



## Oil Refinery Improves Throughput and Efficiency

### The Company

National Petroleum Refiners of South Africa (NATREF) is part of Sasol Oil, South Africa's only inland oil refinery. The NATREF refinery is designed to process heavy, high-sulfur crude oils. Operations at NATREF are characterized by world class refinery performance in terms of availability and operating stability.

### The Challenges

The refinery consists of different functional areas that are integrated in an extraordinarily complex manner. The main areas are Inbound Crude Tanks, Primary Refinery Plants, Intermediate Tanks, Intermediate Plants, Final Component Tanks, Blending Tanks and Final Product Tanks. Production processes through the plant can follow various routes based on the type of crude oil and the type of end-product. NATREF needed a way to manage such aspects of the plant more effectively as: shutdown scheduling of individual sub-plants; how to react on sudden demand changes due to market forces; and indications of possible capacity constraints or additional requirements.

### The Deliverables

NATREF's drive for continuous improvement in throughput and refinery efficiency led to the initiation of a project during which a simulation model was developed using Arena® simulation software. The model performed shutdown planning and transfer capacities between units and evaluated such parameters as:

- Impact of increasing volumes and new processes on current capacity.
- Influence of planned shutdowns.
- Effect of capacity changes of plants and storage facilities.
- Impact of blending changes.
- Effect of yield changes at different plants.

The model was designed to interface with other information systems to enable users to obtain the necessary input parameters, such as: plant yields according to crude input; plant operation modes due to

downstream capacity; current tank levels; tank limits; final product blending schedules; and final product dispatching schedules.

### The Results

The project resulted in a tool that allows users to easily import data from other systems and view the resulting outputs with interfaces created in Microsoft® Visual Basic for Applications®. No changes need to be performed in the Arena model - everything is driven from external spreadsheets. The model provides the following outputs: tank level plots; reporting of tank overflow and empty occurrences; and production summary. The use of this model as a decision support system will assist NATREF in objectively analyzing shutdown-scheduling alternatives and facility throughput enhancement and indicating possible bottlenecks for cost effective capital expenditure.



### For more information, contact us:

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