



Load Rack Modeller

Are you designing a new load rack or considering upgrading your existing load rack because of problems with long queuing times or projected increase in throughput, or do you just want to check on the productivity of your existing load rack?

If you intend to perform any of these tasks then let the **DKI Load Rack Modeller** take the guesswork out of your analysis and design work.

Diamond Key International has developed a software modelling tool that can simulate loading activities in a loading rack. This tool scientifically uses inputs relating to your loading activities, and bay configuration and generates outputs including KPI's and graphical representation of how a particular configuration performs.

This Model has been developed and proven over many years; its results have been validated against actual terminal operations. It can be used for single or double sided configurations and provides a scientific analysis of load rack operation/performance to enable customers to evaluate a number of aspects associated with the load rack.

Load Rack Modelling provides the ability to take into consideration all the variables in load rack operations. These can be tuned for top loading, bottom loading and mechanical loading. Some of the time variables are: *enter the bay, connect interlocks, select and connect each arm, load authorization, start each loading arm, change arm to next compartment, park arm, disconnect interlocks, exit bay, ramp up time, ramp up volume, ramp down time, ramp down volume, and of course flow rates.*

The modelling software requires one or more load profiles or types of loads to be defined to represent the actual or planned loads e.g. single product loads or mixed product loads and in this case how many compartments of each product, also the size of the vehicle and number of and size of compartments. It also requires Load Schedules, being the average number of load profiles that arrive at the terminal each hour in a 24 hour period.

DKI have also developed a Load Analysis tool, which assists in generating Load Profiles and Load Schedules from real terminal data. This tool reviews actual loaded data, which can be from an existing TAS, ERP or manual system. The Load Analysis tool outputs:

- Day summary of loads
- Product summary
- Load profile summary
- Load schedule list

Optimum results are obtained by providing at least 3 weeks loading activities preferably during a peak load period. This ensures a set of loading details that closely resembles actual loading activities in the terminal.

The modelling software performs a finite analysis on the loading gantry. This process schedules each truck to the optimal bay and calculates detailed queuing and loading time for each bay for every minute of a 24 hour period. Typical use includes obtaining current actual loading data from the site at input data to the Load Analysis tool which generates Products, Load Profiles and Load Schedules outputs which in turn are used as inputs to Load Modelling.

Diamond Key International		Load Rack Modeller													
Load Rack Report															
Client:	New Fuel Co	Site:	Alice springs	Scenario:	Baseline	25-Oct-06		14:05							
Load Rack Summary		Ref	Lead Rack		Product Summary				Summary KPI's						
Bays:		Mechanical Loading	0		Product No.		Total Qty		Total Capacity		Daily Volume		% of Total		
Top Loading		0		1		AGO + 20% Diesel		4		44%		480		1,422	
Bottom Loading		2		2		ULP		3		39%		360		2,706	
Total Bays		2		3		ULP 10% Ethanol		2		22%		240		526	
Total Arms		9		3											
Total Products		3													
Daily Product Throughput		L.Millions		4.53											
Total Load Profiles		7													
Total Loads		Daily		17%											
Performance Indicators		Total loading time all trucks		Minutes		2,616		Average Bay Utilization		%		91%		Total yard time all trucks	
Maximum Wait Time		Minutes		106.1		Maximum Queue Length		Trucks		9		Yard efficiency		6.6%	
Track Waiting Time (TWT)		Minutes		3,871		Trucks Impacted (PIT)		Trucks		185		Total site time all trucks		10,337	
Average Waiting Time		Minutes		46		No Trucks Impacted (PIT)		Trucks		0		Average Bay Utilization (%) = Sum of utilization for all bays / No. of Bays		3,202	
No Trucks Not Impacted		Trucks		30		Average Waiting Time (PIT)		Minutes		46		Total yard time all trucks		6.6%	
Trucks Not Impacted		Trucks		0		No Trucks Not Impacted		Trucks		0		Yard efficiency (%) = (Total yard time / Total yard time)		10,337	
												Flowrate @ Bay (minutes) = daily product throughput / (based on 1 truck)		max @ rate for 1 bottom @ rack (7.3/min)	
												Total site time (minutes) = Total yard time + Other Activity Time			
												Flowrate			
												General			
												This page summarizes performance of individual bays & site			
												Peak indicators are provided for comparison of bays:			
												- Lower is better for size, queues, and trucks impacted			
												- Higher is better for cost, trucks not impacted			
												Utilization is based on 24 hours, not the hours of operation			
Bay Summary		Bay 1		Bay 2											
Bay Configuration		Loading Method		BOTTOM		BOTTOM									
Linked To Bay		5		4											
Arm Details		Ref													
Arm 1 Product Code		E00		E00											
Flow Rate		2.0		2.0											
Arm 2 Product Code		E00		E00											
Flow Rate		2.0		2.0											
Arm 3 Product Code		ULP		ULP											
Flow Rate		2.0		2.0											
Arm 4 Product Code		ULP		E10											
Flow Rate		2.0		2.0											
Arm 5 Product Code		E10													
Flow Rate		2.0													
Arm 6 Product Code															
Flow Rate															
Performance Indicators		Ref													
Total Loads		Trucks		57		70									
Bay Utilization		%		50%		30%									
Maximum Wait Time		Minutes		106.1		102.3									
Track Waiting Time (TWT)		Minutes		3,736		3,236									
Trucks Impacted (PIT)		Trucks		51		64									
Average Waiting Time		Minutes		46.1		45.3									
Trucks Not Impacted		Trucks		18		14									
Other Activity Time each bay		Minutes		60		60									
Total loading Time each bay		Minutes		1,526		1,591									

The first output from the Load Model then becomes a baseline for comparison against outputs for changed configurations. For a typical loading gantry, once this baseline data has been validated, running the model only takes a few minutes so it is simple to perform 'what-if' type analysis and rapidly see the results against the baseline.

Based on this data one can then ascertain current loading and queuing times.

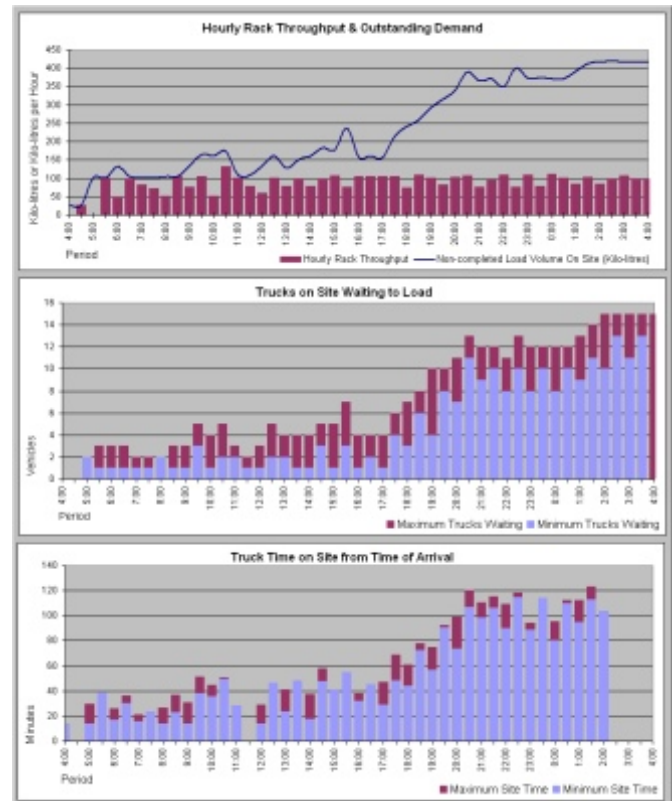
It is then possible to simulate the impact of eg:

- adding arms to bays and/or adding bays
- changing flow rates
- changing products over existing arms
- changing from top to bottom loading

The resulting output over various options can be graphed and the impact as a result of the changes can be quantified. From this a cost/benefit ratio can be derived.

Another use for the load analysis and modelling tools is to confirm productivity of an existing load rack configuration. This could be provided on a regular basis as the loads through a gantry change. Outputs could be used to review the arm/product mapping to improve terminal efficiency.

If you have a gantry that requires modelling, we can provide you with pro-forma templates to collect the required data. This can then be used as input into the model to run a range of options and provide a detailed report complete with graphs for each option. Where there is more than one option, which will give a similar improvement in performance, our report would include a reasoned recommendation as to which option should be used.



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