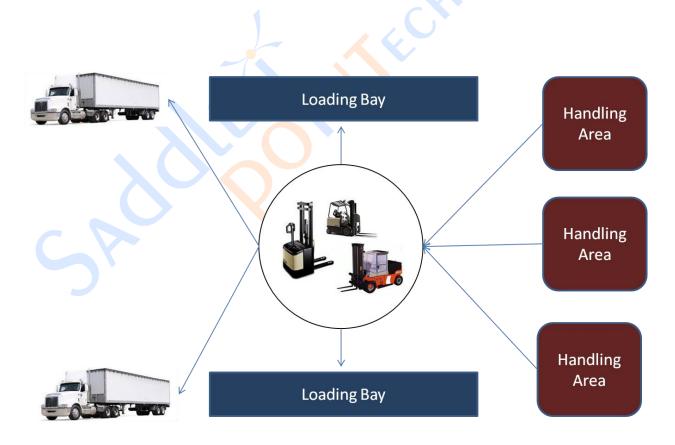# Dock Scheduling and Loading Optimization

Business Case

An FMCG company in Sweden was facing lot of difficulties in scheduling its dispatch trucks on its loading bays. This was because of the many constraints that were supposed to be adhered to e.g. loading bay capacities, moving and loading time characteristics of multiple handling resources, compatibility of loading resources with the loading bays, suitability of use of its many handling and loading resources during scheduling, using adjacent loading bays and availability of material etc.

The complication in scheduling often resulted in huge delays in dispatching the trucks to the cross docks and thereby trucks arriving late at the customer's location.

In addition to the regular features associated with any scheduling solution, some of the other complexities that were modeled were

- Allocation of adjacent lanes
- Ability to do scenario analysis by adding slack to the dispatch time
- Suitability of handling resources with loading bays
- Infeasibilities because of non availability or delay in material receipt

The objective was to find a feasible and close tor optimal plan for the dock scheduling and loading operations.
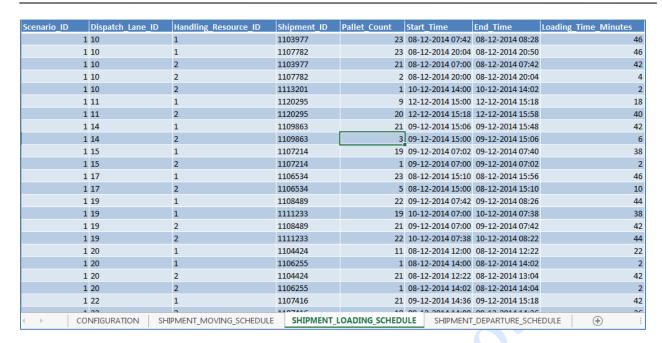
Solution

Saddle Point Technologies developed a Dock scheduling and loading solution using constrained programming with additional objective functions for driving optimality. The entire modeling was done in a very generic way so that various scenarios with multiple loading bay layouts, handling resource types, handling resource capacities, moving and loading times etc. could be modeled without changing the formulation.

Scenario_ID	Shipment_ID	FWhArea_Name	Dispatch_Lane_ID	Handling_Resource_ID	Pallet_Count	Start_Time	End_Time	Moving_Time_Minutes
1	1100870	LOWBAY	E03	2		20	07-12-2014 13:23	07-12-2014 13:43	20
1	1100870	MAN STORAGE	E03	2		23	07-12-2014 12:51	07-12-2014 13:14	23
1	1100870	MANUAL PICK	E03	2		17	07-12-2014 13:43	07-12-2014 14:00	17
1	1100870	TENT	E03	2		7	07-12-2014 13:14	07-12-2014 13:21	7
1	1100870	YARD	E03	2		2	07-12-2014 13:21	07-12-2014 13:23	2
1	1101155	MAN STORAGE	F106	1		2	07-12-2014 10:56	07-12-2014 10:58	2
1	1101155	LOWBAY	F106	1		3	07-12-2014 10:58	07-12-2014 11:01	3
1	1101155	MANUAL PICK	F106	1		16	07-12-2014 11:01	07-12-2014 11:17	16
1	1101155	MAN STORAGE	F106	3		11	07-12-2014 11:17	07-12-2014 11:28	11
1	1101155	LOWBAY	F106	3		27	07-12-2014 11:28	07-12-2014 11:55	27
1	1101155	MANUAL PICK	F106	3		5	07-12-2014 11:55	07-12-2014 12:00	5
1	1101721	LOWBAY	E05	1		1	07-12-2014 12:07	07-12-2014 12:08	1
1	1101721	LOWBAY	E05	3		34	07-12-2014 12:15	07-12-2014 12:49	34
1	1101721	MAN STORAGE	E05	3		7	07-12-2014 12:08	07-12-2014 12:15	7
1	1101721	MANUAL PICK	E05	3		11	07-12-2014 12:49	07-12-2014 13:00	11
1	1102221	LOWBAY	E03	3		21	07-12-2014 19:21	07-12-2014 19:42	21
1	1102221	MAN STORAGE	E03	3		25	07-12-2014 18:55	07-12-2014 19:20	25
1	1102221	MANUAL PICK	E03	3		18	07-12-2014 19:42	07-12-2014 20:00	18
1	1102221	TENT	E03	3		1	07-12-2014 19:20	07-12-2014 19:21	1
1	1102222	LOWBAY	F117	2		14	07-12-2014 21:39	07-12-2014 21:53	14
1	1102222	MAN STORAGE	F117	2		21	07-12-2014 21:16	07-12-2014 21:37	21
1	1102222	MANUAL PICK	F117	2		7	07-12-2014 21:53	07-12-2014 22:00	7
1	1102222	TENT	F117	2		2	07-12-2014 21:37	07-12-2014 21:39	2

CONFIGURATION | SHIPMENT_MOVING_SCHEDULE | SHIPMENT_LOADING_SCHEDULE | SHIPMENT_DEPARTURE_SCHEDULE | ⊕

Scenario_ID	Dispatch_Lane_ID	Handling_Resource_ID	Shipment_ID	Pallet_Count	Start_Time	End_Time	Loading_Time_Minutes
1	10	1	1103977	23	08-12-2014 07:42	08-12-2014 08:28	46
1	10	1	1107782	23	08-12-2014 20:04	08-12-2014 20:50	46
1	10	2	1103977	21	08-12-2014 07:00	08-12-2014 07:42	42
1	10	2	1107782	2	08-12-2014 20:00	08-12-2014 20:04	4
1	10	2	1113201	1	10-12-2014 14:00	10-12-2014 14:02	2
1	11	1	1120295	9	12-12-2014 15:00	12-12-2014 15:18	18
1	11	2	1120295	20	12-12-2014 15:18	12-12-2014 15:58	40
1	14	1	1109863	21	09-12-2014 15:06	09-12-2014 15:48	42
1	14	2	1109863	3	09-12-2014 15:00	09-12-2014 15:06	6
1	15	1	1107214	19	09-12-2014 07:02	09-12-2014 07:40	38
1	15	2	1107214	1	09-12-2014 07:00	09-12-2014 07:02	2
1	17	1	1106534	23	08-12-2014 15:10	08-12-2014 15:56	46
1	17	2	1106534	5	08-12-2014 15:00	08-12-2014 15:10	10
1	19	1	1108489	22	09-12-2014 07:42	09-12-2014 08:26	44
1	19	1	1111233	19	10-12-2014 07:00	10-12-2014 07:38	38
1	19	2	1108489	21	09-12-2014 07:00	09-12-2014 07:42	42
1	19	2	1111233	22	10-12-2014 07:38	10-12-2014 08:22	44
1	20	1	1104424	11	08-12-2014 12:00	08-12-2014 12:22	22
1	20	1	1106255	1	08-12-2014 14:00	08-12-2014 14:02	2
1	20	2	1104424	21	08-12-2014 12:22	08-12-2014 13:04	42
1	20	2	1106255	1	08-12-2014 14:02	08-12-2014 14:04	2
1	22	1	1107416	21	09-12-2014 14:36	09-12-2014 15:18	42
1	22	2	1107416	18	09-12-2014 14:00	09-12-2014 14:36	36

CONFIGURATION | SHIPMENT_MOVING_SCHEDULE | **SHIPMENT_LOADING_SCHEDULE** | SHIPMENT_DEPARTURE_SCHEDULE | ⊕

Some of the main reports provided were

- Shipment Moving Schedule

- Shipment Loading Schedule

- Shipment Departure Schedule

Scenario planning and evaluation was also an integral part of this solution.