

Why You Should Use Pre-mixed Expanders

Presentation to the 10th Asian Battery
Conference

Bangkok, Thailand

September 2003

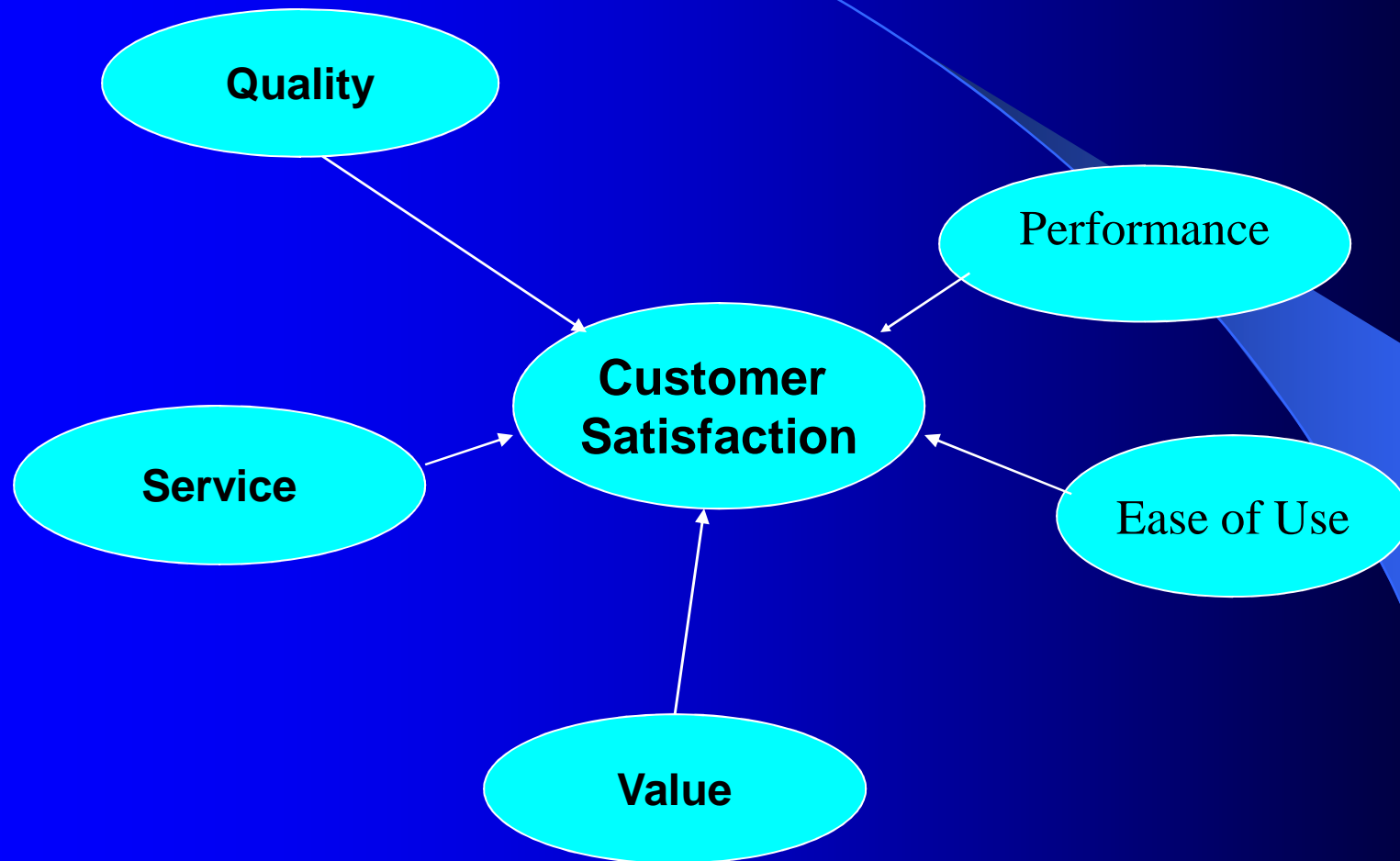
By

Dr. David P. Boden

Objective

- We are going to review:
 - The many advantages of pre-mixed and tested expanders
 - How these improve the quality of your batteries
 - How they reduce cost
 - How they simplify battery manufacture

Customer Requirements



What Is a Pre-blended Expander?

- All the components are blended, tested and packaged **before** you receive them.
- These can be expander, flock and other additives all in the same bag.
- Bag contains exact amount for your paste mix.
- All you have to do is add the contents to your paste mix.

Let's Compare This to Conventional Expanders

- Before pre-mixed expanders were available several ways were used to add expander to a paste mix:
 - Adding the separate components.
 - Mixing the components with water before adding to the paste mix.
 - Mixing the components in the battery plant before adding to the paste mix.

All of These Methods May Increase Errors and Cost

- You have to purchase several materials:
 - Carbon black
 - Wood flour
 - Lignosulfonate
 - Sometimes several types
 - Barium sulfate
 - Blanc fixe
 - Barytes

This Involves Several Actions

- Purchasing
- Receiving
- Storage
- Inventory control
- Waste disposal

All of these actions cost money

Materials in inventory take up space

Additional Costs and Risk

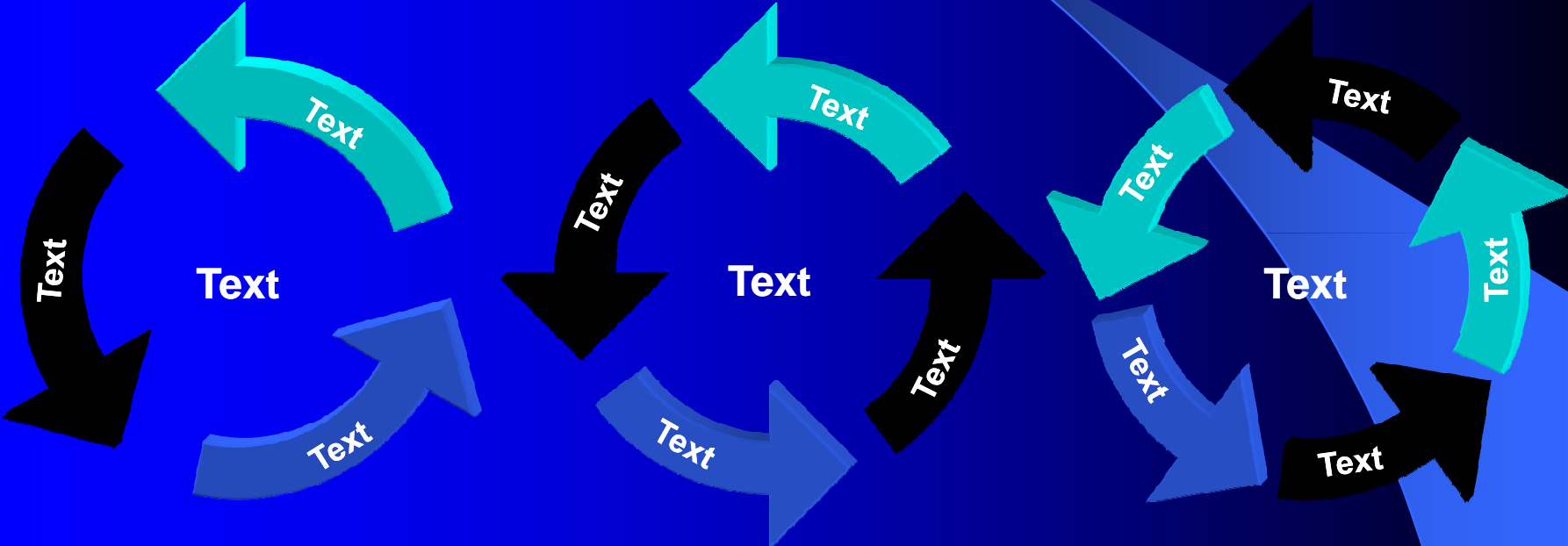
- Mixing your own components:
 - Adds cost
 - Labor
 - Equipment
 - Maintenance
 - Increases the risk of error
 - Weighing(were the components weighed accurately).
 - Adding to mixer(was the correct amount added)?.

With a Pre-blended Expander

- You purchase one stock keeping unit which:
 - Reduces purchasing transactions
 - Reduces shipping transactions
 - Reduces space

This reduces cost

Our Strengths



More Problems With Conventional Methods

- The composition can not be verified.
 - When you add the components directly into the mixer or blend them before adding to the mixer you can not verify the component weights. You assume that the work is done perfectly every time.

This increases risk.

Key Benefits of Pre-blended Expanders

- The composition of every batch is verified by analysis before it is approved.
 - Several methods are used.
 - Ash content. This shows mix composition.
 - UV spectrophotometry. Lignosulfonate content.
 - DCS and TGA. Individual component analysis.
 - ICP. Metallic impurities.
- This assures repeatability of paste mixing.

Key Benefits of Pre-blended Expanders

Certificate of Conformance

HAMMOND EXPANDERS
A Division of HAMMOND GROUP, INC.

Hammond Expanders • 6544 Osborn Avenue • Hammond, IN 46320 • Tel. (219) 989-4060 • Fax (219) 989-4071

Certificate of Analysis

Customer: _____
Attention: _____
Location: _____

HGI Order #: _____ P.O. #: _____
Shipping Date: _____ Product: _____
Number of Pallets: _____ Customer Part #: _____
Bags per Pallet: _____ Change #: _____
Bag Weight: _____

Test Results

Test	Method	Lower Specification	Upper Specification

MFG. Date	Batch #	Pallet #	Residue (%)	MFG. Date	Batch #	Pallet #	Residue (%)

Certified By: _____ Title: _____
Signature: _____

Key Benefits of Pre-blended Expanders

State of the art laboratory



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Key Benefits of Pre-blended Expanders

Assistance With Expander Selection

Automotive

Motive power

Golf car

Flooded

Standby power

VRLA

Key Benefits of Pre-blended Expanders

- **Availability of expander experts.**
 - Expander manufacturer provides proven formulas.
 - These are used by battery manufacturers worldwide.
 - A wide range of expanders is available for every battery application.



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Key Benefits of Pre-blended Expanders

All Expanders Are Electrochemically Tested



Key Benefits of Pre-blended Expanders

Motive Power Battery Expanders

Applications:
Fork Lift Trucks, Sweepers/Scrubbers, Golf Carts, Mining Equipment.

Description:
Formulated to provide outstanding battery performance at moderate discharge rates with very high depths of discharge.

Expander Selection Guide:

Application	Expander	Composition	Ash Content	Addition Rate
Trucks				
HD-115	HD-115	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	89.1 ± 2.3%	2.00 %
Sweepers/Scrubbers				
Golf Carts				
HD-120	HD-120	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	77.8 ± 3.0%	2.00 %
Equipment				
HD-111	HD-111	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	88.6 ± 2.3%	2.00%

Impurities:

Element	Typical (ppm)	Maximum (ppm)
Lead	100	200
Copper	5	10
Nickel	5	10
Iron	5	10

Packaging: Bagged to customers requested weight.

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6544 Odium Avenue • Hammond, IN 46324 USA • Tel: (219) 938-8800 • Fax: (219) 932-2240
Hammond Expanders UK, LLC
1 Clarendon Court, Eastbury • Team Valley Trading Estate • Gateshead NE11 0TF, England • Ph: +44 (0) 191 269 2500 • Fax: +44 (0) 191 269 2570

SLI/Engine Starting Battery Expanders

Applications:
Automobiles, Lawn and Garden Equipment, Recreational Vehicles and Marine.

Description:
Formulated to provide outstanding battery performance at very high discharge rates in sub-zero temperatures.

Expander Selection Guide:

Application	Expander	Composition	Ash Content	Addition Rate
Automobiles				
LD-4640	LD-4640	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	50.8 ± 5.5%	1.00 %
Lawn and Garden Equipment				
RV-631	RV-631	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	63.6 ± 5.0%	1.00 %
Recreational Vehicles				
POBTE-90	POBTE-90	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	66.5 ± 5.0%	1.00 %

Impurities:

Element	Typical (ppm)	Maximum (ppm)
Lead	100	200
Copper	5	10
Nickel	5	10
Iron	5	10

Packaging: Bagged to customers requested weight.

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Standby Power Battery Expanders

Applications:
Telecommunications, Uninterruptible Power Supplies, Security/Lighting and Switchgear.

Description:
Formulated to provide outstanding battery performance over a wide range of discharge rates at moderate temperatures.

Expander Selection Guide:

Application	Expander	Composition	Ash Content	Addition Rate
Telecommunications				
UPS	HE-40LF	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	84.6 ± 2.5%	2.00 %
Security/Lighting				
HE-1140	HE-1140	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	73.7 ± 2.5%	1.00 %

Impurities:

Element	Typical (ppm)	Maximum (ppm)
Lead	100	200
Copper	5	10
Nickel	5	10
Iron	5	10

Packaging: Bagged to customers requested weight.

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Valve Regulated Battery Expanders

Applications:
Telecommunications, Uninterruptible Power Supplies, Security/Lighting, Mobile Power and Solar Energy.

Description:
Formulated to provide outstanding battery performance over a wide range of discharge rates and temperatures.

Expander Selection Guide:

Application	Expander	Composition	Ash Content	Addition Rate
Telecommunications				
UPS	HE-120	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	77.8 ± 2.5%	2.00 %
Security/Lighting				
Mobile Power				
Solar Energy				
HE-150	HE-150	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	58.1 ± 5.0%	2.00 %
HE-1160	HE-1160	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	72.7 ± 5.0%	1.00%
HE-40LF	HE-40LF	Carbon Black Sulfur Carbon Black Carbon Sulfonphosphate	84.6 ± 2.5%	2.00 %

Impurities:

Element	Typical (ppm)	Maximum (ppm)
Lead	100	200
Copper	5	10
Nickel	5	10
Iron	5	10

Packaging: Bagged to customers requested weight.

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Key Benefits of Pre-blended Expanders

- Electrochemical testing

- Automotive

- Cold cranking

- Reserve capacity

- Charge acceptance

- Gassing

- Life cycle

- Industrial

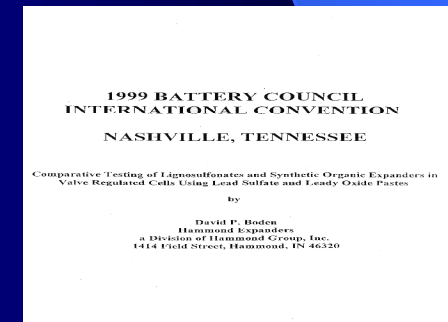
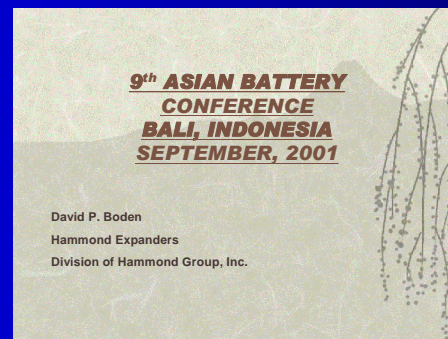
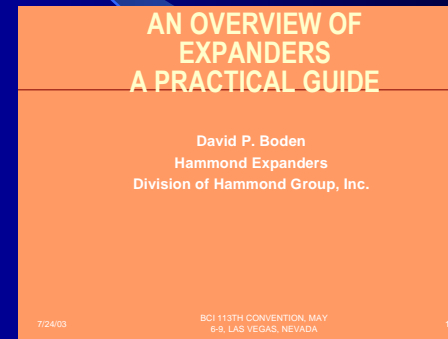
- Capacity

- Cycle life

- Float behavior

Key Benefits

- Customer support
 - Problem solving
 - Testing
- Research and development
 - New products
 - New materials



Key Benefits

Simplicity

Low cost

Repeatability

No risk

Next Steps

- Specify the actions required of your audience