

Inventory Optimization Process

Global Automotive Aftermarket Symposium

Justin Holman

05-17-12



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WWW.TERRASEER.COM

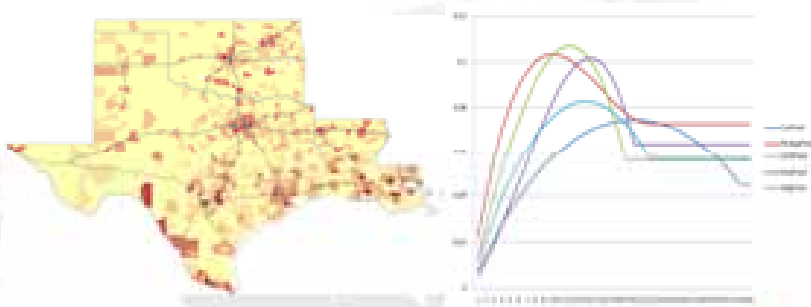
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Inventory Optimization Process

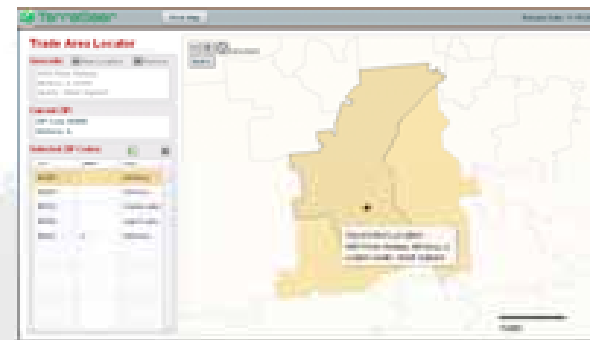
1. Develop Total Demand Model

- Vehicle registrations by zip
- Replacement rates by vehicle



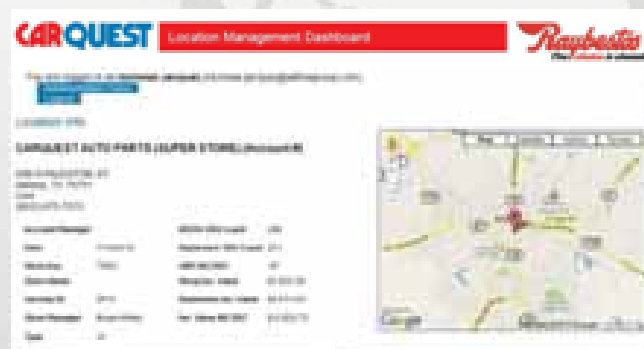
2. Forecast Demand By Location

- Aftermarket dynamics
- Competitive/operating factors



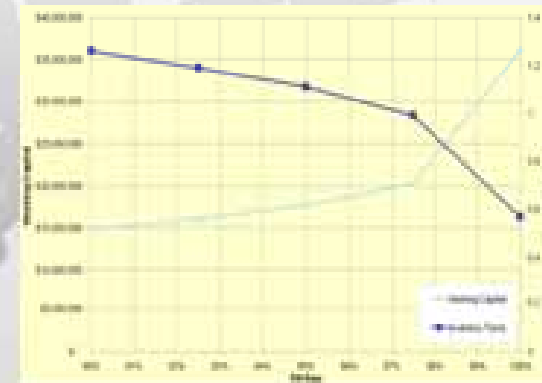
4. Communicate & Manage Network

- Web tools enable collaboration



3. Optimize Network Inventories

- By location, by SKU

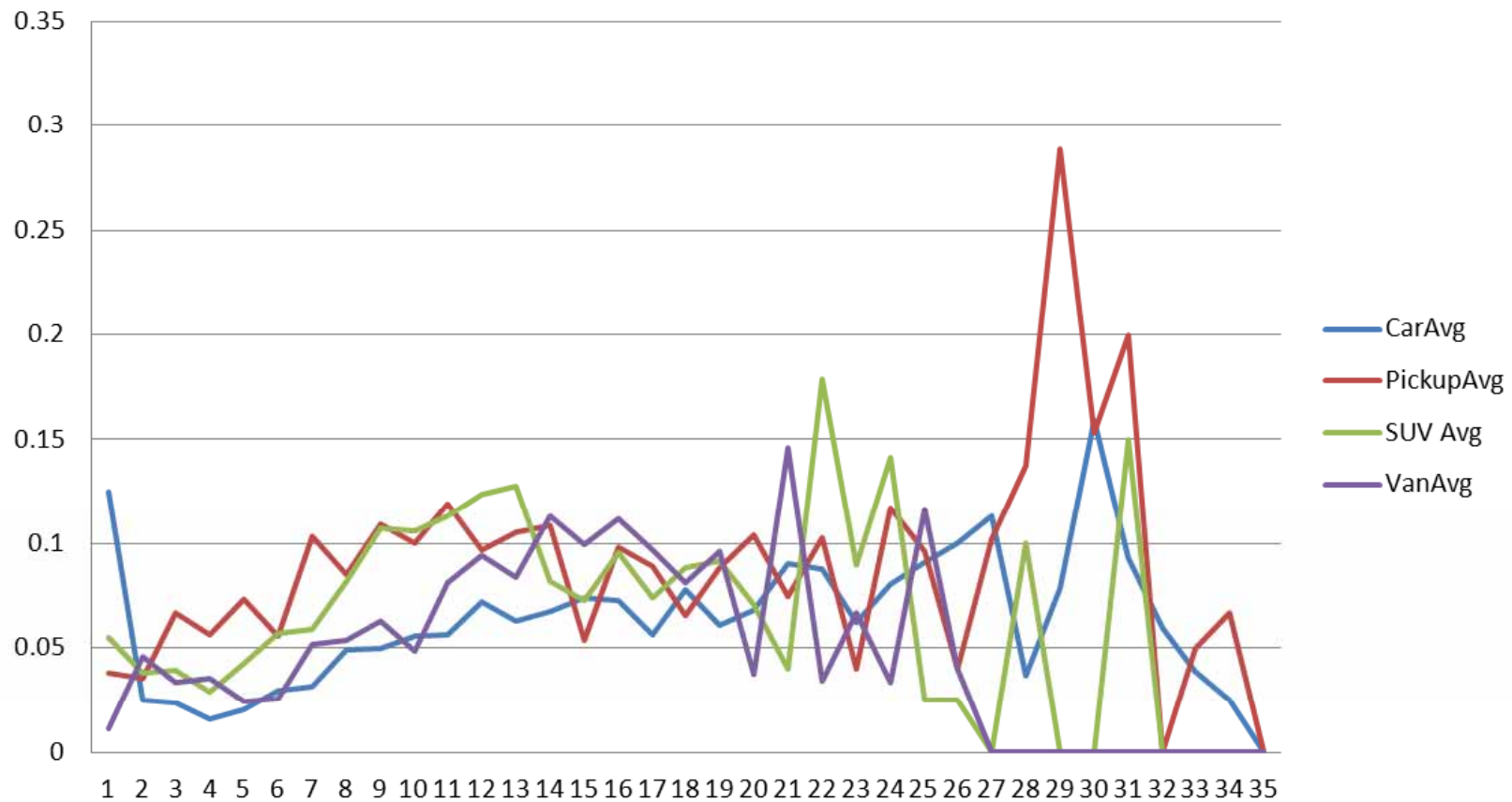




Repair Rate Modeling Process

1. Calculate Repair Rates

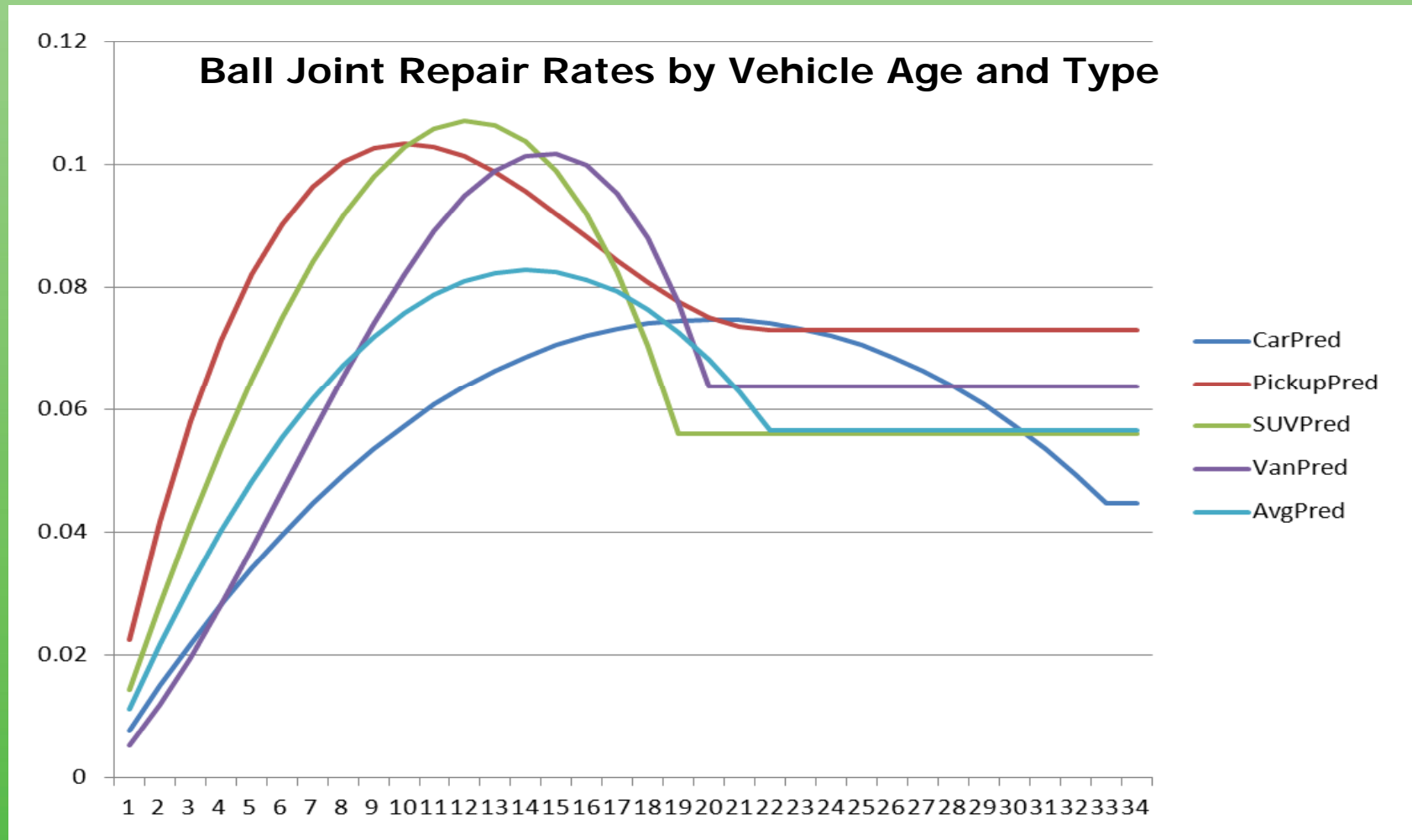
Ball Joint Repair Rates by Vehicle Age and Type





Repair Rate Modeling Process

2. Build Statistical Models





Repair Rate Modeling Process

3. Create Adjustment Factors

- Make, Model, and Regional Adjustments
- Analyze Residuals and Calibrate Model

Sample Adjustments for Ball Joints

Lower than Forecast

1. Alabama
2. California
3. Georgia
4. Washington
5. Oregon

Higher than Forecast

1. New Hampshire
2. Vermont
3. Maine
4. Massachusetts
5. Rhode Island

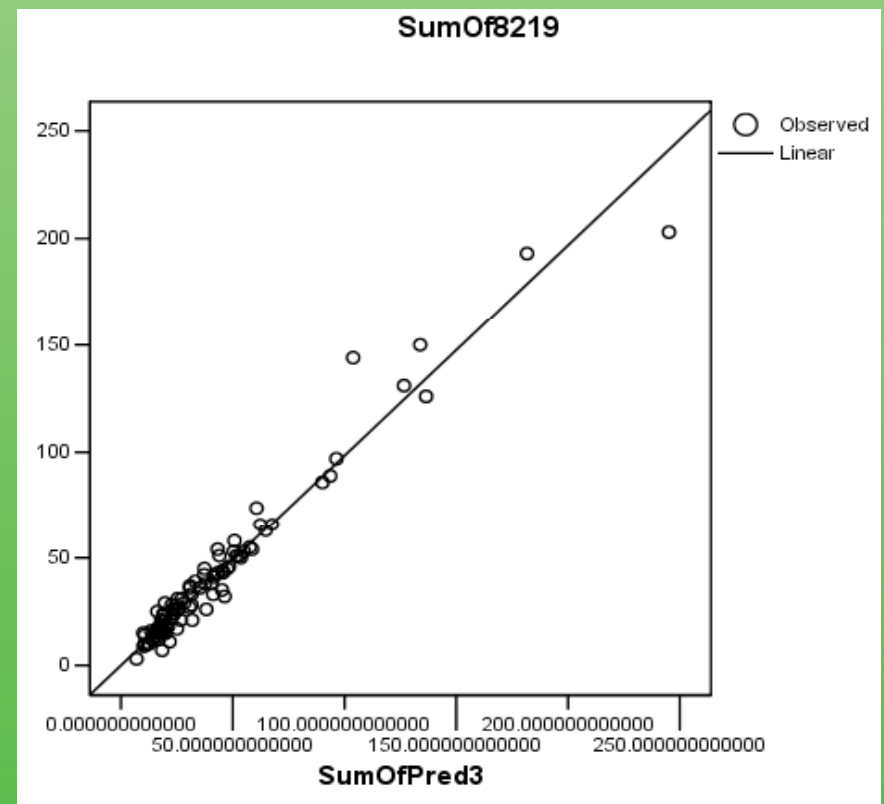
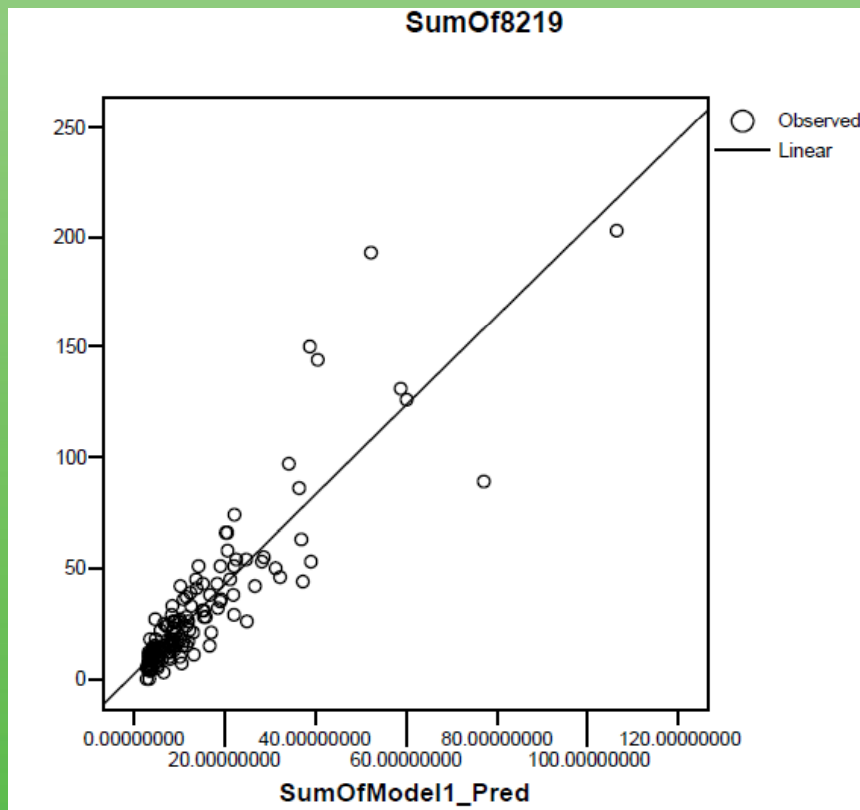


Repair Rate Modeling Process

4. Validate Predictive Accuracy

Initial model: $R^2 = 0.787$

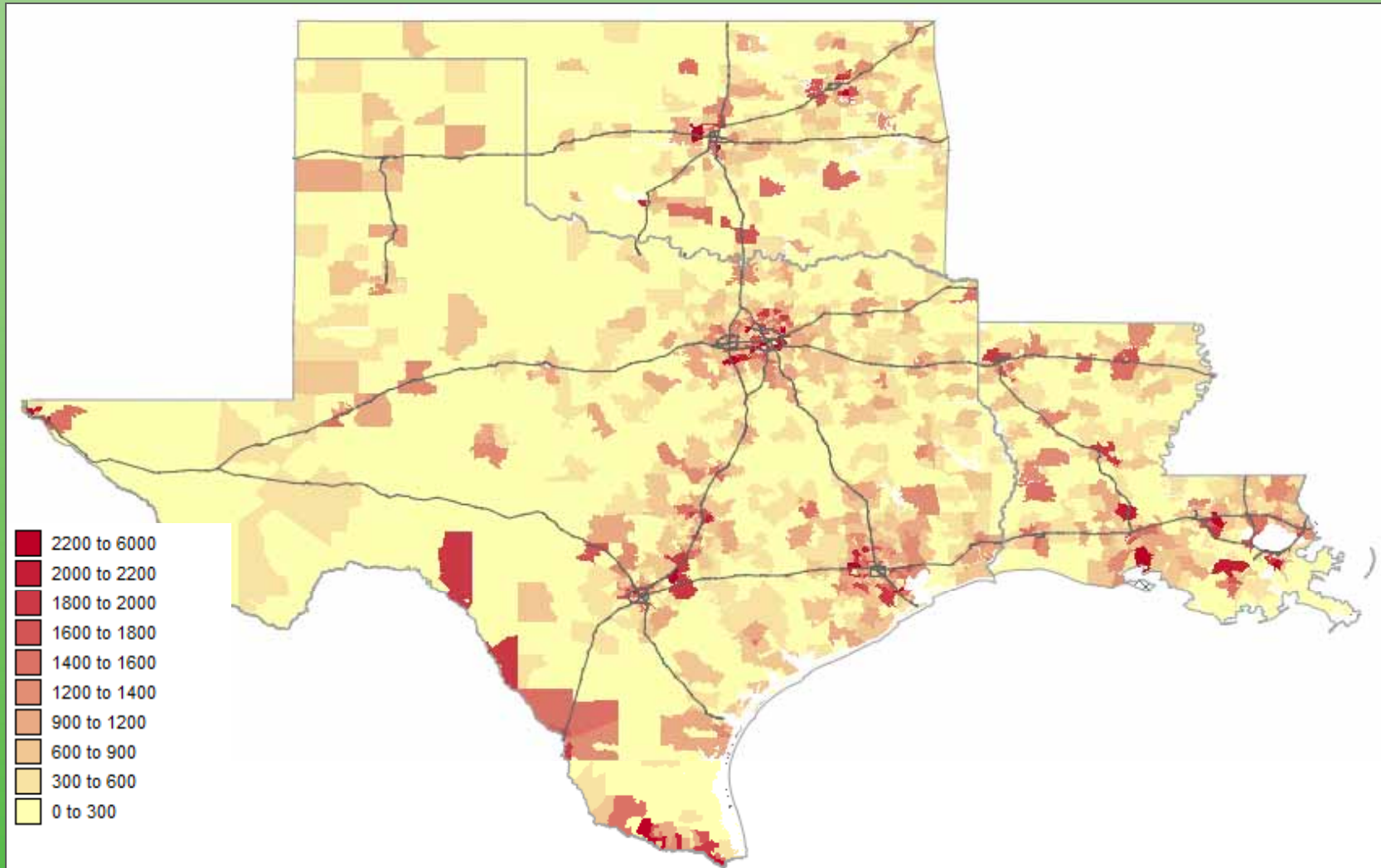
Adjusted Model $R^2 = 0.978$





Total Demand Forecast

Zip Code VIO x Repair Rates





Total Demand > Sales Forecast

TOTAL DEMAND
SKU Level Demand by ZIP

Create Store Trade Areas (ZIP codes)

Aftermarket Adjustment

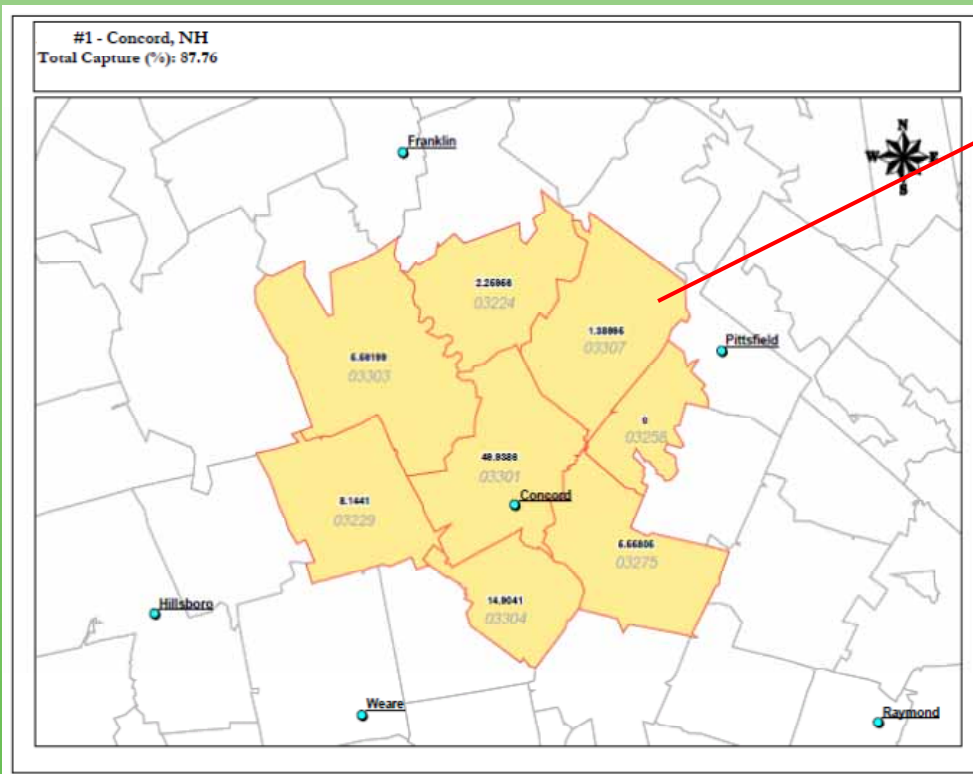
Channel Market Share

**Part Attributes
(good, better, best)**

Sales Forecast



Trade Area Sales Forecast



- **ZIP Code**
Total Demand x Market Share
= ZIP Forecast
- **Store Location**
Sum of ZIP Forecasts
= Store Sales Forecast

- Key Factors: Market Share, Aftermarket Adjustment, Proximity to Store Location, Competition, Part Attributes



Sales Forecast > Inventory Recommendation

SALES FORECAST

SKU Level Sales Estimates by Store

Estimated Forecast Error

Target Service Level

Replenishment Lead Time

Order Frequency

Holding Cost



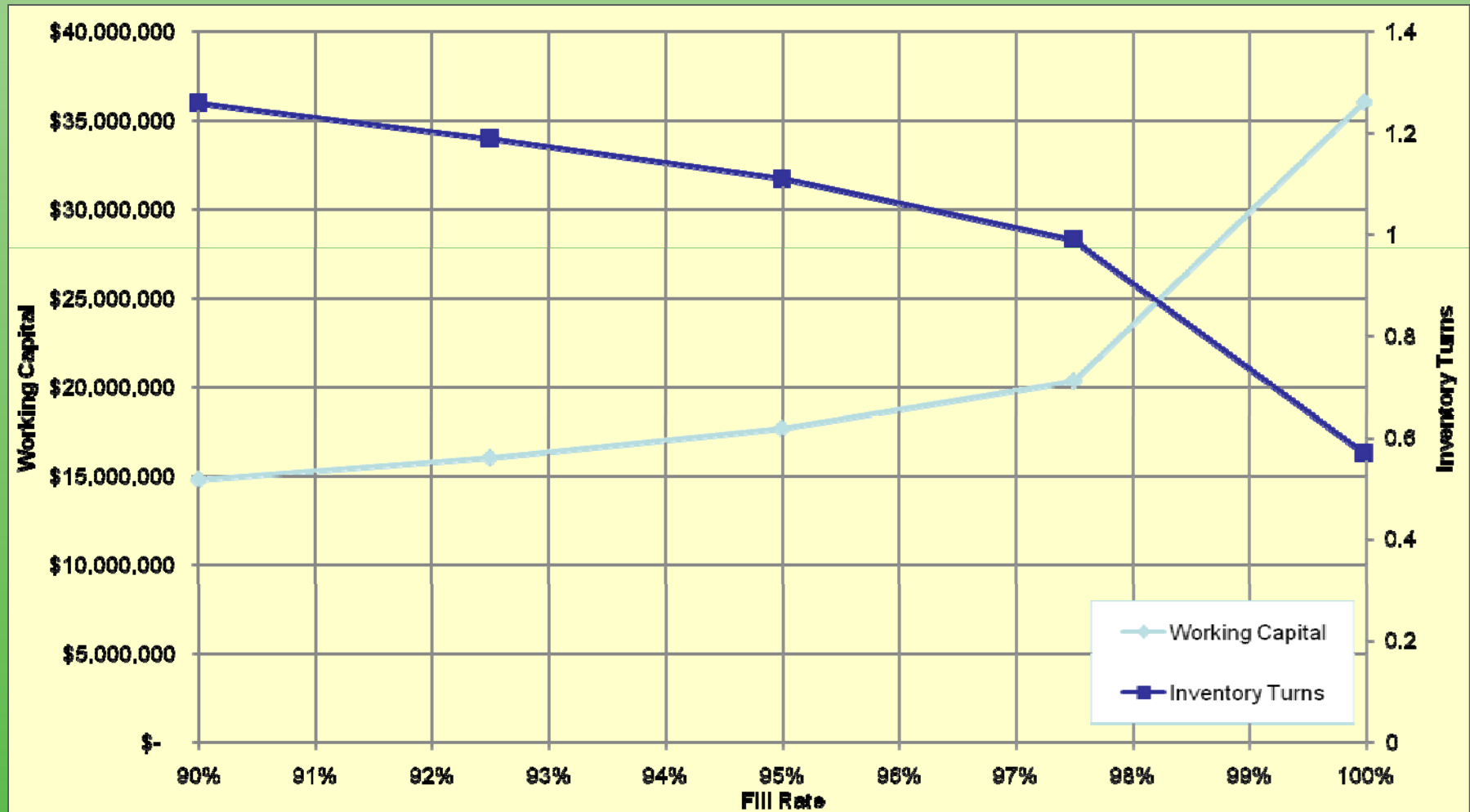
Optimization Engine



Inventory Recommendation

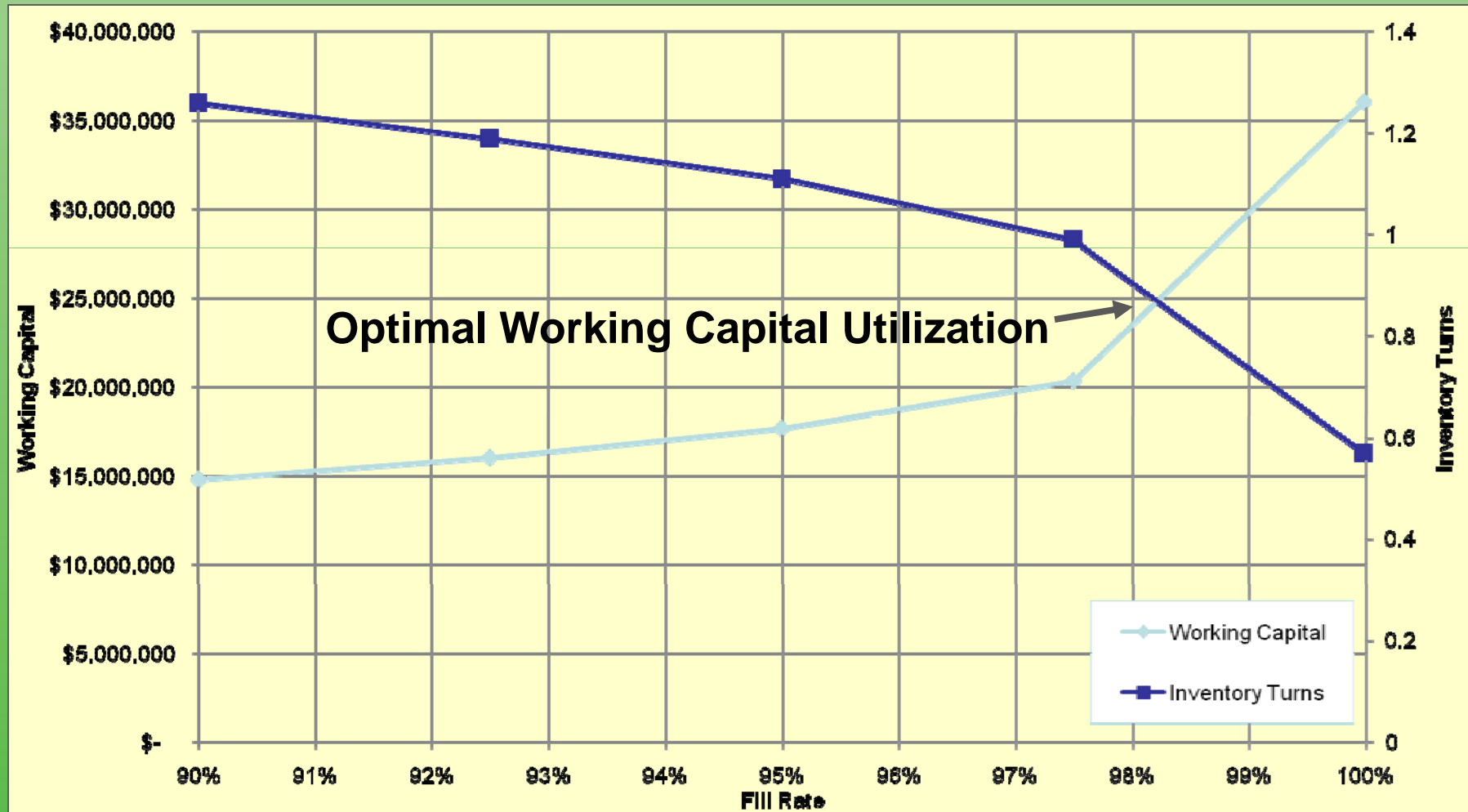


Optimize Inventories For Efficiency





Optimize Inventories For Efficiency

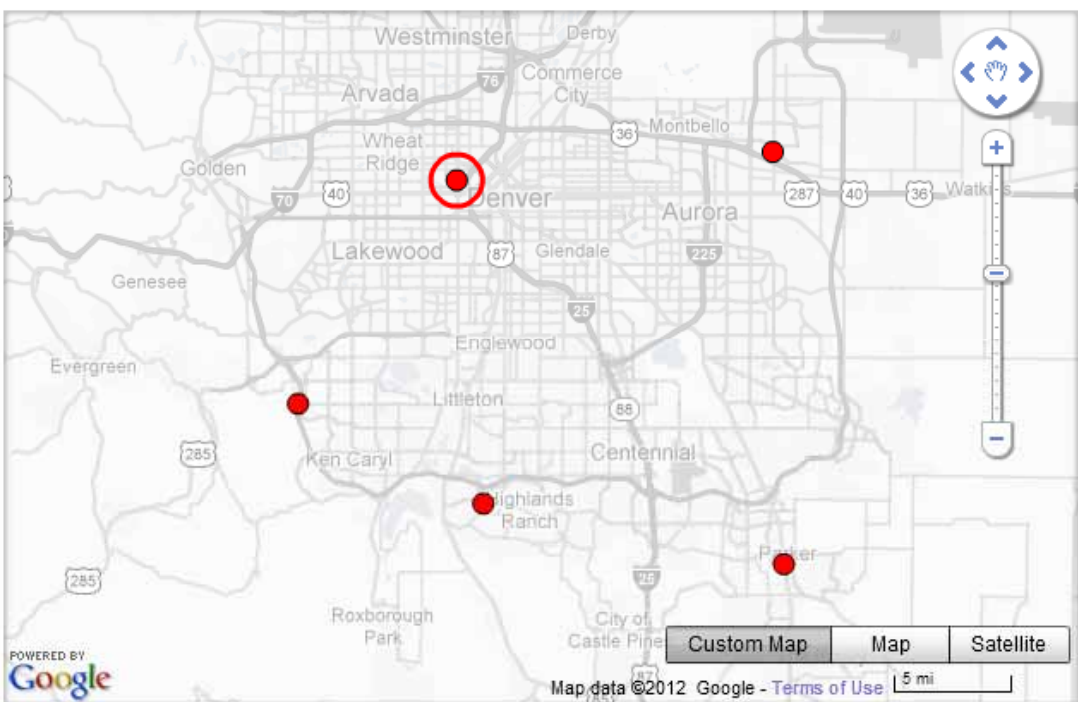





Recommendations via Web Portal

http://www.terraeer.com/lesschwab/

www.terraeer.com/lesschwab/ Google



Available Stores

151	Tower Road
152	Federal Blvd
153	Sergeant Jon Stiles Dr
154	Bowles Ave
156	Pikes Peak Dr

Selected Store

152, Federal Blvd
2001 Federal Blvd
Denver, CO 0
Size: 2, Non-Hub

Go to Inventory

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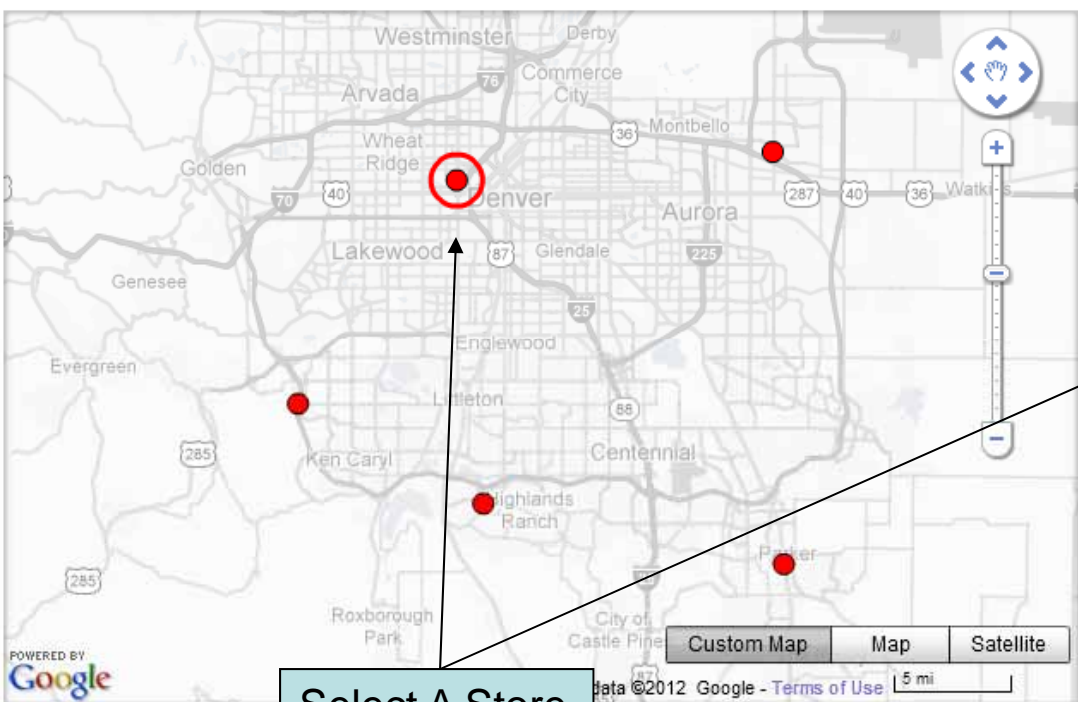



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www.terraseer.com/lesschwab/

Google



Available Stores

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- 152 Federal Blvd
- 153 Sergeant Jon Stiles Dr
- 154 Bowles Ave
- 156 Pikes Peak Dr

Selected Store

152, Federal Blvd
2001 Federal Blvd
Denver, CO 0
Size: 2, Non-Hub

Go to Inventory

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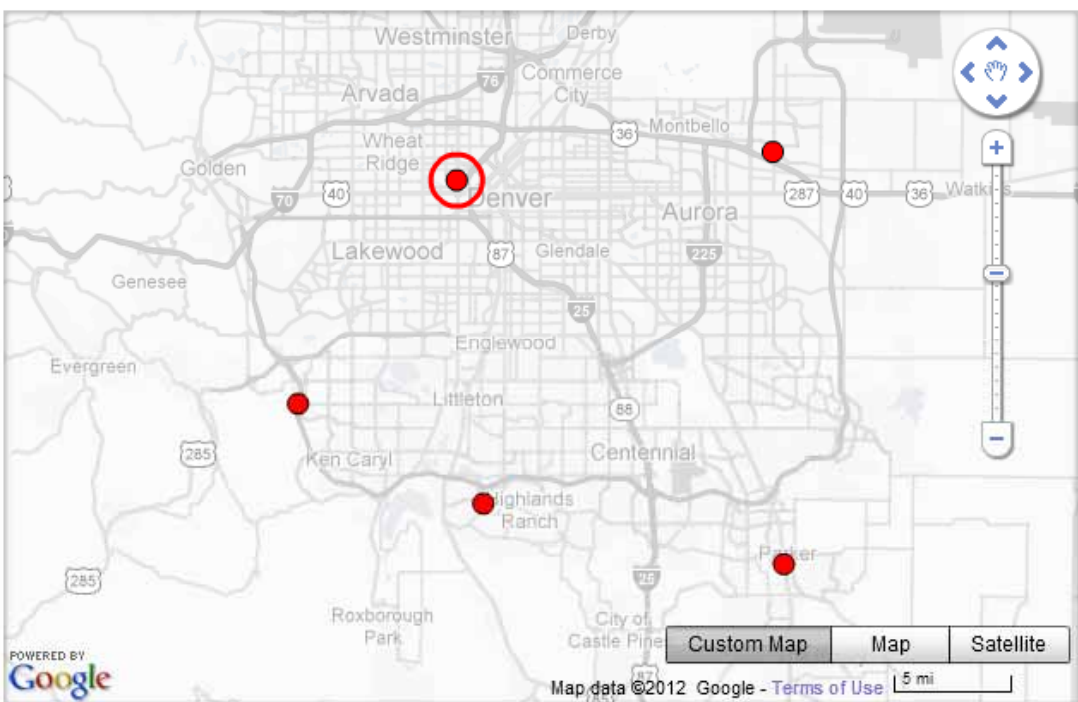

Select A Store



Recommendations via Web Portal

http://www.terraSeer.com/lesschwab/

www.terraSeer.com/lesschwab/ Google



Available Stores

- 151 Tower Road
- 152 Federal Blvd
- 153 Sergeant Jon Stiles Dr
- 154 Bowles Ave
- 156 Pikes Peak Dr

Selected Store

152, Federal Blvd
2001 Federal Blvd
Denver, CO 0
Size: 2, Non-Hub

Go to Inventory

Click To See Inventory

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Recommendations via Web Portal

http://www.terraeer.com/lesschwab/



www.terraeer.com/lesschwab/ Google



Selected Store: 152, Federal Blvd

Search: Filter/Search..

Store ID	Part Number	Base Number	Inventory Rec... 1 ▼	On Hand	Sales (ttm)	Vehicle Count 2 ▲	Nameplate	Buyers Guide
152	680147	880147	1	0	0	1433	N/A	FordTrk:Explorer(20
152	680147R	880147	1	0	0	1433	N/A	FordTrk:Explorer(20
152	66833R	86833	1	0	0	1443	N/A	FordTrk:Windstar(1
152	66833	86833	1	0	0	1443	N/A	FordTrk:Windstar(1
152	56851R	86851	1	0	0	1491	N/A	Bui:Le Sabre(2000-
152	56851	86851	1	0	0	1491	N/A	Bui:Le Sabre(2000-
152	76777	86777	1	0	0	1492	N/A	Chry:300M(1999-20
152	76777R	86777	1	0	0	1492	N/A	Chry:300M(1999-20
152	580244	880244	1	0	0	1621	N/A	Chev:Malibu(2002-2
152	580244R	880244	1	0	0	1621	N/A	Chev:Malibu(2002-2
152	76505R	86505	1	0	0	1657	N/A	Chry:Cirrus(1995-2
152	76505	86505	1	0	0	1657	N/A	Chry:Cirrus(1995-2
152	980050	880050	1	0	0	1710	N/A	Vol:S60(2001-2009






Recommendations via Web Portal

http://www.terraser.com/lesschwab/

www.terraser.com/lesschwab/ **Search Function** ☆ Google





Selected Store: 152, Federal Blvd

Search: Part Number Filter/Search... GO Select Another Store

Store ID	Part Number	Base Number	Inventory Rec...	On Hand	Sales (ttm)	Vehicle Count	Nameplate	Buyers Guide
152	680147	880147	1	0	0	1433	N/A	FordTrk:Explorer(20
152	680147R	880147	1	0	0	1433	N/A	FordTrk:Explorer(20
152	66833R	86833	1	0	0	1443	N/A	FordTrk:Windstar(1
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152	980050	880050	1	0	0	1710	N/A	Vol:S60(2001-2009

Save As
Excel (.xlsx)
Excel 97-2003 (.xls)





Recommendations via Web Portal

http://www.terraser.com/lesschwab/

www.terraser.com/lesschwab/

Tires LES SCHWAB

Selected Store: 152, Federal Blvd

Search: Part Number Filter/Search... GO X Select Another Store

Multiple Sorts

Store ID	Part Number	Base Number	Inventory Rec...	On Hand	Sales (ttm)	Vehicle Count	Nameplate	Buyers Guide
152	680147	880147	1	0	0	1433	N/A	FordTrk:Explorer(20
152	680147R	880147	1	0	0	1433	N/A	FordTrk:Explorer(20
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Save As

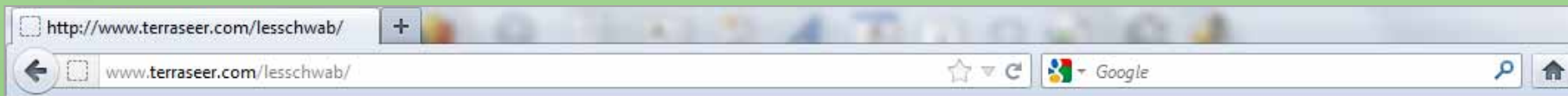
- Excel (.xlsx)
- Excel 97-2003 (.xls)

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Recommendations via Web Portal



Selected Store
152, Federal Blvd

Search: Part Number

Filter/Search...



Select Another Store

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Save As

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Save To Excel





Recommendations via Web Portal

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Tires LES SCHWAB

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Save As

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Go Back To Pick Another Store



Customize Web Portal for Unique Requirements

Coinstar Service Application - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Coinstar Service Application

www.terraser.com/coinstar/

Google

coinstar

Machines Routes Coverage

coinstar machines

served after: 02/01/2010

served before: 10/10/2011

Served Within Previous:

- 30 Days
- 60 Days
- 90 Days
- 120 Days
- Greater Than 120 Days

routes

Route for: 11/11/2010

Stop	Name	DM Zone
1	Jewel-10233210	Chicago
2	Jewel-10233514	Chicago
3	Food 4 Less-315	Chicago
4	Food 4 Less-315	Chicago
5	Jewel-10233170	Chicago
6	Jewel-43113170	Chicago

Coinstar Machine Records

DM Zone: Chicago
 FT Zone: Chicago/Chicago East
 Resource ID: Chicago East 1
 Quantity: 1
 Name: Jewel-10233344
 Chain Name: Jewel
 StoreID: 10233344
 PIN: 38723
 FT Name: Venissia Green

Date	Duration	Stop #
6-1-2010	30 minutes	4
6-24-2010	30 minutes	1
7-15-2010	30 minutes	1
7-29-2010	30 minutes	6
9-3-2010	30 minutes	8
10-12-2010	30 minutes	1
10-12-2010	30 minutes	2
10-29-2010	30 minutes	3
12-8-2010	30 minutes	2

Days Between Visits

edit records download records email records

Simple Map Plain Map Satellite Map



Data Inputs

- 3rd Party Data:
 - Vehicle Registration (Experian, Polk)
 - Repair Survey (IMR)

- Channel Data
 - Store Locations and Attributes
 - Current Inventory By SKU/Store/DC
 - Sales History By SKU/Store/DC
 - Delivery and Service Level Requirements

- Nice to Have
 - Customer (end-user) Locations
 - Estimated Market Share
 - Demand Forecast
 - Competition



Iterative Analytical Approach

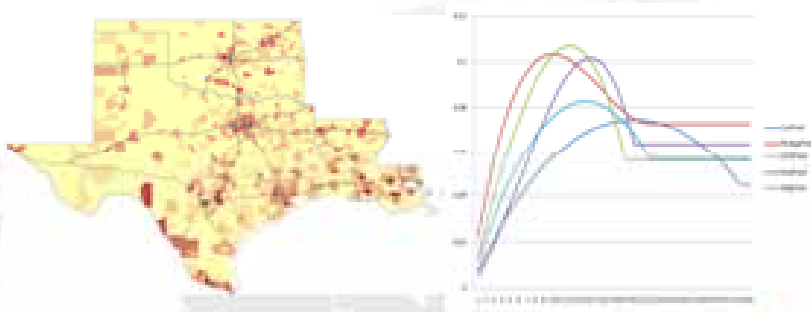
- Rinse and Repeat
 1. Model Repair Rates
 2. Generate Demand Forecasts
 3. Trade Area Sales Forecasts
 4. Optimize Inventory
 5. Develop Web Portal
 6. Maintain/Refine Models
 7. Maintain/Refine/Customize Web Portal
 8. Start Over, Improve and Repeat



Inventory Optimization Process

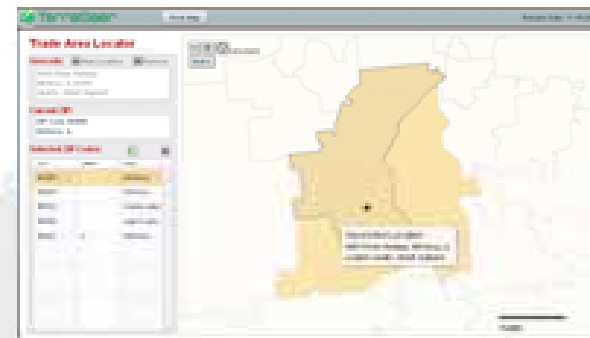
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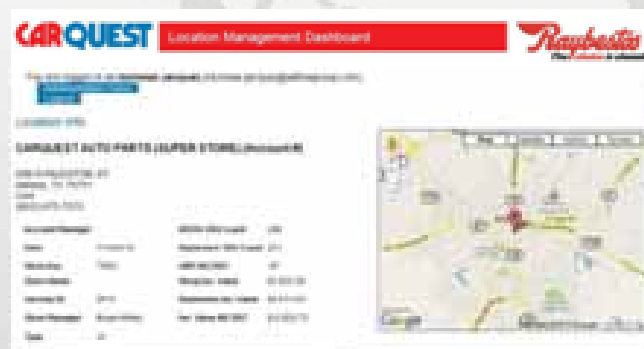
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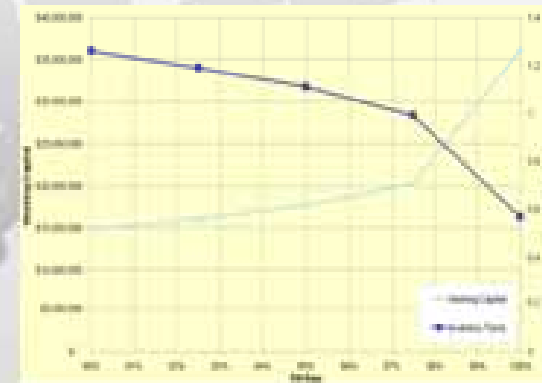
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- By location, by SKU



justin.holman@terraseer.com

mobile: 734.709.4188

twitter: @justinholman



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