Manufacturing

Devising Blend Optimization Framework To Maximize Value Potential Of Coke Production

AI enabled UI tool enhanced performance and quality parameters

Industry

Energy Management

Function

Production & Maintenance

Data Sources

1. ERP
2. Lab Data(LIMS)
3. External Data(Vendor)
4. Historians

Tech Stack

1. TensorFlow
2. SQL
3. PiML
4. Power BI

Who Is The Client?

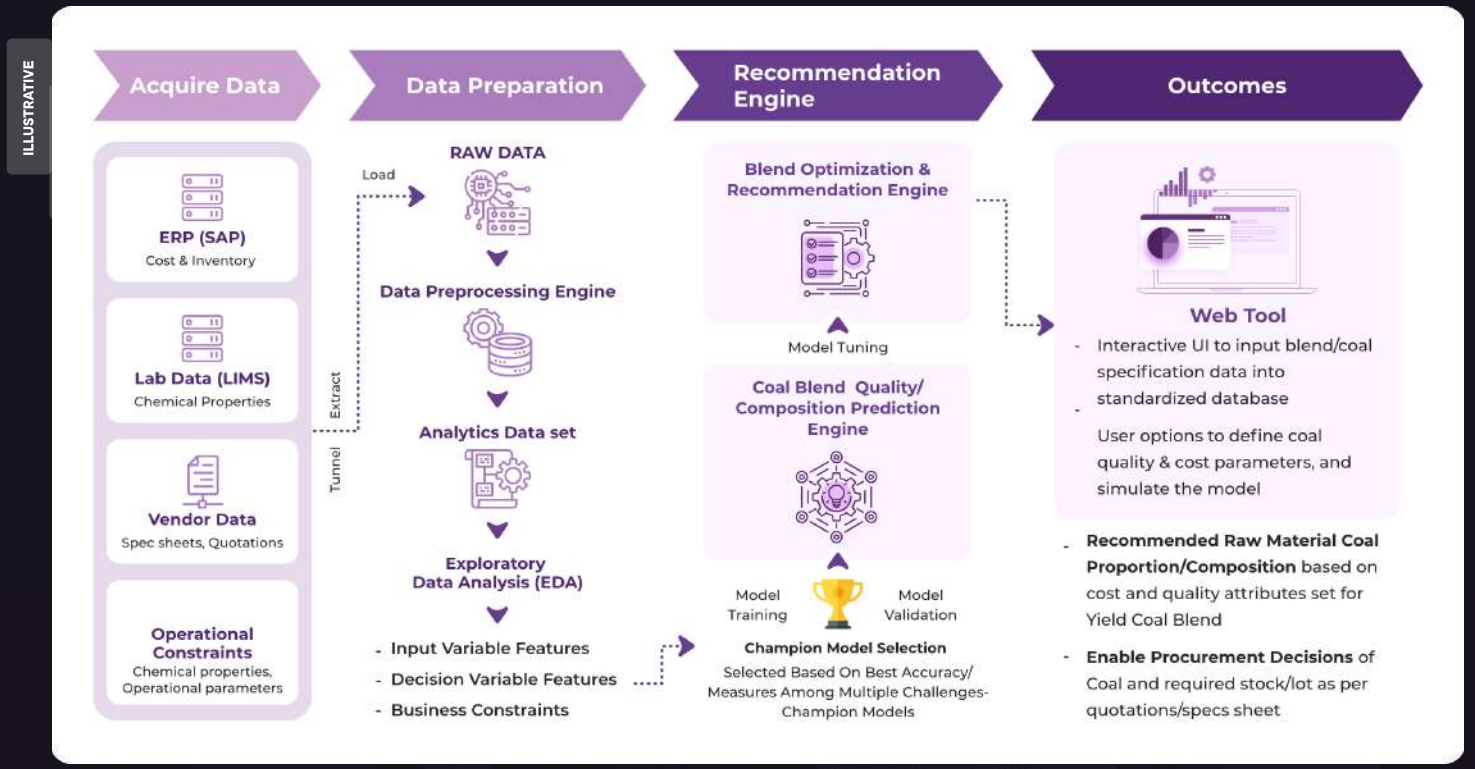
With a formidable impact on the metal manufacturing industry and a globally diversified presence, the client prioritizes self-sufficiency to inject value creation into society through process optimization in manufacturing Iron, Zinc, Steel, and many precious metals, like silver and copper.

Business Quandary

Coke constitutes 50% of the cost of molten metal extraction. Choosing the right blend of two or more coal types is challenging but critical to producing the desired coke quality at a low cost. The client needed Affine to build an automated system to simplify this decision-making process of choosing the right blend without compromising on calorific performance and quality composition.

How Did We Solve The Problem?

Our team of Decision Science experts pre-processed different data sources (lab data, vendor spec sheets, and cost/inventory information) that play a role in blend composition. This was done through Linear Programming and MILP. Later, we trained a model through Machine Learning to develop an advanced blend optimization framework using this analytical dataset. The model analyzed cost and quality relationships to help the client choose cost-efficient and high-quality coal blend compositions.



The Pay Off

We designed and customized an autonomous web user interface tool for the client. This tool identified profitable linkages between input metrics and decision variables using neural networks and genetic algorithms. It reduced the variation in coke quality parameters, including CSR, CRI, M40 and M10 with thin blends. The client obtained recommendations based on cost and quality attributes to choose optimal coal blends that were superior but inexpensive. They were also able to innovate their procurement approach for restocking and inventory.

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Augmented Outcomes

The client accomplished the following milestones:

↓ Reduction In Variability With Respect To Strength And Reactivity Indices

4% - 6% ↓ Reduction In High-Value Coal Consumption

↑ Increase In Procurement Savings