DCSim

Belge Engenharia e Sistemas LTDA

Promodel Corporation Distributor in Brazil

Main Menu

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- About Belge
- Simulation Concepts
- DCSim
- Exit

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About Belge

BELGE

- Founded in 1995, originated from the engineering division of Siemens

- Focused in modeling and consulting projects, simulation and logistic optimization

- Official Promodel Corporation distributor in Brazil – Worldwide leader in the simulation software segment.

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Reference in Simulation Technology and Forecasting in Brazil

Innovation 2008

- 6 International Simulation Conferences (1999, 2001, 2003, 2006, 2007 e 2008)
- 2 International Forecasting Conference

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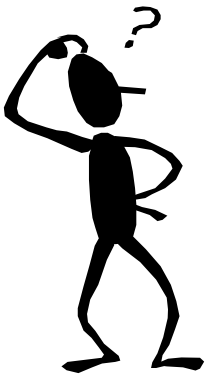
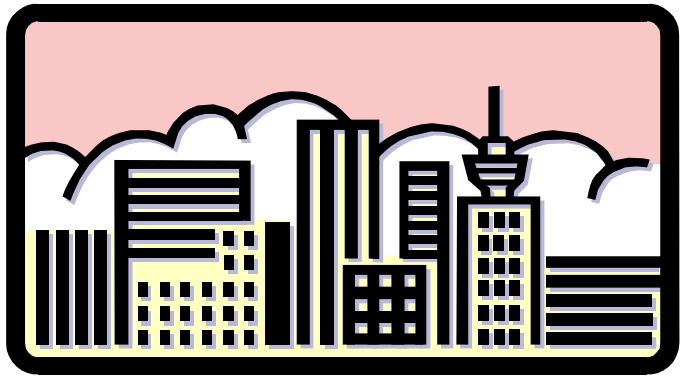
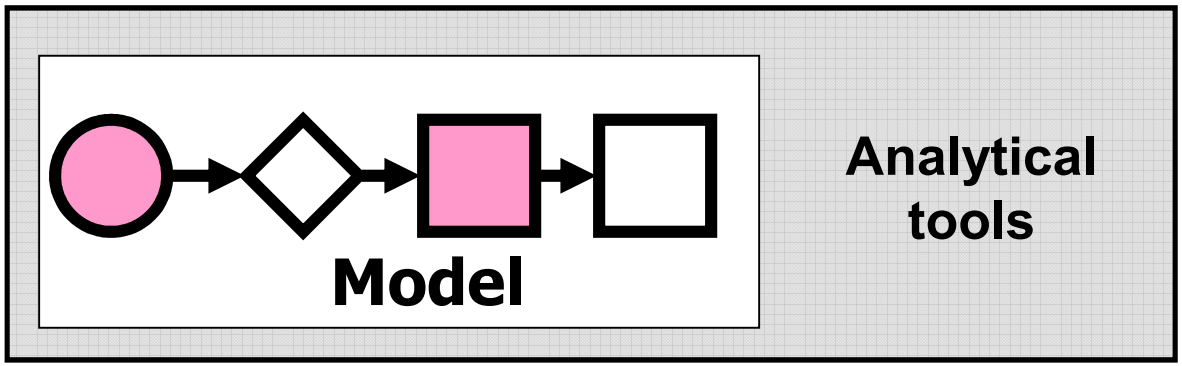
Analysis System Methods





Reality



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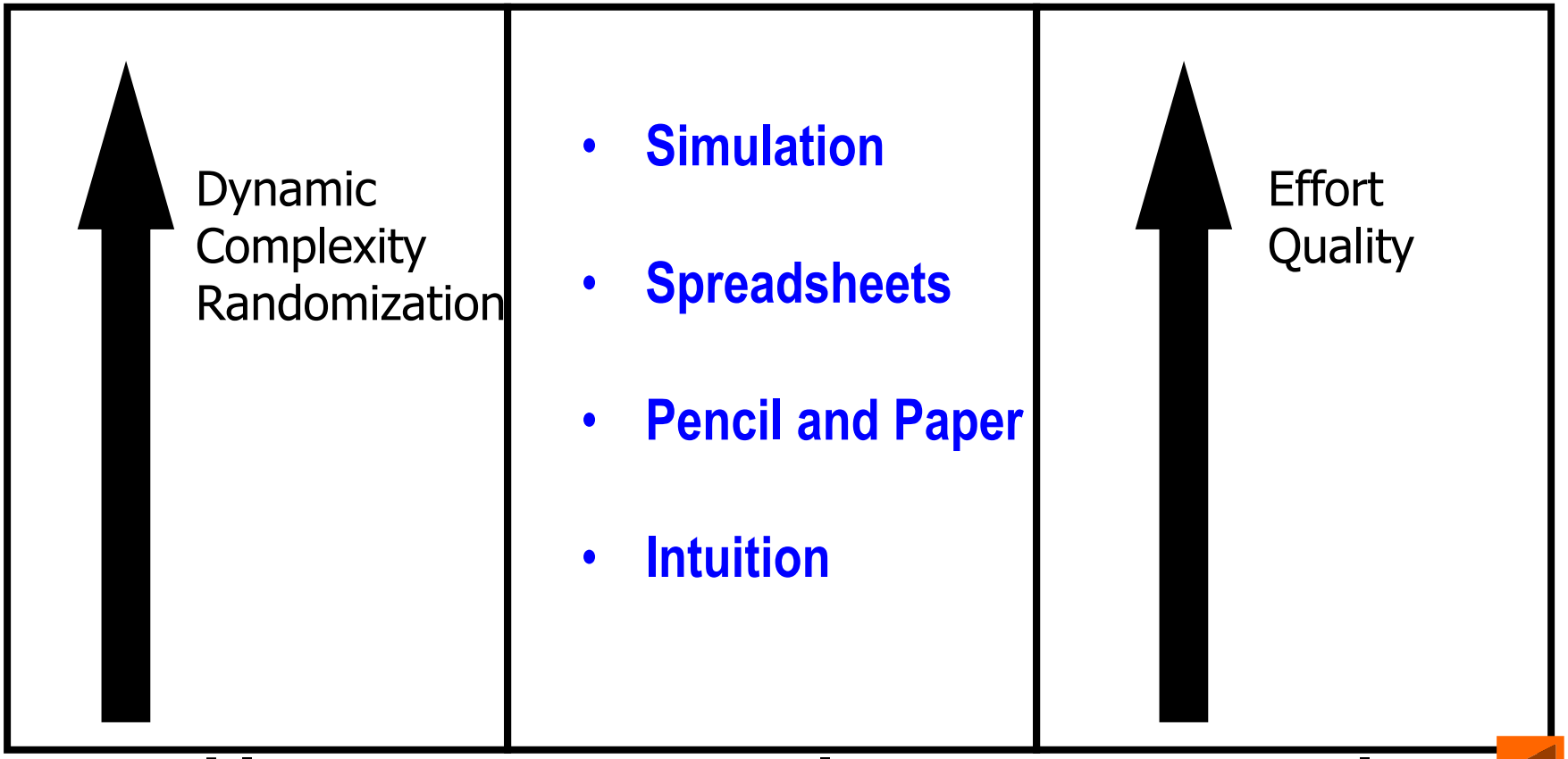
Analysis System Methods
Methodological Scale



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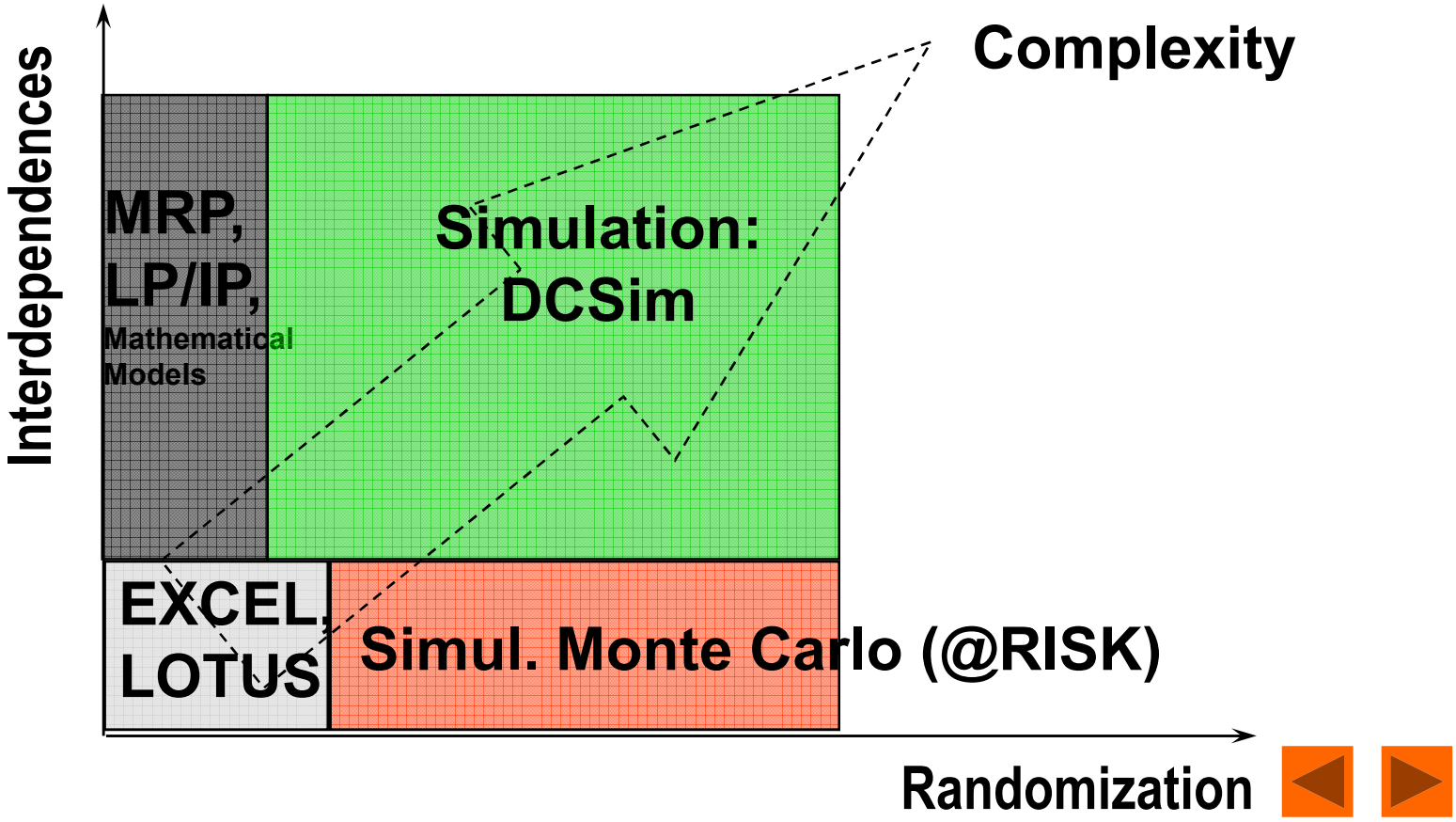
When should you simulate?



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The simulation value

1. If your company could make the best decision right on *the first attempt*

2. If your company could make the best decision in *half of the time*

How much would that be worth to you?

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Simulation –Virtually test your DC

The customer can construct and test different Scenarios

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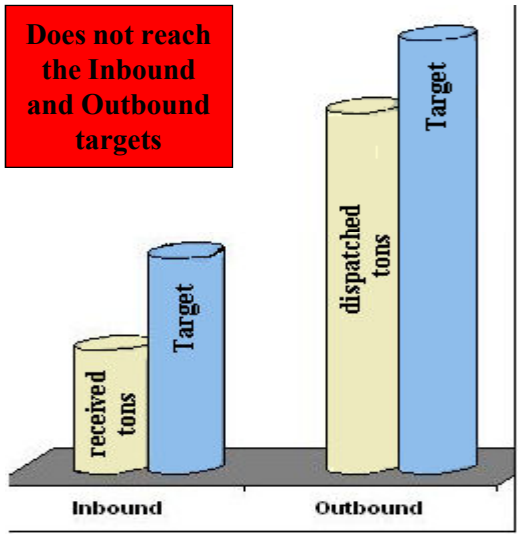
How simulation helps in decision making?

Base Scenario to be tested

Simulation Model DCSim

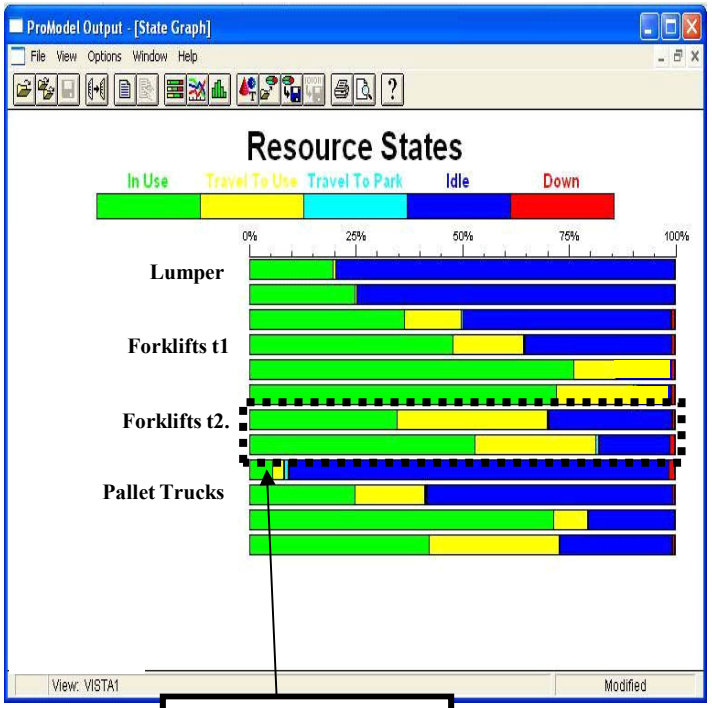
Results

Does not reach the Inbound and Outbound targets



Causes

Resource States on the tested scenario



Bottlenecks

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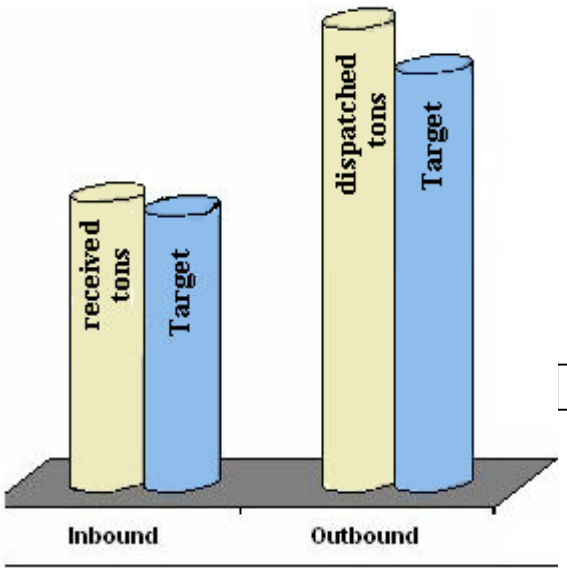
How simulation helps in decision making?

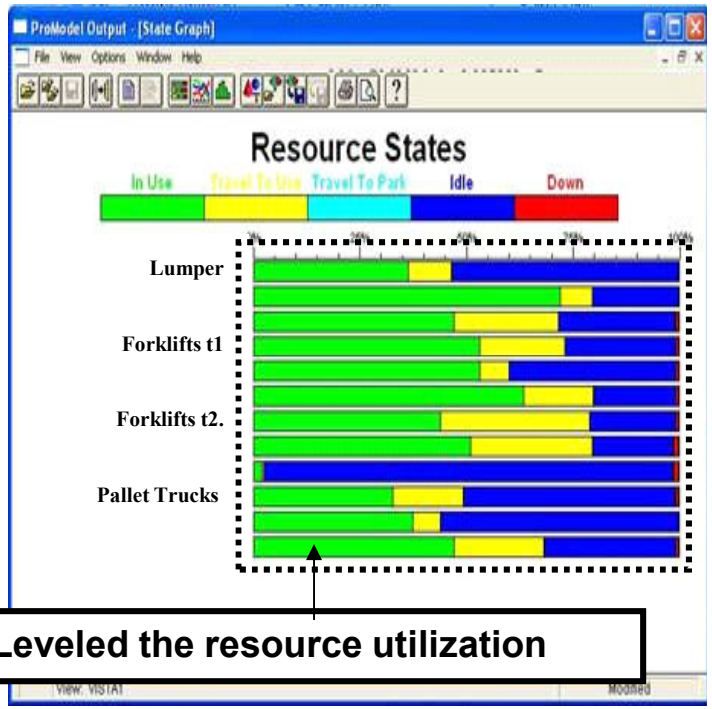
Increasing qty. of bottleneck resources and decreasing idle resources

Simulation Model DCSim

Results



Resource States on the tested scenario



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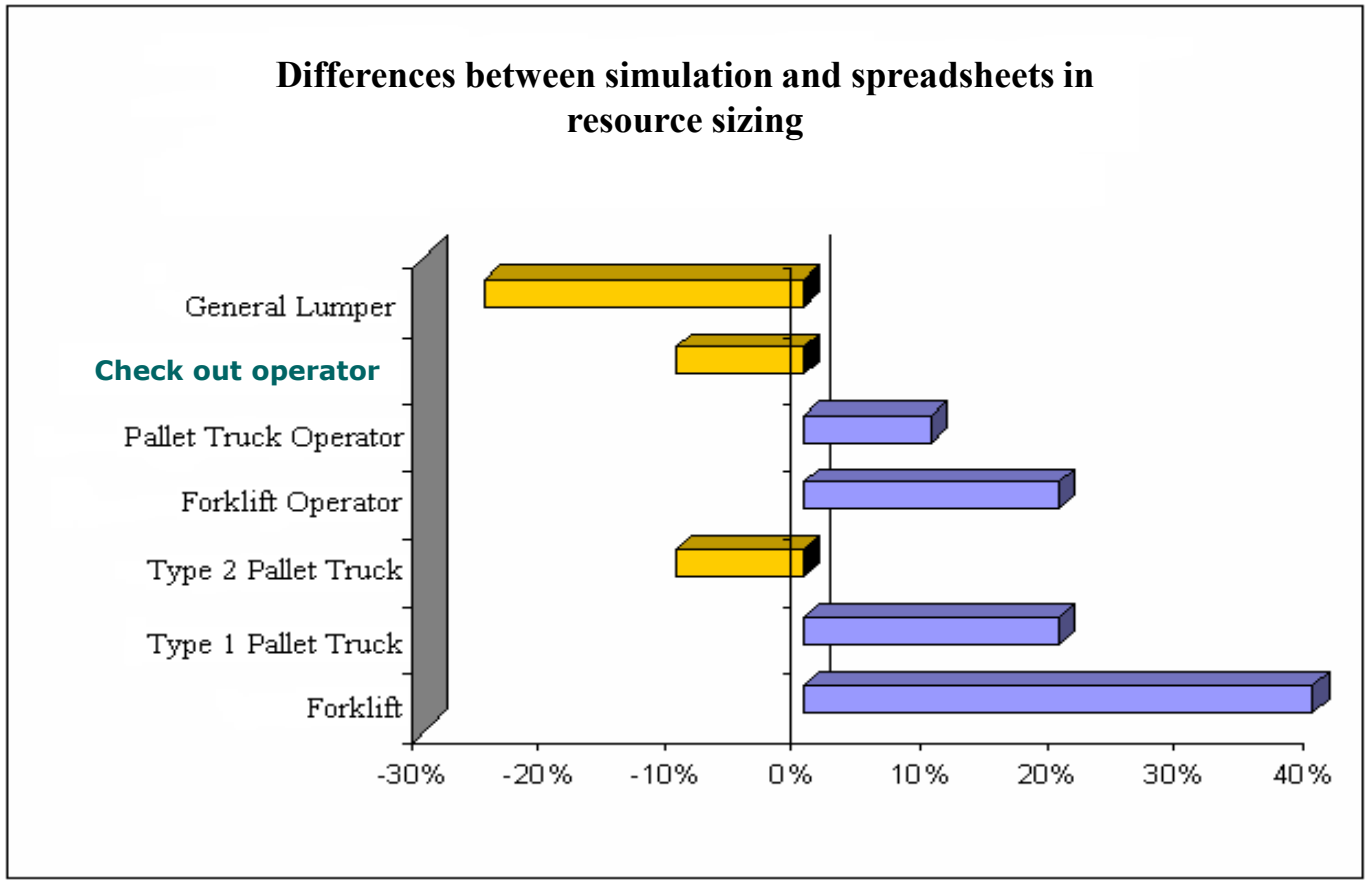
Sizing errors incoming from Excel SpreadSheets vs DCSim



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DCSim

- What is DCSim?
- Cockpit
- Simulator
- Training

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What is DCSim?

- It is a DC simulator , easy-to-use package with a standardized architecture easily customized to suit your specific distribution facility.
- This approach reduces the effort of constructing a new simulation model by as much as 70%, when compared to the use of generic modeling software.
- Natural complement of WMS
  - WMS = DC operation
  - DCSim= DC Planning

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What is DCSim?

- DCSim is a one-of-a-kind tool for improving distribution center logistics
- Drawing on the practical expertise of Brazil's Belge Consulting and using the powerful ProModel® simulaton engine
- DCSim allows you to assess and analyze key DC management decisions in a realistic environment. Imagine testing your ideas in a virtual DC, risk free.

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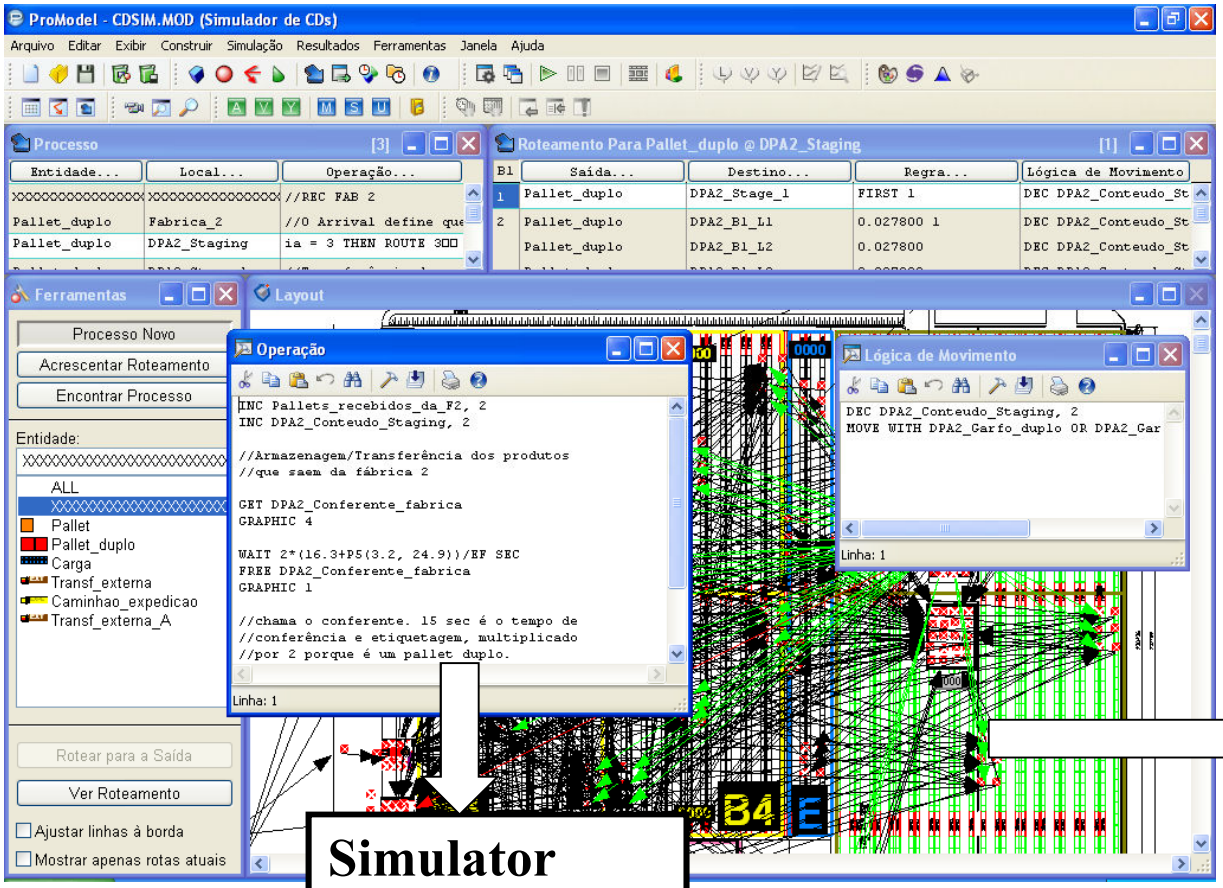
DCSim uses ProModel Technology



- World state-of-art in simulation
- Clear for all users (do not requires any previous knowledge about simulation)

Simulator Language

Routing

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Gains

- Up to a 40% increase in outbound capacity, made possible through the identification and modification of system bottlenecksMinimized startup errors in new and modified DCs
- Minimized startup errors in new and modified DCs
- Up to a 30% reduction in human resource requirements during peak days
- Operational cost reductions of up to 35%

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Benefits/Advantages

- Dynamic analysis of DC operations
- Evaluation of inherent variability
- Identification of best layout
- Optimal planning of resources / stock areas / docks
- Analysis and improvement of methods and procedures
- Bottleneck identification
- Resource reductions
- Increased productivity

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Training

- How do setup scenarios and analyze reports/results
- ProModel Training - Basic
- ProModel Training - Advanced
- How do customize DCSim

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Technical Support

Brazil - São Paulo :

- Hot line – Phone +55 (11) 5561-5353
- Email, FTP and webinar

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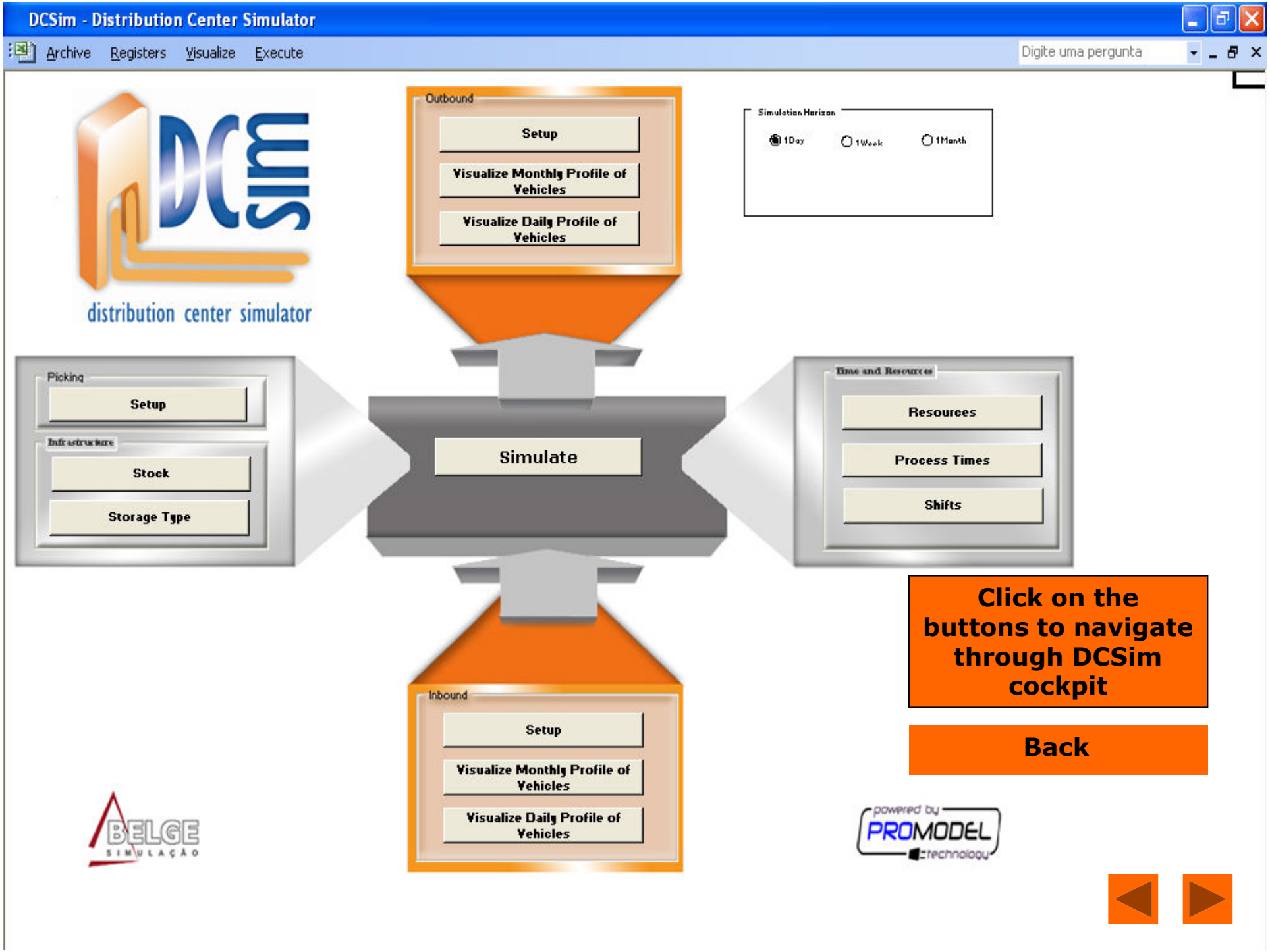
DCSim - Distribution Center Simulator
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Visualize
Execute
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distribution center simulator
Outbound
Setup
Visualize Monthly Profile of Vehicles
Visualize Daily Profile of Vehicles
Simulation Horizon
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1Week
1Month
Picking
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Time and Resources
Resources
Process Times
Shifts
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Visualize Daily Profile of Vehicles
Click on the buttons to navigate through DCSim cockpit
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DCSim - Distribution Center Simulator

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INBOUND

Load to Receive (t)	
Week 1	30000
Week 2	32000
Week 3	34000
Week 4	36000

Product Classes (%)				
	Week 1	Week 2	Week 3	Week 4
Product 1	80%	50%	20%	50%
Product 2	10%	10%	80%	50%
Product 3	10%	40%	0%	0%
Product 4	0%	0%	0%	0%
Product 5	0%	0%	0%	0%
Product 6	0%	0%	0%	0%
Product 7	0%	0%	0%	0%
Product 8	0%	0%	0%	0%
Product 9	0%	0%	0%	0%
Product 10	0%	0%	0%	0%
Total	100,00%	100,00%	100,00%	100,00%

Inventory Turn (%)			
	A	B	C
Product 1	80%	15%	5%
Product 2	80%	15%	5%
Product 3	80%	15%	5%
Product 4	80%	15%	5%
Product 5	80%	15%	5%
Product 6	80%	15%	5%
Product 7	80%	15%	5%
Product 8	80%	15%	5%
Product 9	80%	15%	5%
Product 10	80%	15%	5%

Pallet medium weight (t)	
Product 1	0,50
Product 2	0,40
Product 3	0,55
Product 4	0,55
Product 5	0,55
Product 6	0,55
Product 7	0,55
Product 8	0,55
Product 9	0,55
Product 10	0,55

Pallet quantity				
	Week 1	Week 2	Week 3	Week 4
Product 1	48000	32000	13600	36000
Product 2	7500	8000	68000	45000
Product 3	5455	23273	0	0
Product 4	0	0	0	0
Product 5	0	0	0	0
Product 6	0	0	0	0
Product 7	0	0	0	0
Product 8	0	0	0	0
Product 9	0	0	0	0
Product 10	0	0	0	0

Type of load (%)		
	Palletized	Re-assembled
Product 1	90%	10%
Product 2	90%	10%

DCSim - Distribution Center Simulator

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	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5	Vehicle 6	Vehicle 7	Vehicle 8	Vehicle 9
Vehicle nominal capacity (pallets on the floor)	32	26	16	14	12	10	8	5	4

Palletization index/re-assemblence									
Products	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5	Vehicle 6	Vehicle 7	Vehicle 8	Vehicle 9
Product 1	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00
Product 2	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30
Product 3	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30
Product 4	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30
Product 5	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30
Product 6	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30
Product 7	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30
Product 8	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30
Product 9	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30
Product 10	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30

% of vehicle type									
	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5	Vehicle 6	Vehicle 7	Vehicle 8	Vehicle 9
Product 1	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 2	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 3	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 4	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 5	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 6	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 7	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 8	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 9	70%	30%	0%	0%	0%	0%	0%	0%	0%
Product 10	70%	30%	0%	0%	0%	0%	0%	0%	0%

Week profile	Week 1	Week 2	Week 3	Week 4
Monday	15%	15%	15%	5%
Tuesday	20%	15%	20%	15%
Wednesday	15%	15%	15%	20%
Thursday	25%	20%	25%	20%
Friday	18%	15%	18%	25%
Saturday	5%	10%	5%	10%

DCSim - Distribution Center Simulator

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Each day profile	Day of the week	Day of the month	00:00 - 01:00	01:00 - 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	06:00 - 07:00
Week 1	Monday	1	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
	Tuesday	2	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
	Wednesday	3	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
	Thursday	4	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
	Friday	5	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
	Saturday	6	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
	Sunday	7	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
Week 2	Monday	8	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
	Tuesday	9	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
	Wednesday	10	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
	Thursday	11	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
	Friday	12	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
	Saturday	13	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
	Sunday	14	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
Week 3	Monday	15	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
	Tuesday	16	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
	Wednesday	17	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
	Thursday	18	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
	Friday	19	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
	Saturday	20	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
	Sunday	21	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
Week 4	Monday	22	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
	Tuesday	23	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
	Wednesday	24	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
	Thursday	25	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%
	Friday	26	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%
	Saturday	27	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	4,4%
	Sunday	28	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	5,0%

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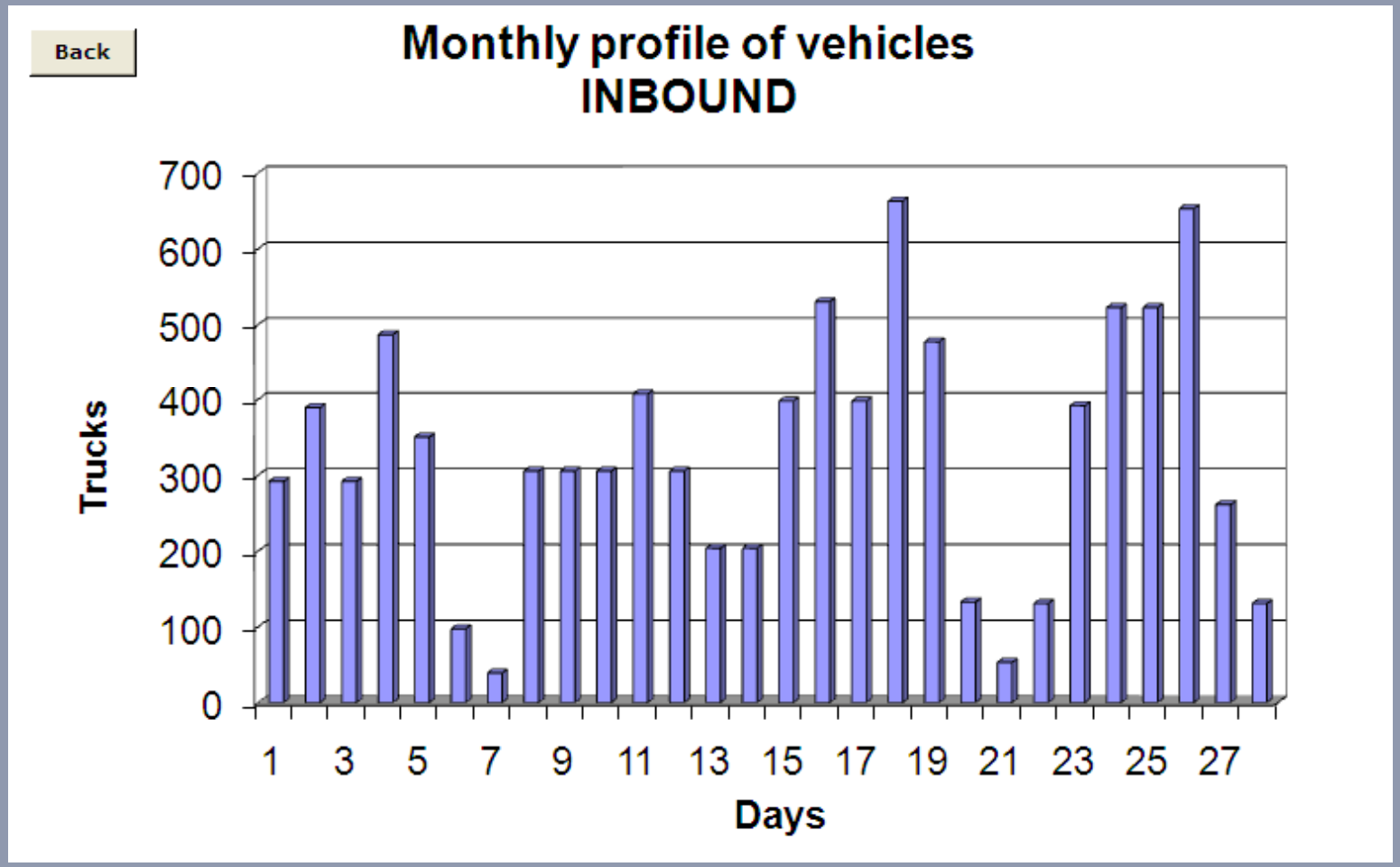

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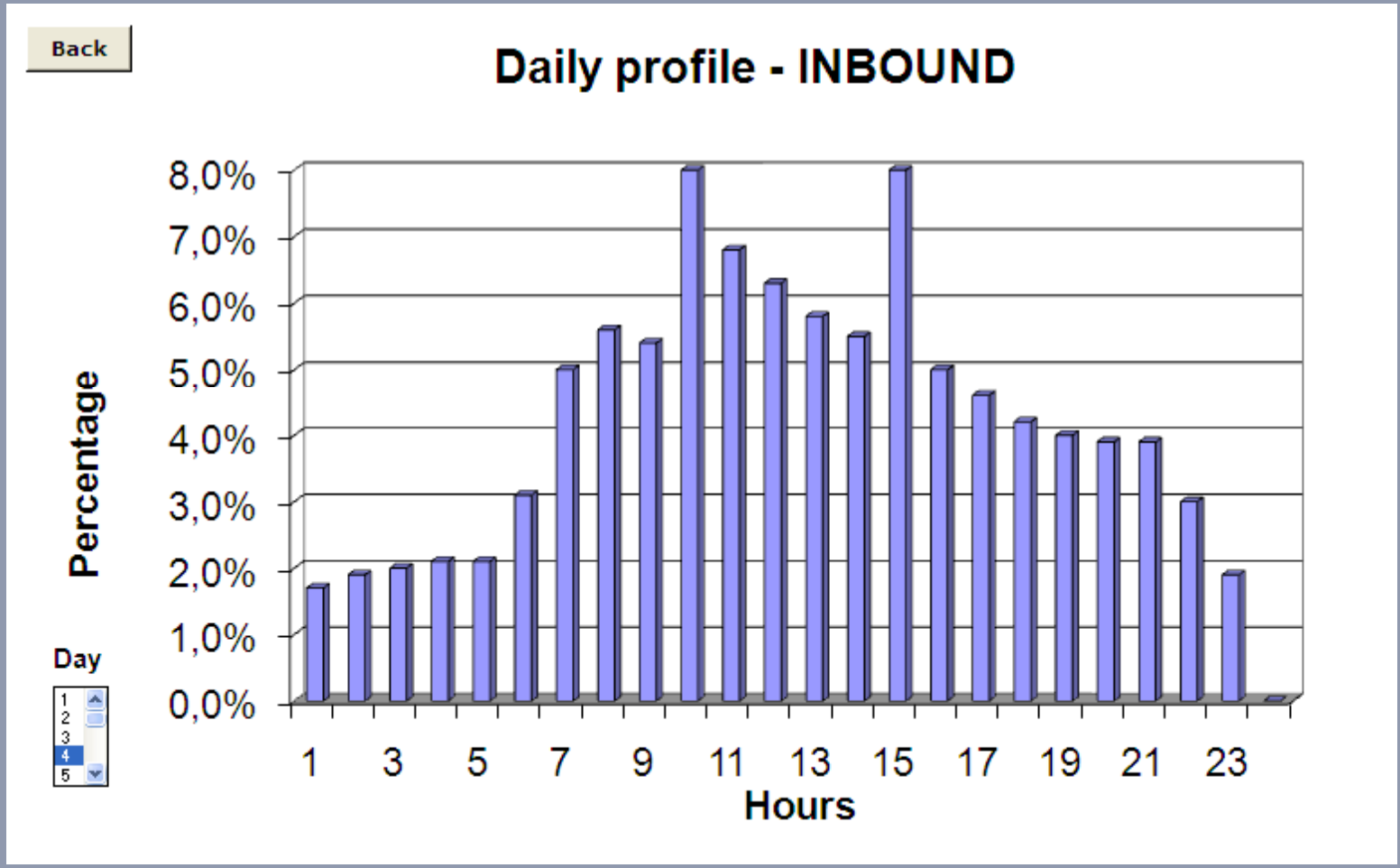

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OUTBOUND

Load to send (t)	
Week 1	28000
Week 2	29000
Week 3	33000
Week 4	40000

Product classes (%)				
	Week 1	Week 2	Week 3	Week 4
Product 1	80%	50%	20%	50%
Product 2	10%	10%	80%	50%
Product 3	10%	40%	0%	0%
Product 4	0%	0%	0%	0%
Product 5	0%	0%	0%	0%
Product 6	0%	0%	0%	0%
Product 7	0%	0%	0%	0%
Product 8	0%	0%	0%	0%
Product 9	0%	0%	0%	0%
Product 10	0%	0%	0%	0%
Total	100,00%	100,00%	100,00%	100,00%

Inventory turn (%)			
	A	B	C
Product 1	80%	15%	5%
Product 2	80%	15%	5%
Product 3	80%	15%	5%
Product 4	80%	15%	5%
Product 5	80%	15%	5%
Product 6	80%	15%	5%
Product 7	80%	15%	5%
Product 8	80%	15%	5%
Product 9	80%	15%	5%
Product 10	80%	15%	5%

Pallet medium weight (t)	
Product 1	0,50
Product 2	0,40
Product 3	0,55
Product 4	0,55
Product 5	0,55
Product 6	0,55
Product 7	0,55
Product 8	0,55
Product 9	0,55
Product 10	0,55

Pallet quantity				
	Week 1	Week 2	Week 3	Week 4
Product 1	44800	29000	13200	40000
Product 2	7000	7250	66000	50000
Product 3	5091	21091	0	0
Product 4	0	0	0	0
Product 5	0	0	0	0
Product 6	0	0	0	0
Product 7	0	0	0	0
Product 8	0	0	0	0
Product 9	0	0	0	0
Product 10	0	0	0	0

Type of load (%)		
	Palletized	Re-assembled
Product 1	95%	5%

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	Palletized	Re-assembled
Product 1	95%	5%
Product 2	95%	5%
Product 3	95%	5%
Product 4	95%	5%
Product 5	95%	5%
Product 6	95%	5%
Product 7	95%	5%
Product 8	95%	5%
Product 9	95%	5%
Product 10	95%	5%

	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5	Vehicle 6	Vehicle 7	Vehicle 8	Vehic
Vehicle nominal capacity (pallets on the floor)	32	26	16	14	12	10	8	5	4

Palletization index/Re-assemblence									
Products	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5	Vehicle 6	Vehicle 7	Vehicle 8	Vehic
Products 1	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,0
Products 2	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3
Products 3	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3
Products 4	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3
Products 5	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3
Products 6	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3
Products 7	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3
Products 8	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3
Products 9	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3
Products 10	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,3

% of the vehicle type									
Products	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5	Vehicle 6	Vehicle 7	Vehicle 8	Vehic
Products 1	70%	10%	5%	10%	3%	2%	0%	0%	0%
Products 2	70%	10%	5%	10%	3%	2%	0%	0%	0%
Products 3	70%	10%	5%	10%	3%	2%	0%	0%	0%
Products 4	70%	10%	5%	10%	3%	2%	0%	0%	0%
Products 5	70%	10%	5%	10%	3%	2%	0%	0%	0%

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Week profile	Week 1	Week 2	Week 3	Week 4
Monday	15%	15%	15%	5%
Tuesdau	15%	15%	15%	15%
Wednesday	35%	15%	15%	20%
Thursday	15%	20%	15%	20%
Friday	5%	15%	15%	25%
Saturday	10%	10%	15%	10%
Sunday	5%	10%	10%	5%
Total	100,00%	100,00%	100,00%	100,00%

Each day profile	Day of the week	Day of the month	00:00 - 01:00	01:00 - 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	06:00 -
Week 1	Monday	1	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
	Tuesday	2	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
	Wednesday	3	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
	Thursday	4	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
	Friday	5	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
	Saturday	6	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
	Sunday	7	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
Week 2	Monday	8	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
	Tuesday	9	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
	Wednesday	10	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
	Thursday	11	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
	Friday	12	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
	Saturday	13	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
	Sunday	14	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
Week 3	Monday	15	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
	Tuesday	16	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
	Wednesday	17	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
	Thursday	18	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
	Friday	19	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
	Saturday	20	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
	Sunday	21	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
Week 4	Monday	22	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
	Tuesday	23	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
	Wednesday	24	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
	Thursday	25	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	
	Friday	26	4,2%	4,2%	4,2%	4,2%	4,2%	4,2%	
	Saturday	27	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
	Sunday	28	1,7%	1,9%	2,0%	2,1%	2,1%	3,1%	

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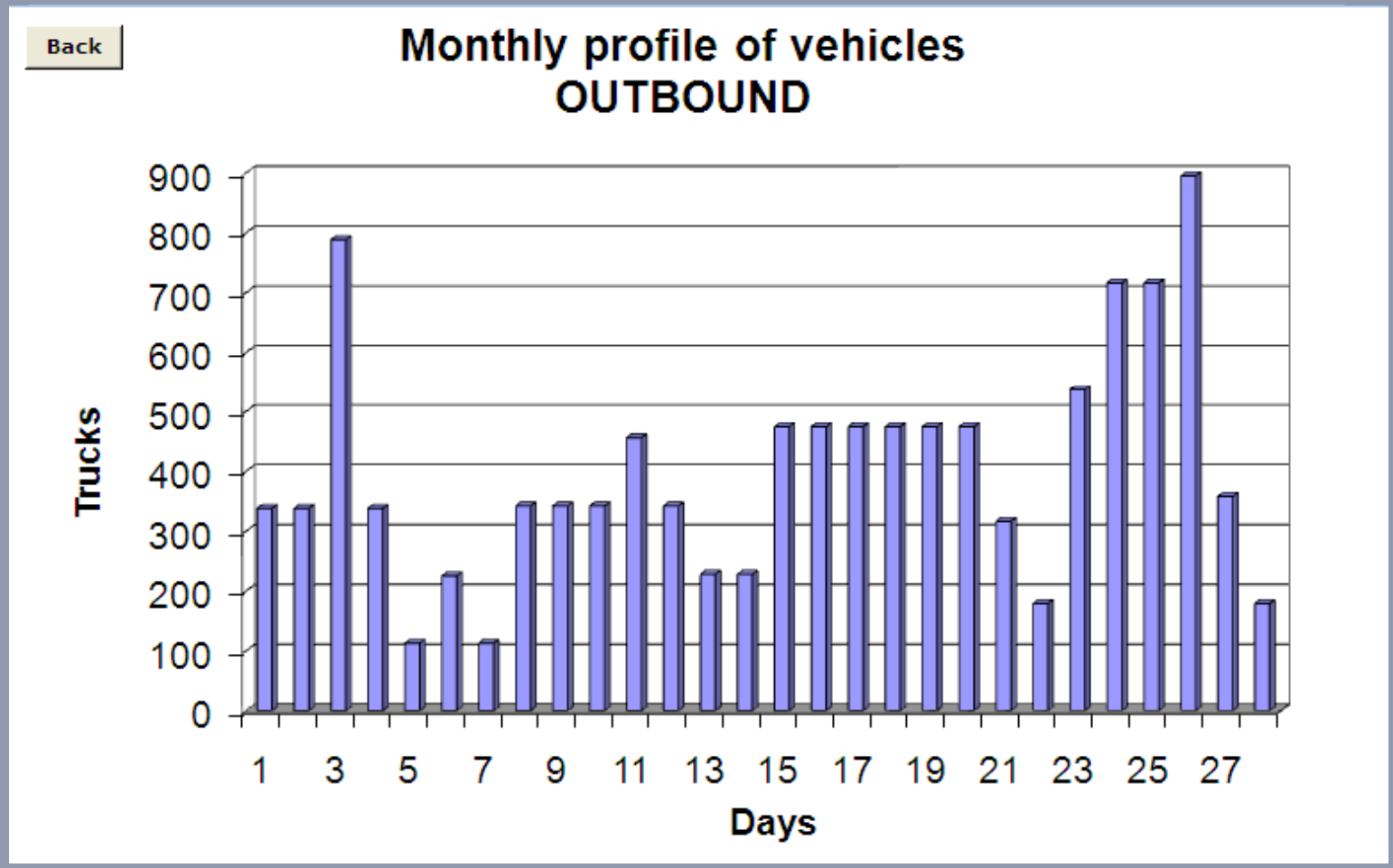

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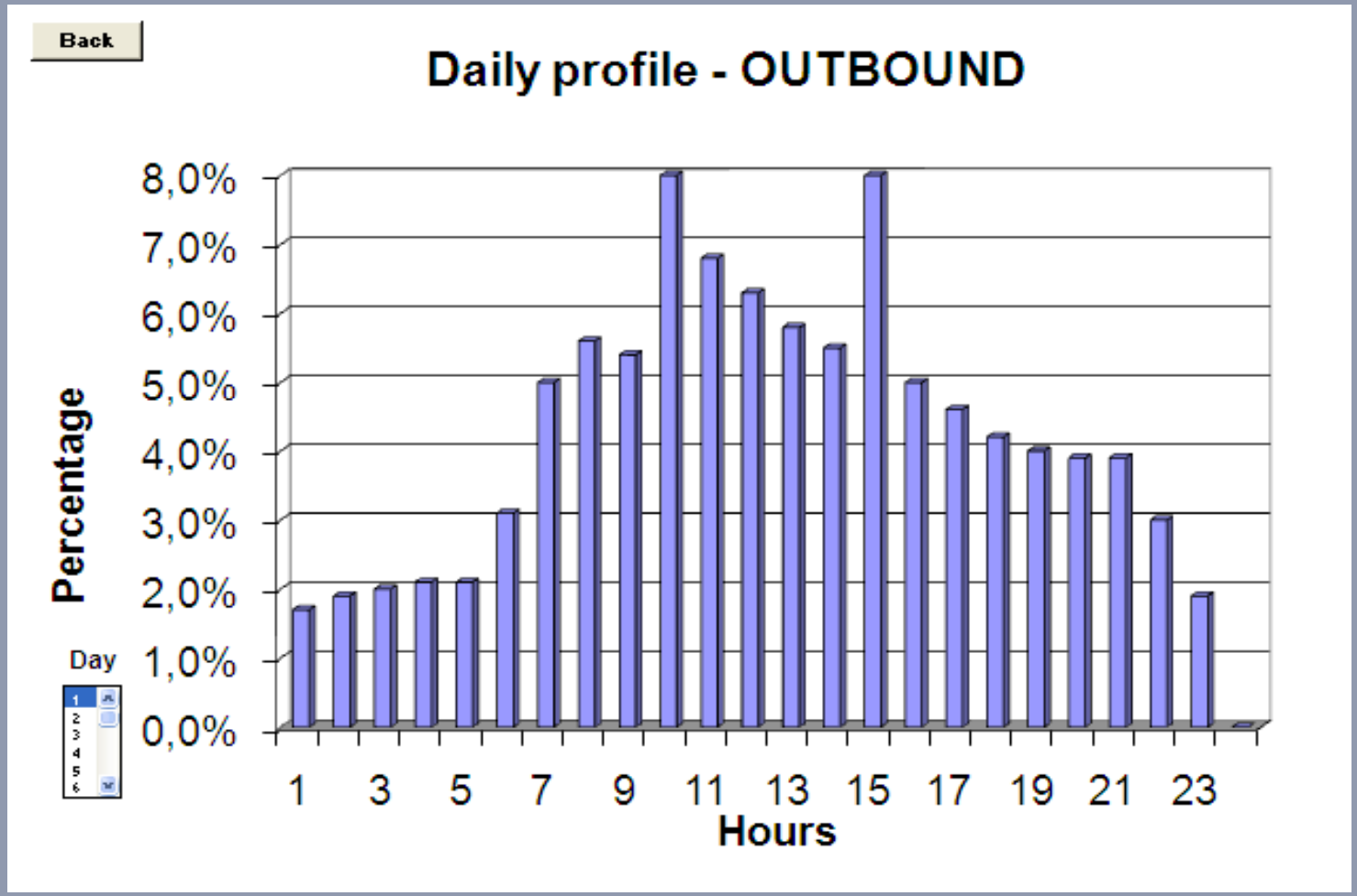

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PICKING

Set of loads (% of expedition)		
Product	Loads without picking	Loads with picking
P1	95%	5%
P2	95%	5%
P3	95%	5%
P4	95%	5%
P5	95%	5%
P6	95%	5%
P7	95%	5%
P8	95%	5%
P9	95%	5%
P10	95%	5%

Pallet origin (% load)		
Product	full pallets	picking of pallets
P1	70%	30%
P2	70%	30%
P3	70%	30%
P4	70%	30%
P5	70%	30%
P6	70%	30%
P7	70%	30%
P8	70%	30%
P9	70%	30%
P10	70%	30%

Picking procedure				
Product	Picking 1	Picking 2	Picking 3	Total
P1	50%	50%	0%	100%
P2	50%	25%	25%	100%
P3	50%	25%	25%	100%
P4	50%	25%	25%	100%

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STOCK AREAS CAPACITY

This parameter will not restrict the stock capacity, although it will be utilized as a reference for a capacity analysis

Area 1 capacity	Amount of Pallets Turn A	Amount of Pallets Turn B	Amount of Pallets Turn C	Total
P1				-
P2				-
P3				-
P4				-
P5				-
P6				-
P7				-
P8				-
P9				-
P10				-
			Total	-

Area 2 capacity	Amount of Pallets Turn A	Amount of Pallets Turn B	Amount of Pallets Turn C	Total
P1				-
P2				-
P3				-
P4				-
P5				-
P6				-
P7				-
P8				-
P9				-
P10				-
			Total	-

Picking areas capacity	Amount of Pallets Turn A	Amount of Pallets Turn B	Amount of Pallets Turn C	TOTAL
P1				-
P2				-
P3				-
P4				-
P5				-
P6				-
P7				-
P8				-
P9				-
P10				-
			Total	-

INITIAL STOCK

Area 1 initial stock	Amount of Pallets Turn A	Amount of Pallets Turn B	Amount of Pallets Turn C	Total
P1	15.000	4.000	1.000	20.000
P2				-
P3				-
P4				-
P5				-
P6				-
P7				-
P8				-
P9				-
P10				-
			Total	20.000

Area 2 initial stock	Amount of Pallets Turn A	Amount of Pallets Turn B	Amount of Pallets Turn C	Total
P1				-
P2				-
P3				-
P4				-
P5				-
P6				-
P7				-
P8				-
P9				-
P10				-
			Total	-

Picking initial stock	Amount of Pallets Turn A	Amount of Pallets Turn B	Amount of Pallets Turn C	Total
P1				-
P2				-
P3				-
P4				-
P5				-
P6				-
P7				-
P8				-
P9				-
P10				-
			Total	-

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Storage structure

Fill with : 1 - Type 01; 2 - Type 02; 3 - Type 03

P_1	P_5				P_{18}	P_{22}
3	2				2	3
P_2	P_6	P_9	P_{12}	P_{15}	P_{19}	P_{23}
1	1	1	1	1	1	1
P_3	P_7	P_{10}	P_{13}	P_{16}	P_{20}	P_{24}
1	1	1	1	1	1	1
P_4	P_8	P_{11}	P_{14}	P_{17}	P_{21}	P_{25}
1	1	1	1	1	1	1

Position	Type
P_1	3
P_2	1
P_3	1
P_4	1
P_5	2
P_6	1
P_7	1
P_8	1
P_9	1
P_{10}	1
P_{11}	1
P_{12}	1

P_1 - P_{25} : Storage positions in the CDSIM layout. Everytime the layout and the number of positions in the storage is changed, this matrix must be changed.

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Resources parameters

	Description	VALUE
Speed when empty (m/min)	Pallet truck 03	60
	Forklift 01	130
	Forklift 02	130
	Forklift 03	140
	Forklift 04	140
	Lumper	55
	Pallet truck 01	75
	Pallet truck 02	75
Speed when loaded (m/min)	Pallet truck 03	60
	Forklift 01	130
	Forklift 02	130
	Forklift 03	140
	Forklift 04	140
	Lumper	55
	Pallet truck 01	75
	Pallet truck 02	75
Quantity	Checking clerk	3
	Lumper	50
	Forklift 01	2
	Forklift 02	10
	Pallet truck 01	5
	Pallet truck 02	10
	Forklift 03	4
	Forklift 04	4
	Pallet truck 03	5

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Process Times (seconds)

Description	Value
Time of activity 01	10
Time of activity 02	10
Time of activity 03	10
Time of activity 04	10
Time of activity 05	10
Time of activity 06	10
Time of activity 07	10
Time of activity 08	10
Time of activity 09	10
Time of activity 10	10
Time of activity 11	10
Time of activity 12	10
Time of activity 13	10
Time of activity 14	10
Time of activity 15	10
Time of activity 16	10
Time of activity 17	10
Time of activity 18	10
Time of activity 19	10
Time of activity 20	10
Time of activity 21	10
Time of activity 22	10
Time of activity 23	10
Time of activity 24	10
Time of activity 25	10
Time of activity 26	10
Time of activity 27	10
Time of activity 28	10
Time of activity 29	10
Time of activity 30	10
Time of activity 31	10

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Shifts

Shifts	Start		End		Resource
	HH	MM	HH	MM	
Shift 1	03	20	01	10	Forklift type 04
Shift 2	23	00	19	30	Forklift type 02
Shift 3	23	20	23	20	Lumper
Shift 4	23	00	19	00	Lumper
Shift 5	23	00	23	00	Forklift type 03
Shift 6	23	00	18	00	Lumper
Shift 7	23	00	23	00	Forklift type 01
Shift 8	17	00	17	00	Forklift type 01
Shift 9	23	00	23	00	Forklift type 01
Shift 10	23	00	23	00	Forklift type 02
Shift 11	23	00	23	20	Forklift type 02
Shift 12	23	00	23	00	Forklift type 02
Shift 13	23	00	23	00	Forklift type 03
Shift 14	23	00	23	00	Forklift type 03
Shift 15	23	00	23	00	Forklift type 03
Shift 16	23	20	23	20	Forklift type 04
Shift 17	23	00	23	00	Forklift type 04
Shift 18	23	00	23	00	Forklift type 04
Shift 19	16	00	16	00	Pallet truck 01
Shift 20	21	20	18	40	Pallet truck 01

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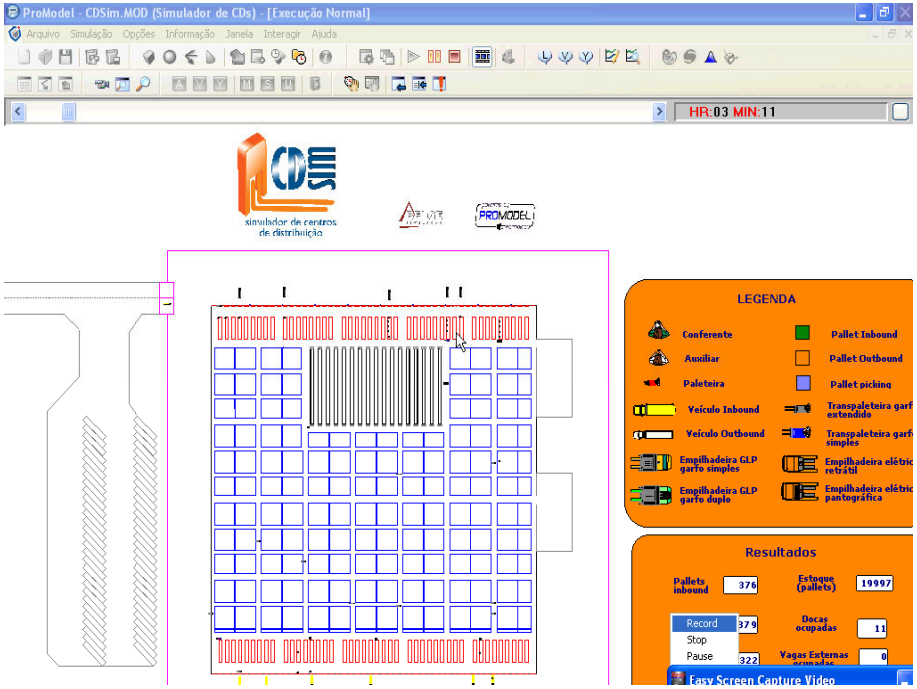

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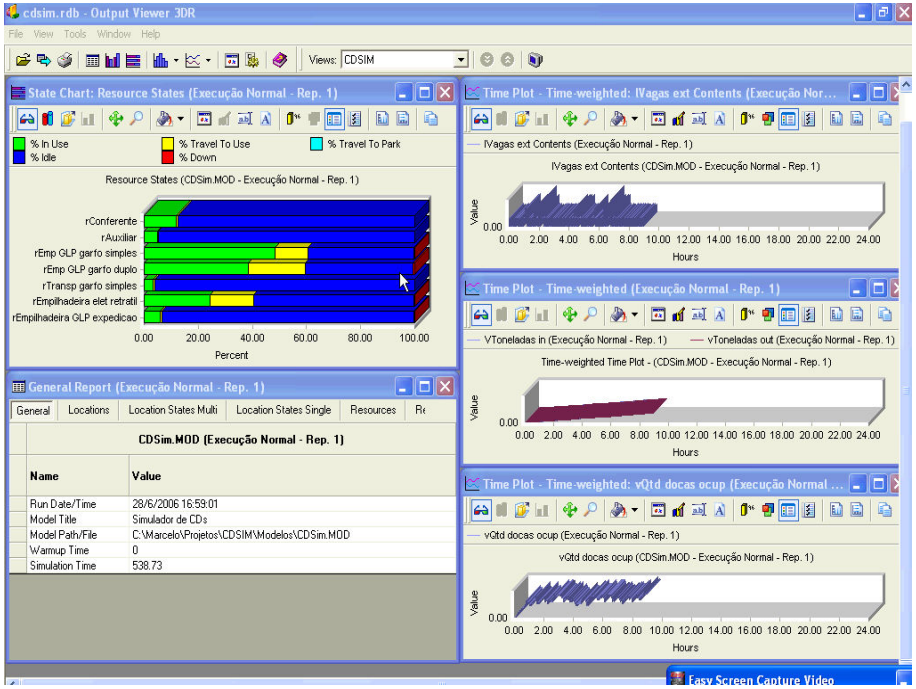

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