

## Abstract

The refining industry plays a very important role in international economics and in our daily life. The world refining capacity has increased rapidly during the last decade and this makes operation planning, scheduling, and optimization in general become important tools for the refinery industry. However, environmental regulations is pressing the refinery industry to minimize its emissions, namely SO<sub>2</sub>.

An efficient model for the refinery planning will represent production planning with different SO<sub>2</sub> mitigation options in order to meet certain SO<sub>2</sub> reduction. The model will be illustrated on a case study. The aim of the model is to maximize the profit of an oil refinery by producing certain amount of each product with specific quality and meet a SO<sub>2</sub> reduction target by implementing several mitigation options. A nonlinear unit models that can find a more accurate products flow rate and properties rather than the linear model of assuming fixed yield will be developed and linked with a nonlinear properties blending equations to represent a more accurate properties of the final products. The overall model considered the SO<sub>2</sub> mitigation options to select the least cost option that gives the desired reduction.