



Multi-Product Single-Period

+ Inventory



Topic ID OEA43T
Title Multi-Product Single-Period + Inventory
Category O-Optimize Production
eLearning Level Basic

Introduction

Multi-product manufacturing takes place at refineries. Diesel, gasoline, aviation fuel, and many other products are produced as a result of continuous processes during refinery operation. A final refinery product is obtained by blending many intermediate products to achieve the desired quality, quantity, and schedule specification. To meet the availability of quality products in sufficient quantity at the right time, planning, scheduling, and optimization are crucial.

This topic will discuss component volume balance for all blend grades, limits imposed on the tank inventory by the planner, recipe constraints by the planner, equipment limits, blending constraints, component tank inventory restriction, volume balance of component taking into account all in and out flows, etc.

Constraints and Decision Variables for Blending Optimization

Different types of constraints for blend optimization include inventory constraints (volume limits on feed components) as well as quality/operational constraints. Quality constraints include analyzer limits as well as tank property specifications. Operational constraints restrict equipment concerning component flow. Considering minimum giveaway optimization mode, the minimum cost (in cost-mode calculation) should be less than the cost function value.

In the context of blending optimization, there are many decision variables such as rundown total flow, feed component property, blend volume, segregation flow, total flow to blender, product property variables, etc. In the destination tank, blend volume refers to predicted volume. Here, product is supposed to meet prescribed specifications. The

segregation tank receives flow from the rundown stream. This flow is called segregation flow.

All problems are formulated, keeping in view that blending optimization is multi-objective optimization. To keep products as per specification by controlling the blend process is the primary objective, whereas cost minimization is a secondary objective. The giveaway mode or minimum distance mode may also be the secondary objective. There may be a combination of objectives.

The control mode keeps a product on specification, while cost mode minimizes the cost of the feed component. The giveaway mode minimizes quality giveaway, i.e., helps in producing the high-quality product in such a manner that the quality of product is better than the specification. The giveaway mode is crucial as the money lost (in achieving quality better than specification) is reduced by this mode. The minimum distance mode helps in reducing the distance between current value and target value.

Summary

This topic walks through the blend constraints and decision variables for blending optimization. It gives a brief overview regarding primary, secondary and combo objectives.

Options for eLearning This Topic

Mode of eLearning	Available?
Free Course	No
Refresher Course	Yes
Pick N Choose (Custom Curriculum)	Yes
Advanced Level Course	Yes
Structured MCOR Curriculum	Yes