Asphalt Plant Achieves 15-19% Increase In Fuel Efficiency Using END GAME

Background:

A major international asphalt producer identified a pilot project at one of its continuous throughput asphalt plants, a plant that already had one of the lowest fuel usages in the business. The project was designed to demonstrate the value of machine learning derived prescriptive analytics in optimizing the plant's performance around energy consumption and carbon emissions. Specifically, the pilot project focused on the use of advanced machine learning ("AML") to optimize the natural gas consumption efficiency of the plant relative to overall plant volume.

Objective:

The objective of the pilot project was to use machine learning tools to inform the plant's operators in real-time of step(s) to be taken to increase

fuel efficiency while maintaining or increasing the plant's throughput rate; and maintaining or improving product quality. Recognizing that fuel efficiency may vary given the asphalt mix being run at any given time, it was necessary to understand the data for each of the several mixes run by the plant in order to give mix-specific guidance to the operators.

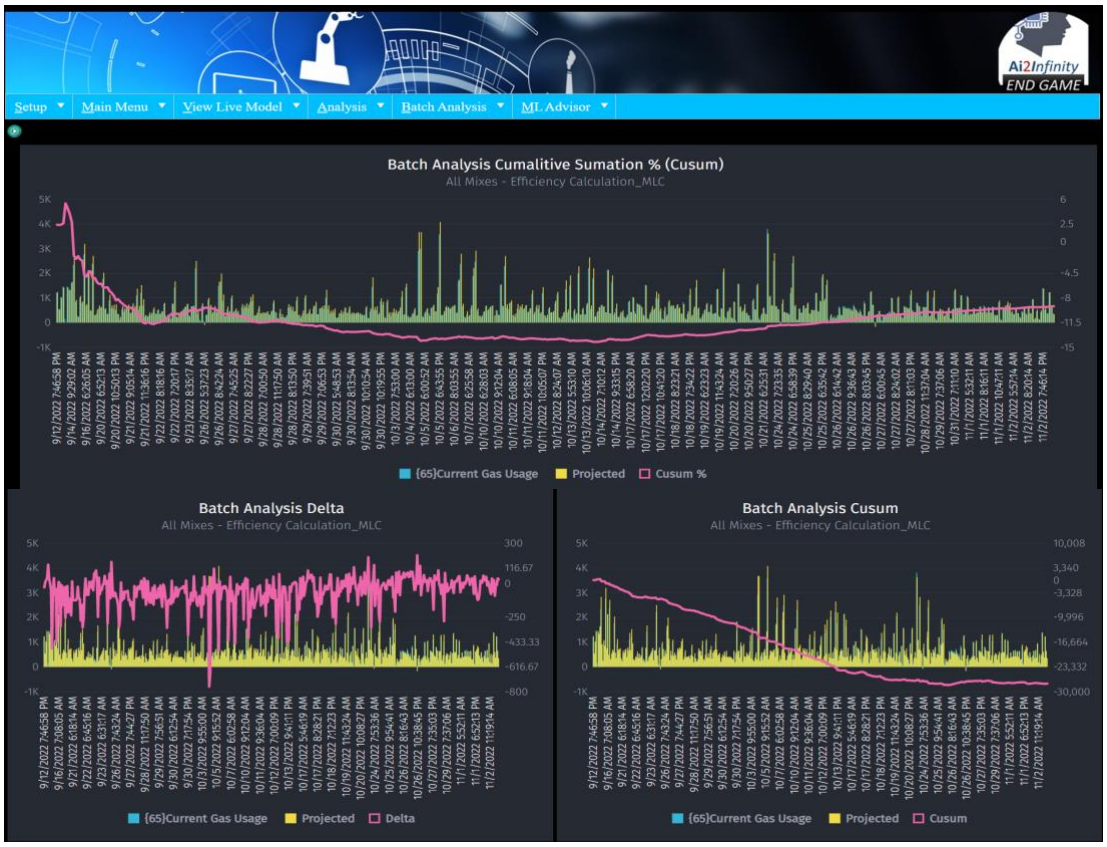
Project:

The plant installed Ai2Infinity's END GAME device and began collecting real-time data from the plants PLC, including ambient weather data from a weather station installed at the site for the project. END GAME analyzed the data and discovered the relationships between the key variables to be included in the AML optimization model. After collecting sufficient data to build a reliable model, the team began conducting a series of trials to test the reliability of the model against the various weather conditions at the site and the product mixes run by the site. A dashboard was developed within END GAME (see Figure A) to provide real-time recommendations to the operators on those set point adjustments required to maximize fuel efficiencies (e.g., burner position and production rate) given dynamically-changing operating conditions. Once the plant team was comfortable with the recommendations derived from the optimization model, those recommendations were brought to the operators through an HMI link to the plant's SCADA system in the control room.

(Figure A)

Results To Date:

The plant has achieved an overall improvement in fuel efficiency measured using IPMVP (International Performance Measurement & Verification Protocol) with savings in excess of 15% on natural gas consumption (see Figure B).



(Figure B)

END GAME tracks the plants normalized gas consumption in real-time against RAP %, Mix-type, Mix Setpoint, Production rate and Weather, along with numerous other variables. END GAME analyzes the impact of all these variables on each particular product mix. The dynamic modelling capability within END GAME seamlessly learns as it encounters different operating conditions and, given those conditions, recommends new settings to the operators through the plant's SCADA platform.

Lessons Learned:

- Prior to this project, the conventional wisdom in operating this and other continuous throughput asphalt plants was that slower operating speeds led to more fuel-efficient production. END GAME demonstrated that, in most cases, just the opposite was true, leading to a 15-19% increase in efficiency at higher production rates.
- The increase in efficiency at higher production rates has also had the collateral benefit of allowing the RAP levels to be increased from 20 - 35%+, thereby substantially reducing the overall cost of the plants raw materials.
- END GAME has the potential of identifying areas in which specific operators need additional training and of facilitating the training process.