



# Inventory Optimization Project

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July 22<sup>th</sup>, 2019

# Project Goals

- **Goal One**
  - What is the current state of our inventory in our Lancaster PDC?
- **Goal Two**
  - What are your recommendations to optimize our inventory in Lancaster?
    - Are there opportunities to reduce or increase inventory?
    - What is the impact to our service level?
- **Goal Three**
  - Tell us what you liked about this project
  - Tell us what you would do with more time.





# Project Deliverables

- **Deliverable One**
  - **Provide two printed copies of your PowerPoint with 3 slides per page.**
- **Deliverable Two**
  - **Submit all code and supporting materials you used to Canvas.**



# The Data You're Provided

- **10 Data Files**
  - **Data Dictionary**
  - **Demand**
  - **Annual**
  - **Forecast Error**
  - **Forecast**
  - **Item Location Data**
  - **Lead Time Data**
  - **On Time Shipping Data**
  - **Part Information Data**
  - **Protected Inventory Data**





# Demand Data

- **725,401 Records**
- **10 Columns**
- **Data by Month**
- **Data Represents Our Fill Metric**

- **76,505 Records**
- **7 Columns**
- **Table is Demand Quantity**

order_month	dim	whse_vndr_id	division	nline	rline	nhit	rhit	demand_qty	rhit_qty
1/1/2017	R59-6093-221000LAN	19544AA	K	16	16	0	0	17	0
1/1/2017	844393RGTLAN	14404AD	P	1	1	0	0	1	0
1/1/2017	L72-1052LAN	00856AA	K	2	0	0	0	2	0
1/1/2017	GS3823LAN	16517AE	K	31	31	0	0	40	0
1/1/2017	F85-6557LAN	20550AB	K	1	0	0	0	1	0
1/1/2017	2897334CUMLAN	04383AB	K	49	49	0	0	141	0
1/1/2017	1899870PELAN	04383AB	P	42	42	0	0	68	0
1/1/2017	3800298CUMLAN	04383AB	P	17	17	0	0	18	0
1/1/2017	065181BXWLAN	01674AA	K	49	49	0	0	68	0
1/1/2017	4966441CUMLAN	04383AB	K	25	25	7	11	50	21

dim	2014	2015	2016	2017	2018	2019
800973BXWLAN	2	8	13	10	10	9
L42-6006-1244LAN	53	986	742	747	664	408
3651898LAN		2635	2340	2665	3430	1135
F42-6009LAN	2	42	37	33	34	11
90401GR0LAN	11	43	58	45	40	31
A11205Y2729LAN	11	205	163	138	189	132
CN22150LAN		63	22		75	162
S60-1477-100LAN		194	235	237	270	174
59-15LAN	225	1200	695	935	1145	340
M66-6541-0390LAN	19	212	149	130	120	52

# Lead Time Data

- **309,351 Records**
- **5 Columns**
- **Data by Month**
- **Lead time is the date difference between the issue date and ship date.**

ship_month	dim	avg_lead_time	sum_lead_time	lines_shipped
1/1/2017	P27-1181-001LAN	91	546	6
1/1/2017	K209-8LAN	120	120	1
2/1/2017	5405858CUMLAN	133	133	1
2/1/2017	K223-1213-30LAN	136	136	1
1/1/2017	TE11003LAN	95	190	2
1/1/2017	Q21-1051-001LAN	96	288	3



# Item Data

- **496,126 Records**
- **30 Columns**
- **Data by DIM**
- **Stock Class & Stock Class Desc**
- **Marketing Category**
- **Velocity**
- **Safety Stock and Buy Days**
- **TRP Ind, MX Ind, NGP Ind, LFNA Ind, LFNA 4C Ind**
- **Natl\_Stk\_Ind, Whse\_Stk\_Ind**

# Forecast Data

- **266,098 Records**
- **3 Columns**
- **Forecast is for the entire month**

dim	fcst_month	fcst_qty
CC23400LAN	9/1/2019	1.598260877
1508622-00LAN	10/1/2019	13.43644391
15-06607LLAN	10/1/2019	0.933573991
K068-4605-5LAN	8/1/2019	2.161417013
F66-2566LAN	7/1/2019	3.078130345
HWU05223LAN	9/1/2019	12.97764946



# Forecast Error Data

- **956,227 Records**
- **6 Columns**
- **Historical forecast performance**

fcst_error_month	dim	error_abs	error_total	fcst_total	total_history
12/1/2017	987687ALULAN	0.648895525	0.648895525	0.648895525	0
11/1/2017	BS86039LAN	0.0045577	0.0045577	0.0045577	0
12/1/2017	010023515LAN	4.848792914	4.848792914	11.84879291	7
9/1/2017	AS74440LAN	0.063485163	0.063485163	0.063485163	0
3/1/2018	MD0763LAN	0.103233483	0.103233483	0.103233483	0
10/1/2018	B84LAN	13.44382086	13.44382086	13.44382086	0
10/1/2018	B850BTSLAN	0.954990821	0.954990821	0.954990821	0
10/1/2017	LP8-14LAN	0.224476147	0.224476147	0.224476147	0
6/1/2018	N71-6123-213LAN	0.67527685	0.67527685	0.67527685	0

# Item Location Data

- **26,177 Records**
- **2 Columns**
- **Parts that are stored in multiple locations can be thought of as “overstocked”**

dim	location_count
GC3030LCWLAN	14
TU28P0024-22NSLAN	10
L79-1037-100LAN	10
N71-1264-310RLAN	9
QT00213BULK10LAN	9
DW1732-30LAN	8
MF38807LAN	7
4354199CUMLAN	7



# Protected Inventory Data

- **25,395 Records**
- **3 Columns**
- **These parts can not be scraped since marketing has them protected in case a customer needs this part.**

item_id	protected_cat	protected_ind
OMEG300X	Vendor Minimum Buy (less than \$1k)	1
1-160759-1	LFNA	1
1-962841-1	2.1m	1
1-962842-1	LFNA	1
1-967325-1	LFNA	1
1-967325-2	2.1m	1
1-967325-3	2.1m	1
1-967622-1	LFNA	1
1-967626-1	LFNA	1

# On Time Shipping Data

- **38,898 Records**
- **OTS: tracks the supplier shipping performance.**
- **OTS is often seen as a percentage:**
  - **$(\text{early} + \text{on\_time} + \text{pd\_shipped}) / (\text{past\_due} + \text{total\_all})$**

ots_month	vndr_id	channel	early	on_time	pd_shipped	past_due	total_all
1/1/2016	00121AM	PDC	16	0	4	33	32
1/1/2016	00121MA	PDC	116	49	8	25	184
1/1/2016	00121MM	PDC	2	0	0	0	5
1/1/2016	00122MM	DSP	0	267	0	0	1,018
1/1/2016	00122XX	PDC	0	0	0	20	26
1/1/2016	00253AB	PDC	136	180	0	1	319
1/1/2016	00470AM	PDC	0	0	0	10	12
1/1/2016	00470CB	DSP	1	0	0	0	1



# Grading

## Presentation (5 pts, 10%)

- Flow of presentation

- Is the presentation presentable to senior leadership?

- Do all the team members talk?

## Inventory Insights (15 pts, 30%)

- Does the team address the current state of inventory at LAN?

- Does the team show how their findings impact PACCAR's business?

## Recommendations (20 pts, 40%)

- Does the team provide a plan to increase/decrease parts based on the data provided?

- Does the team show how their recommendations impacts PACCAR's business?

## Project Review (10 pts, 20 %)

- Do all the team member provide feedback about the project?

- Has the team critically thought about other data or business practices that would help their analysis?

## Extra Credit (5 pts)

- Does the team provide examples of disruptive technologies and how they could use API's/outside sources to enhance model?