Oil Refinery Optimisation using Linear Programming (LP)

Example training module 1

This module is suitable for those with limited or no Linear Programming (LP) knowledge and are curious how LP technology is used in the refining industry.

This module explains the economic concepts for refinery optimization and presents a graphical solution to a simple refinery LP problem.

Contents

Included in this sample

Remainder of the training module (not incl in the sample)

Learning Outcomes

After completing this module, you will be able to:

- Describe what LP (Linear Programming) is
- Understand and visualize how LP inputs determine the optimal solution
- Use a graphical method to solve an LP problem
- Understand that software is used to solve LP problems quickly

What is LP?

- Linear Programmimg (LP) is a mathematical method to achieve the best outcome for a system of limited resources.
- The constraints on the system and the objective function can be described in linear terms, (or “straight lines”).
- The feasible region is defined by these constraints, which may be equality or inequality (linear) equations.
- The best outcome will be the minimization or maximization of this objective function. In the context of most businesses, maximizing profit (or minimizing costs) is the usual optimization outcome.
- In the context of the refining business, maximizing the processing margin on crude oil purchases and product sales is the desired outcome.

Refinery Optimisation

Inputs

- Crude Purchase options
- Product Sales options
- Prices : Crudes, Products, Utilities
- Processing Capability

Outputs

- Purchase and Sales Amounts
- Operating Conditions
- Optimum Variable Margin

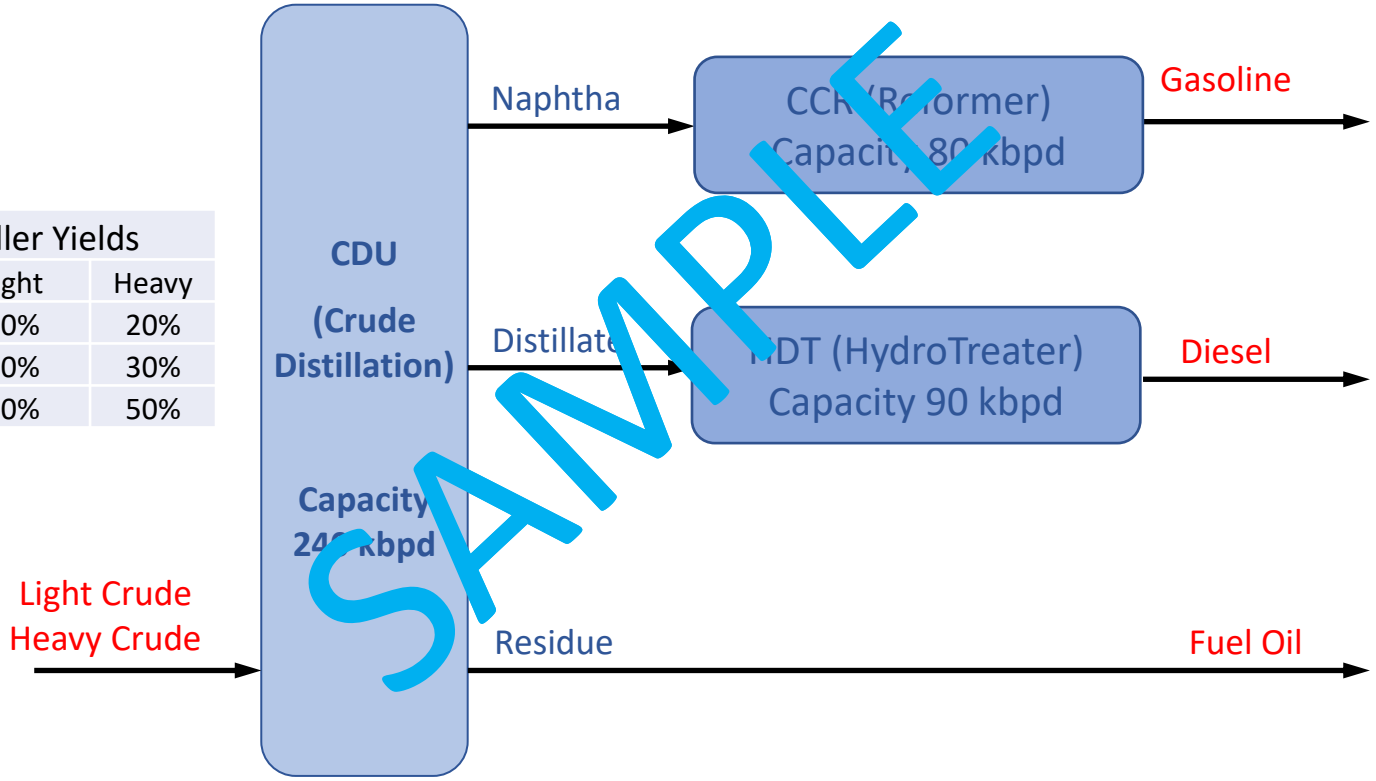
For a given pricing environment;

- what is the optimal mix of crudes to purchase?
- what products to make?
- and how to run the refinery?

Our refinery configuration

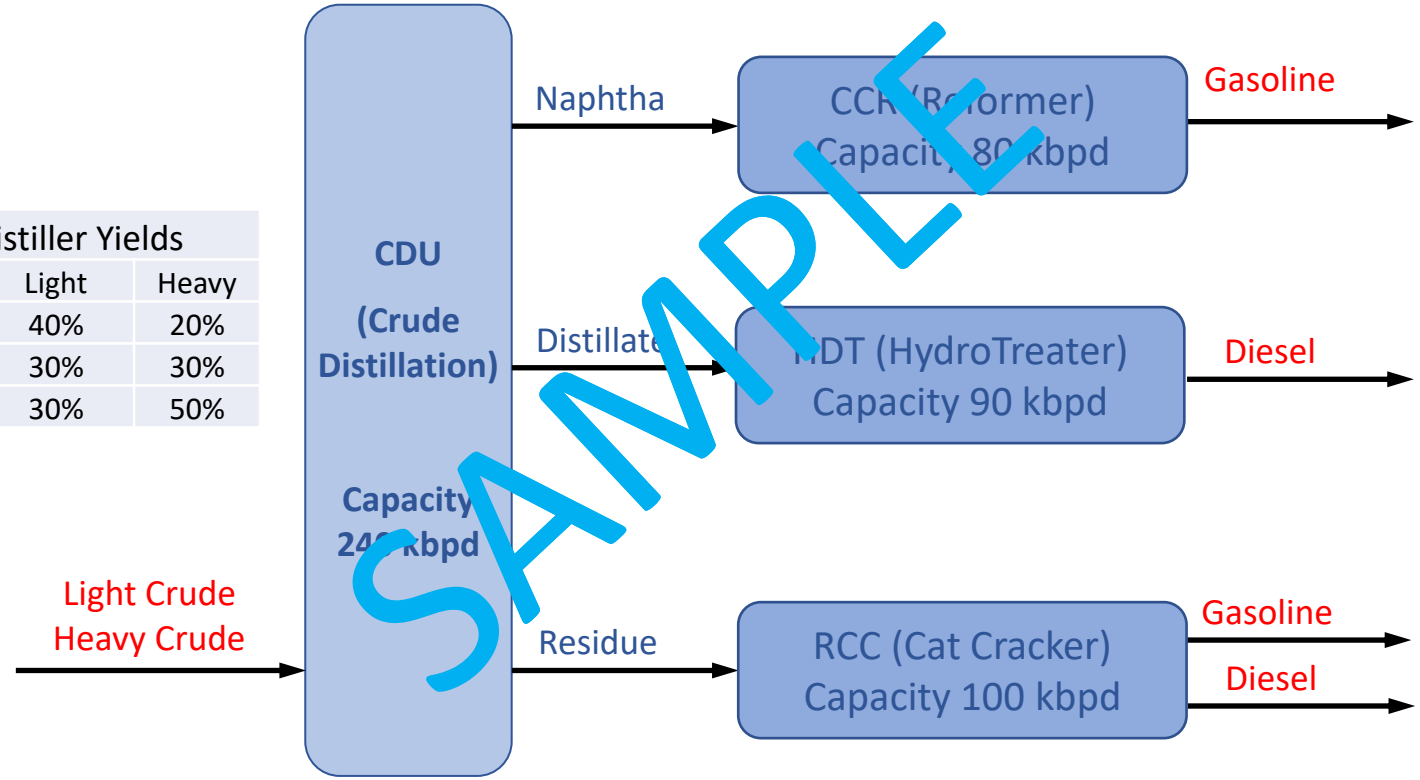
Partial Upgrading Capability => no residue upgrading

Crude Distiller Yields		
	Light	Heavy
Naphtha	40%	20%
Distillate	30%	30%
Residue	30%	50%



Full Upgrading Capability

Crude Distiller Yields		
	Light	Heavy
Naphtha	40%	20%
Distillate	30%	30%
Residue	30%	50%



RCC Yields	
Gasoline	60%
Diesel	40%