal, transform, accelerate, and optimize the way enterprises and software companies do business. With expertise across healthcare, retail, media, financial services, software, and more, we implement end-to-end solutions to deliver the innovation, quality, and speed that our clients' users expect.

SoftServe delivers open innovation—from generating compelling new ideas, to developing and implementing transformational products and services.

Our work and client experience is are built on a foundation of empathetic, human-focused experience design that ensures continuity from concept to release.

We empower enterprises and software companies to (re)identify differentiation, accelerate solution development, and vigorously compete in today's digital economy—No matter where you are in your journey.

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### USA HQ

201 W 5th Street, Suite 1550  
Austin, TX 75703  
+1 866 687 3588

### EUROPEAN HQ

One Canada Square  
Canary Wharf  
London E14 5AB  
+44 (0) 800 302 9436

[info@softserveinc.com](mailto:info@softserveinc.com)  
[www.softserveinc.com](http://www.softserveinc.com)

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