

Optimal Scheduling of Refined Products Pipelines and Terminal Operations

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PROBLEM STATEMENT

Given: (a) a multiproduct pipeline connecting an oil refinery to a unique distribution center; (b) the number and type of products to be transported; (c) the forbidden two-product sequences; (d) the daily product demands at the distribution center; (e) the alternative lot sizes and the maximum storage capacity for each product; (f) the initial pipeline conditions (sequence of batches inside the line at $t = 0$ and their sizes); (g) the initial inventory of every product in terminal tanks; (h) the maximum number of lot injections throughout the time horizon; (i) the constant pumping rate; (j) the minimum settling time for each product; and (k) the specified number of daily periods comprised by the multiperiod time horizon.

The problem is to determine:

- (1) the sequence of product lots to be pumped in the pipeline;
- (2) the selected lot sizes and the starting/end times of lot injections;
- (3) the amounts and types of products delivered to storage tanks from batches arriving to the terminal during every lot injection;
- (4) the starting time for the lot settling period, i.e. the time at which it has been completely loaded in the terminal tank;

- (5) the end time of the settling period at which the lot is released to meet client demands;
- (6) the product inventory management at the unique terminal by simultaneously considering product batches on settling period, released product lots and client demands on a daily basis.

We present 3 variations of the problem:

- (a) A fixed sequence of products has been arbitrarily adopted before solving the problem (fixed sequence case).
- (b) An incomplete pre-defined product sequence has been adopted, with a limited number of open positions to be filled with pre-defined allowable products (mixed sequence case).
- (c) No pre-defined product sequence has been previously adopted, and the complete sequence of lot injections is a model decision (free sequence case).

Reference

1. Cafaro, D. C.; Cerdá, J. Efficient Tool for the Scheduling of Multiproduct Pipelines and Terminal Operations. *Ind. Eng. Chem. Res.* **2008**, *47*, 9941–9956.
2. Relvas, S.; Matos, H. A.; Barbosa-Póvoa A. P. F. D.; Fialho J.; Pinheiro A. S. Pipeline Scheduling and Inventory Management of a Multiproduct Distribution Oil System. *Ind. Eng. Chem. Res.* **2006**, *45*, 7841-7855.