



## About the Client

The Client is a global leader in Industrial Automation

## Business Problem

The client, a manufacturer specializing in Industrial Automation products, faced challenges with their current product demand forecasting methodology. Relying solely on inputs from the sales team for demand predictions resulted in inconsistencies between expected orders and actual sales. This discrepancy led to excessive accumulation of product inventory, impacting operational efficiency and profitability. To address this issue, the client sought an accurate and data-driven approach to predict product demand and optimize inventory management.

## Solution

In collaboration with the client, we embarked on a comprehensive solution to enhance their product demand forecasting. Leveraging three years of historical data encompassing product demand, production, and inventory information, we initiated the process by conducting exploratory data analysis. This allowed us to gain deeper insights into historical demand patterns and identify correlations between demand, production, and inventory levels.

To streamline the forecasting process, we categorized products based on their historical monthly demand data, segregating them into A, B, and C categories based on demand intensity. After consultation, we focused our efforts on forecasting demand solely for the high-demand "A" category products. Using advanced techniques, we addressed missing data and employed the Dickey-Fuller test to evaluate non-stationarity. Subsequently, we treated trends and seasonality to transform the data into a stationary format.

With the data prepared, we explored several time series algorithms, including ARIMA, Holt-Winters, and RNN LSTM. Our evaluations demonstrated that the baseline ARIMA model achieved a demand forecasting accuracy ranging from 80-85% for high-demand products. Additional experiments with Holt-Winters and RNN LSTM indicated higher accuracy levels of 90-92% and below 90% respectively. Considering the superior performance, we chose the Holt-Winters model for deployment due to its consistent and accurate demand predictions.

## Outcome

Following the integration of the new machine learning demand forecasting models, the client witnessed significant improvements in their demand prediction accuracy, particularly for high-demand products. Armed with more precise forecasts, the client successfully optimized production



planning and inventory management. The accurate insights empowered the client to proactively adjust production levels based on real-time demand, thereby reducing excess inventory and minimizing the risk of stockouts. This strategic approach streamlined operations, improved resource allocation, and bolstered the client's overall business performance.

### Technology Landscape

The solution utilized Python, leveraging the power of Sci-kit Learn for data analysis and manipulation. Time series forecasting was achieved through the application of diverse algorithms, including ARIMA, Holt-Winters, and RNN LSTM, each tailored to the specific demands of the problem. The technology stack ensured accurate demand predictions and actionable insights, enhancing the client's efficiency and competitiveness within the Industrial Automation sector.