

High Voltage Demand Planning

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velocity

CONNECT + ACCELERATE + INNOVATE

Agenda

- ▶ Who is Power Solutions
- ▶ Demand Planning Objectives
- ▶ Planning Challenges
- ▶ Solution Deployed
- ▶ Enhancements
- ▶ Benefits
- ▶ Lessons Learned
- ▶ What's Next
- ▶ Q&A



**POWERING
TODAY,
INTO
TOMORROW.**

MILWAUKEE

HANNOVER, GERMANY

SHANGHAI, CHINA

55

MANUFACTURING,
RECYCLING & DISTRIBUTION CENTERS
WORLDWIDE

SERVING CUSTOMERS
150+

154M

BATTERIES
SOLD IN 2018

COUNTRIES

\$8.0B

REVENUE
IN 2018

6 R&D
FACILITIES

16 R&D
PARTNERSHIPS

- GLOBAL HEADQUARTERS
- REGIONAL HEADQUARTERS

OUR BUSINESS AT A GLANCE



15,000

TEAM MEMBERS



THE BROADEST AND MOST EFFICIENT PORTFOLIO OF BATTERIES

STANDARD
LEAD-ACID

ADVANCED
LEAD-ACID

LITHIUM-ION



1 IN 3

VEHICLES IN
THE WORLD IS
POWERED BY
OUR BATTERIES



WORLD'S LARGEST
AUTOMOTIVE BATTERY
RECYCLER



UP TO
99%

OF THE MATERIALS IN
OUR BATTERIES CAN
BE RECOVERED,
RECYCLED, AND
REMADE



8K

BATTERIES RECYCLED
GLOBALLY, EVERY
HOUR, EVERY DAY IN
OUR NETWORK



BY USING RECYCLED
RAW MATERIALS

90%

LOWER ENERGY AND
GREENHOUSE GAS
EMISSIONS

OUR BRANDS INCLUDE:



Delkor



130+ YEAR
TRADITION
OF INNOVATION & GROWTH

Demand Planning Objectives

- ▶ Improve customer service
- ▶ Support supply chain and corporate goals
- ▶ Better signals to understand customer demand
- ▶ Improve forecast accuracy
- ▶ Reduce transportation cost
- ▶ Manage inventory, safety stock
- ▶ Increase productivity at plant
- ▶ Maximize network usage

PLANNING CHALLENGES



Streamlined Integration & Enhanced Data Management

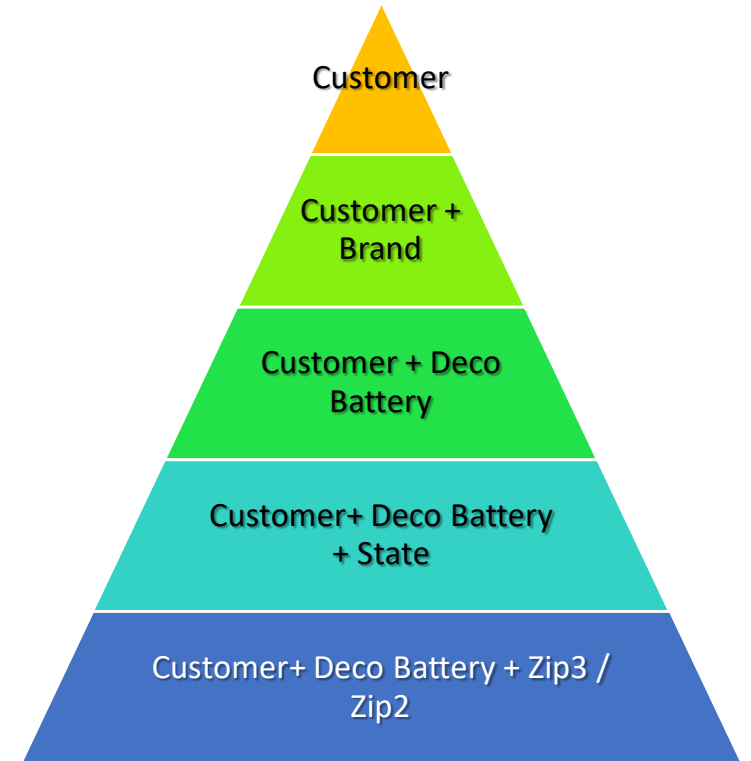
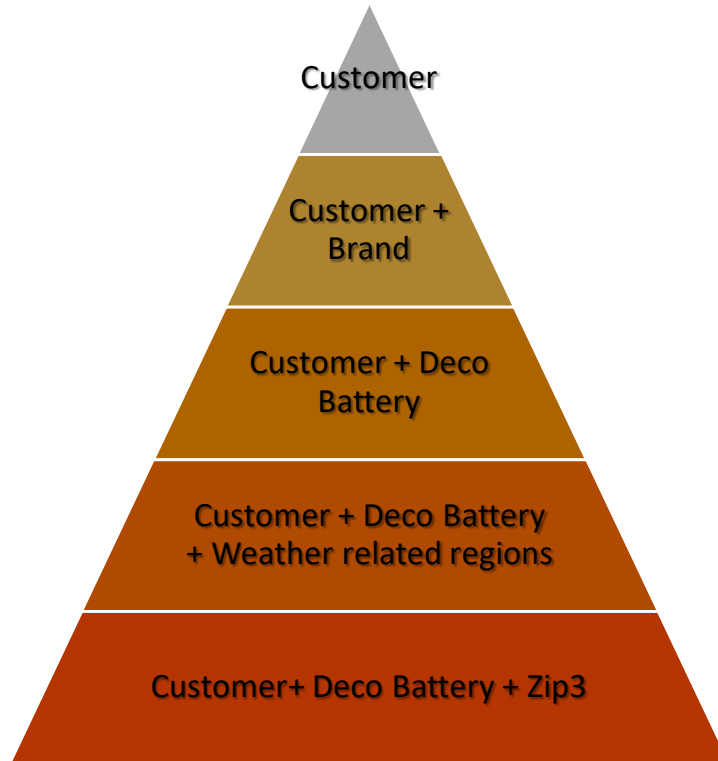
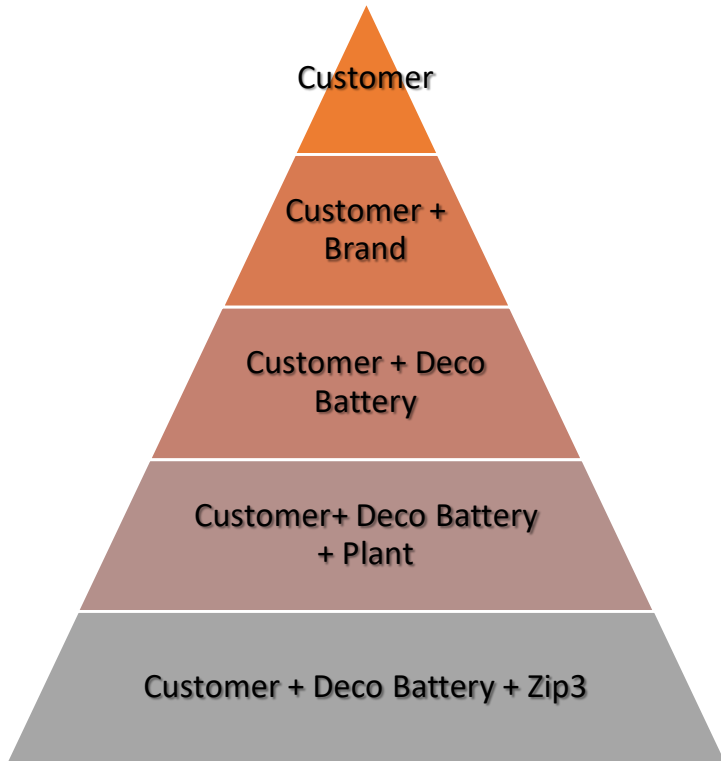


	ERPs integration for LOM
Solutions	Adaplink to integrate different data sources
Results	Information consolidated
Lessons Learned	Need an in-house expert
Unexpected Benefits	Easy to onboard new plants when switching ERP systems

PLANNING CHALLENGES



Evolution of JCI's Pyramid



Understanding Customer Demand

Why is this important

- Identify where the demand will show up
- Cleanse historical data
- Incorporate different streams of business intelligence

Solutions deployed

- Voyager Demand Planning Pyramid Update

Enabled processes

- Enhanced Demand Data Aggregation / Disaggregation
- Customer Collaboration

Results

- Pyramid update to include State

What did we learn, what did we gain

- More data at level 2
- Easy to analyze data: customer orders, VIO, POS, customer locations
- Regional vs Plant Centric Supply Chain – Network optimization

Customer Collaboration

Collaboration Process Meeting

	201904	201905	201906
Segment	Statistical Forecast M1	Statistical Forecast M2	Statistical Forecast M3
AUTOMOTIVE	601,417	723,390	442,543
HEAVY DUTY	511,731	520,094	518,277
LAWN & GARDEN	533,439	620,402	526,439
MARINE	537,930	601,896	557,127
(blank)	201,904	201,905	201,906
Grand Total	2,386,421	2,667,687	2,246,292

	201904	201905	201906
Segment	Resultant Forecast M1	Resultant Forecast M2	Resultant Forecast M3
AUTOMOTIVE	508,667	566,948	516,567
HEAVY DUTY	594,613	605,517	407,719
LAWN & GARDEN	559,950	488,169	602,430
MARINE	590,023	627,518	587,457
(blank)	201,904	201,905	201,906
Grand Total	2,455,157	2,490,057	2,316,079

Technology ✕

- AGM
- OPTIMA
- SLI
- (blank)

State ✕

- AK
- AL
- AR
- AZ
- CA
- CO
- CT
- DC
- DE
- FL
- GA

Segment ✕

- AUTOMOTIVE
- HEAVY DUTY
- LAWN & GARDEN
- MARINE
- (blank)

Customer Collaboration

Channel

- RETAIL
- (blank)

Segment

- AUTOMOTIVE
- HEAVY DUTY
- LAWN & GARDEN
- MARINE
- (blank)

Technology

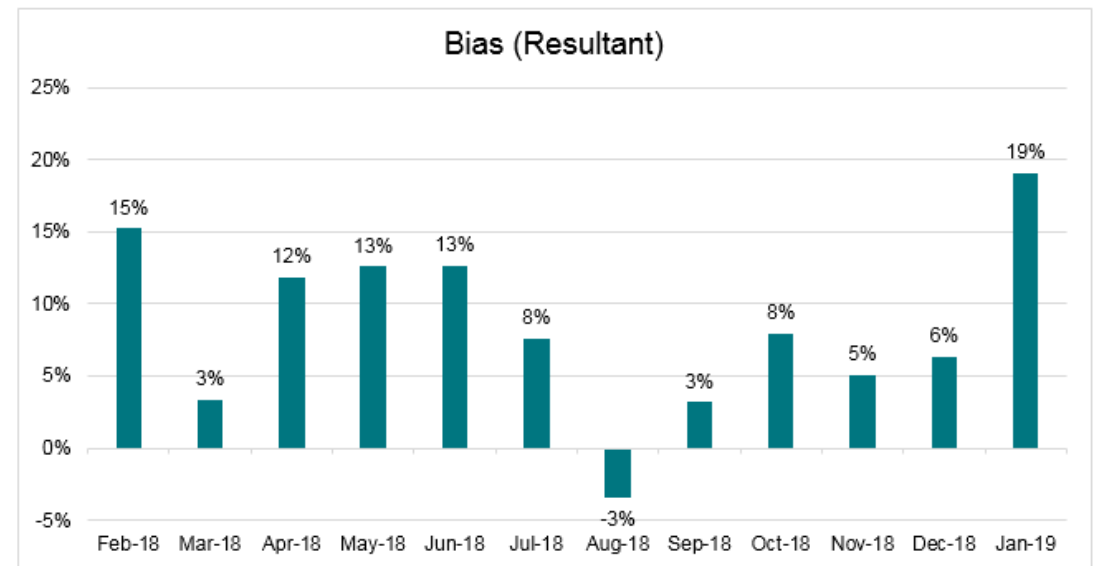
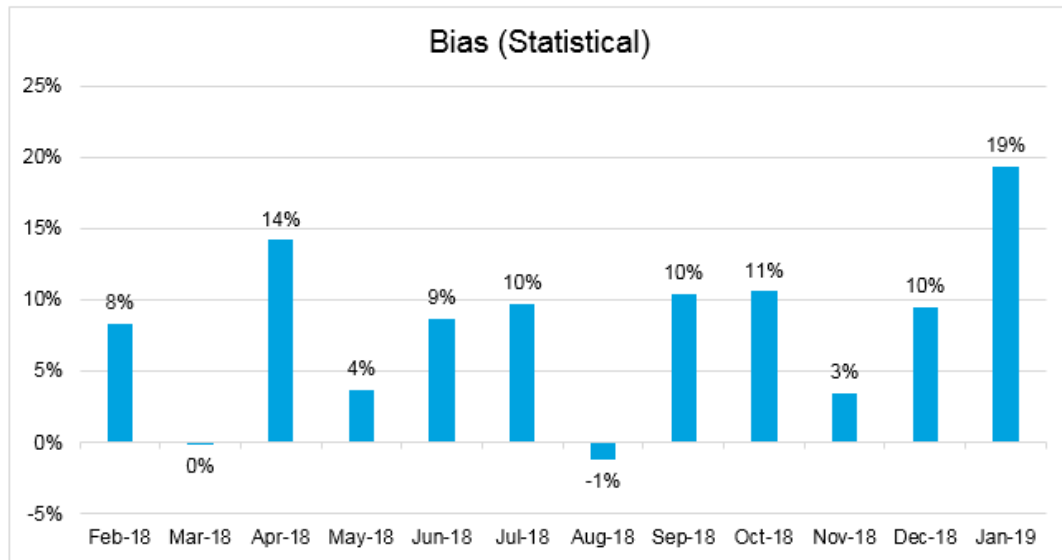
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Sub-brand

- COMMERCIAL
- DURALAST AUTO
- DURALAST COM...
- DURALAST COM...
- DURALAST COM...
- DURALAST COM...

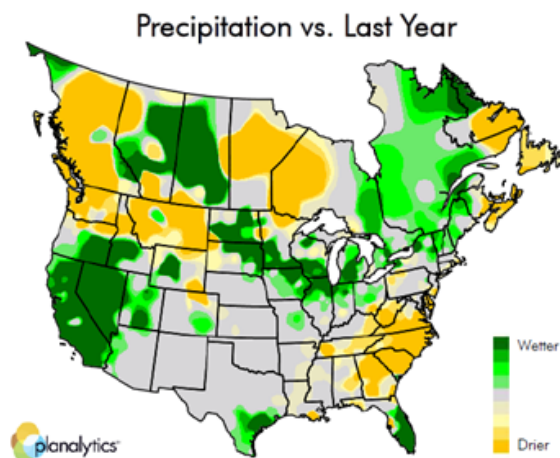
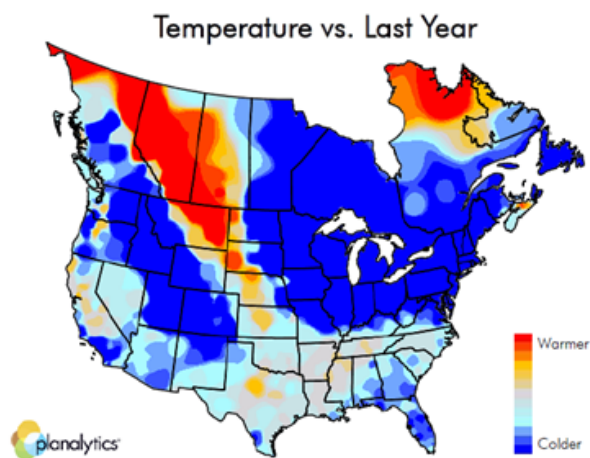
State

- AK
- AL
- AR
- AZ
- CA
- CO



Enhanced Demand Data Aggregation / Disaggregation

Short but Fierce Cold Spell to End the Month. Snow Buried the Midwest. Warmer in the West; Late Week Storms Brought Heavy Rain and Snow. Canada Shivered Under a Blanket of Snow.



	Regional disaggregation
Solutions	Pyramid update to include State
Results	Better understanding of demand by geography
Lessons Learned	More data at level 2
Unexpected Benefits	Able to compare information from different sources and aggregate as needed

Demand Planning Improvement Plan

	Action Taken	Work in Process	Next Steps
	<ul style="list-style-type: none"> ✓ Root Cause analysis ✓ Metric evaluation and redesign ✓ Prepare, cleanse and test source of data ✓ SKU Prioritization ✓ Implement data automation ✓ Generate dashboard to guide customer meetings ✓ Implement Change Management to new metrics 	<ul style="list-style-type: none"> • Tune statistical models • Configure Logility alerts • Conduct logility modeling training to demand planners • Develop processes and support for new collaboration approach with target customers • Implement Change Management to SKU Prioritization • Deploy alternate sources of history 	<ul style="list-style-type: none"> • Predictive/ machine learning Models • Expanded data acquisition • Logility hierarchy re-design • Improve value of customer collaboration • Root cause reporting and analytics • Team competency development, training, and supporting structure to sustain performance and results • Implement Change Management to customer collaboration
Bias	+/- 15%	+/- 10%	+/- 5%
FE	3-5pt reduction	5-8pt reduction	8-10pt reduction

Taken together these actions will reduce Forecast Bias to +/- 5% and Forecast Error by 20-25pts

WHAT'S NEXT

Supply Planning Module

Life Cycle Planning

Full Integrated Supply Chain Approach



QUESTIONS?

THANK YOU

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