Naples, Florida, USA • May 1-4, 2022

BCI Yearbook

& Special Pre-2022 Convention Report

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Batteries International

Naples, Florida, USA • May 1-4, 2022

BCI Yearbook

& Special Pre-2022 Convention Report

BCI YEARBOOK SECOND INSTALLMENT

- Roger Miksad: the regulatory battles continue
- Full details of BCI activities over the year
- Follow our convention session analyses
- Lisa Dry: communication campaign surges on
- The BCI women's group hits ground running
- Bob Flicker, profile of an East Penn veteran

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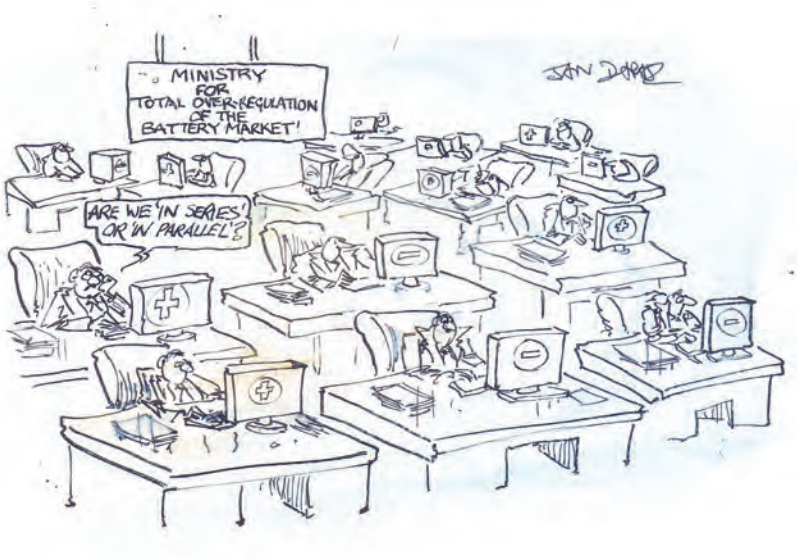
Regulating the regulators

What is the right amount of regulation that's required to make markets work, safeguard industries while still protecting consumers and still letting companies compete and thrive?

This is the dilemma that's at the heart of the battery industry across Europe and North America and once again will be a theme at this year's convention.



The energy storage industry has never been against proper regulation of the battery business. The problem is in working out the right amount — it's a balancing act between conflicting forces, divergent interests and fending off those with other intentions than simply sorting out regulatory matters.

The trouble is that some of the rules being discussed verge on the hyper-purist. Over the last few years the lead battery industry has led the way to providing yet cleaner levels of lead emissions into the environment — unfortunately at a cost that has to be passed on to the consumer — when the scientific evidence needed to justify this has only been anticipated — or is the word imagined?

In Europe senior officials at the European Commission (the civil service arm of the EU) hold preconceptions about the toxicity of lead that are not just unscientific but grossly ill-informed. They believe they are heading towards a political la-la land where we all live in a whizzy future of silent EVs powered by lithium batteries and charged by perpetual sunshine and limitless wind.

(If evidence is needed about their ignorance of battery chemistries the deputy head of the EC was quoted on the record by *Batteries International* last year discussing how he was "chemistry agnostic" but saying that clearly lead batteries were an "outdated technology" that needed to be phased out. He also seemed to think that rare earths were needed in car batteries.)

Overall, it's a very strange mix of witlessness, ignorance and 'agnosticism'!

Fears that where California leads, the rest of the US will inevitably follow has taken a turn for the better. BCI's long experience in explaining the issues to Californian legislators is proving fruitful. The more extreme proposals by the state's wannabe environmentalists are being beaten down by an armoury of facts and common sense.

Not that it is all smooth going, however, clearly progress is happening.

A key convention topic will, again, be how BCI members can support the council's communication capabilities — from lobbying, to talking to legislators, to communicating lead's strengths. The importance of batteries and energy storage need to be a theme equally emphasized as that of a green environment. ■

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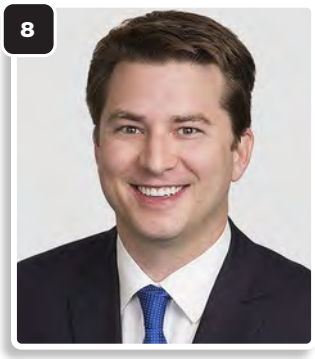
BCI Yearbook & Special Pre-2022 Convention Report

Battery Council International's Convention + Power Mart Expo, looks yet again to be the hottest meeting of the North American lead (and more) battery community this year. With an exciting agenda covering many issues that urgently need to be discussed, and not forgetting the newly introduced innovation awards, the 600 plus delegates heading to Naples, Florida should find much to talk about.



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Welcome to Naples

The year-round perfect climate and exotic beach settings make Naples a perfect destination for this year's BCI convention. Julia Berg reports

When one or two batterymen are gathered together at a US conference their first thoughts tend to be about electrolytes (the recharging thereof) and battery life (discharging energy).

In layman's terms — a relaxing drink and a game of golf.

It's called networking in the US and it's serious stuff. It's work with a capital W. No wonder the great and the good of the Americas' battery industry, roll up their sleeves and drop everything to get to work networking here.

"I wouldn't be able to look my workers in the face if they knew that I hadn't spent a busy week networking on the links and the clubhouses on the firm's behalf," one delegate told *Batteries International*. "It's a tough job but someone's got to do it."

So what better place for a convention than Naples — nicknamed (admittedly by realtors) as the golf capital of the world? With 92 courses, the city has the most golf holes per capita than any other city in the US!

Convention organizers fell in love with Naples a while back. The location provides a breath-taking backdrop to any event and centers like the Naples Grande Beach Resort put delegates and partners on three miles of white sand beach within the heart of Naples itself. A perfect atmosphere for a convention of creativity, delivery and content.

And for partners, both male and female, there are world class shopping experiences with the Waterside Shops at Pelican Bay a magnet for many. Here, the dedicated retail crowd find upmarket designer boutiques alongside department stores selling Ralph Lauren, Gucci and many more brand names in between.

For lovers of nature, kayak trips

A short history of paradise

The word 'paradise' is one of the most over-used terms ever in travel writing and appears relentlessly when describing a discovery that might one day be the next big thing in tourism.

And yet, the paradise word was genuinely in the hearts, minds and wallets of two entrepreneurs — Senator John Williams and his friend, newspaper tycoon Walt Haldeman — who were to establish the city of Naples, Florida in 1886.

In 1885 the two men chartered a boat and sailed down the coast in search of their "paradise", the place where they could establish their city and add to their existing fortune. As they sailed by the location of present-day Naples and noticed the miles of silvery powder coast, the temperate weather and then, behind a vast expanse of beach, the bay itself they knew that they had found their paradise.

The two had already seen something that others hadn't.

Southwest Florida remained virtually uninhabited until after the Civil War and yet this area of the US with its mild climate, plentiful fish and a certain likeness to the Bay of Naples in Italy, could be a perfect winter home for the rich from the north or those seeking a retirement away from the cares of the world.

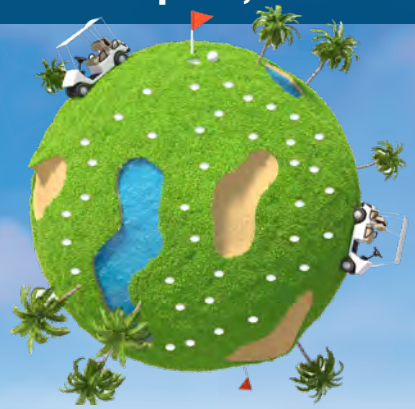
Williams and Walt Haldeman built the pier and the first hotel, a 16-room establishment just two blocks away from the iconic embarcadère and the city started to come to life. The rest was to become history as Naples moved into the 20th century with the addition of railways, electric light and even a pilot training school in WWII — now Naples Airport. ■

Any food you want

Dining out (as much al fresco as you want due to the climate here) can be beach bistro fish casual or fine dining (upscale) with plenty of choices in between from authentic Spanish and Italian restaurants, eclectic wine bars with a nod to France, endless seafood eateries and simple pizza and pasta places.

The Hampton Social

— heart of the Paradise Coast!



explore the mangrove estuaries and there are day trips to the Big Cypress National Preserve. Short of time, then a 15 minute stroll along the boardwalk by the shore will provide a glimpse of, shall we say, "mangrove world".

Golf lovers and shopping experts do their thing while it is the beaches that still remain the main attraction, with almost every beach having sight of the Naples Fishing Pier, the best known local landmark — created early in the city's founding and the heart of this destination.

The beaches here on the Gulf of Mexico are long, miles and miles of mostly white sugary and powdery sand. That is a serious wow factor and on most peoples' wish lists. Even the names of the beaches evoke glamour and fun. Vanderbilt Beach, Clam Pass Beach and so on. According to the Travel Channel, the beaches here are the best in the Americas.

The Paradise Coast embraces Naples, Marco Island and Everglades City and they are all within an hour's drive of each other. Some locals swear that the best beaches in the world are at Marco Island, just 15 miles south of Naples. ■

What better place for a convention than Naples

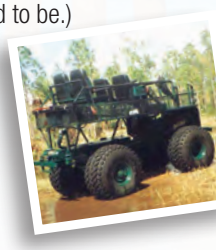
— nicknamed (admittedly by realtors) as the golf capital of the world? With 92 courses, the city has the most golf holes per capita than any other city in the US.

Did you know?

• **Oddly for the 'golf capital of the world'** the first club was only set up in 1966.

• Plenty of beachside places offer open-air morning **yoga sessions,** for a nominal charge, perfect for early risers or conference delegates wanting to clear out the previous night's electrolyte fumes.

• **As one of the wealthiest cities in the US** some say Naples has more millionaires per capita than any other city in Florida. (But then again a million ain't what it used to be.)



• **The Swamp Buggy** (it is as it sounds) was invented in Naples, Florida, to navigate and explore the swamps. Three times a year the swamp buggy races roll along at the Florida Sports Park.

• **Naples Philharmonic Orchestra** presents concerts all year-round with ticket prices as low as $30.

• **There are over 100 art galleries in Naples.** The town has been cited as the #1 Small Art Town in America in John Villani's book The 100 Best Art Towns in America.

• **Shelling** — the collecting that is — is the Big Thing in Naples. It's about ambling on the beaches and shell seeking as you go. Over 100 varieties of shell are often on show, exquisitely, in creations in local art galleries.

… but it better be fish!

We love **The Dock** at Crayton Cove (the brave might try the Seafood Tower), **The Hampton Social** with its wrap-around outdoor terrace, live music and memorable cocktails and **The Turtle Club,** just three minutes from Vanderbilt Beach where ladies are advised to ditch the heels as toes will be firmly in the sand. Shrimp and crab creations rule here.

The Dock

The Turtle Club

"Is the word stupid written across my forehead?"

Yes, a catchphrase from famous Floridian and Neapolitan Judge Judy. She's just one of a bevy of famous people that either live here — she does — or can be seen all-year around. Other famous residents include 'Love to love you baby' Donna Summer, the Queen of Disco, who died here in 2012.

Other music notables here include Bob Seger as well as Denny Laine and John Lodge heroes of the 1960s' The Moody Blues.

Check these out, to find out more: **www.paradisecoast.com** and **www.naples-florida.com**

It's going to be a busy few days with a tightly packed agenda looking across all aspects of the present lead battery market.

(As per schedule agreed on April 18.)

Learning, networking and fun too

Saturday, April 30	
2:00 p.m. – 5:00 p.m.	**Registration Desk Open**
5:00 p.m. – 7:00 p.m.	**President's Reception** (by invitation only)
Sunday, May 1	
9:00 a.m. – 6:30 p.m.	**Registration Desk Open**
12:30 p.m.	**Golf Tournament - Shotgun Start** • Sponsored by ENTEK
6:00 p.m. – 8:00 p.m.	**Opening Reception** • Sponsored by BCI Supplier Members
Monday, May 2	
7:00 a.m. – 5:00 p.m.	**Registration Desk Open**
7:30 a.m. – 8:45 a.m.	**Morning Coffee**
8:45 a.m. – 9:00 a.m.	**Welcome & Opening Remarks** Roger Miksad | BCI Executive Vice President Chris Pruitt | BCI President, CEO and President, East Penn Manufacturing Co.
9:00 a.m. – 9:45 a.m.	**Innovation Award Presentation** Chris Pruitt | BCI President, CEO and President, East Penn Manufacturing Co.
9:45 a.m. – 10:30 a.m.	**Keynote Presentation: Professional Women in Manufacturing: How to Attract and Develop Female Leaders in the Industry** Gina Radke | Owner and CEO, Galley Support Innovations
10:30 a.m. – 10:50 a.m.	**Coffee Break & Meet the Experts**
10:50 a.m. – 11:30 a.m.	**BCI Regulatory and Advocacy Update** Roger Miksad | BCI Executive Vice President
11:30 a.m. – 12:15 p.m.	**Keynote Presentation: Transitioning the U.S. Vehicle Economy to Electric Vehicles — Challenges and Realities** Steve LeVine | Editor, The Electric
12:15 p.m. – 12:45 p.m.	**Meet the Experts**
12:00 p.m. – 5:00 p.m.	**Power Mart Expo**
12:00 p.m. – 1:30 p.m.	**Lunch in Power Mart Expo**
4:00 p.m. – 5:00 p.m.	Power Hour Reception
4:30 p.m. – 5:00 p.m.	**Women in the Global Battery Industry Meeting** (WGBI members only)
5:00 p.m. – 6:00 p.m.	**Women in the Global Battery Industry Networking Reception** (open to non-WGBI members) Sponsored by C+D Technologies/Trojan Battery Company and Hollingsworth & Vose
Tuesday, May 3	
7:00 a.m. – 3:00 p.m.	**Registration Desk Open**
8:30 a.m. – 9:00 a.m.	**Morning Coffee**
8:45 a.m. – 9:00 a.m.	**Special Presentation**
9:00 a.m. – 9:45 a.m.	**Keynote Presentation: Accurately Prepare for Tomorrow** Alan Beaulieu | Principal, ITR Economics

2022 BCI CONVENTION + POWER MART EXPO – SCHEDULE OF EVENTS

9:45 a.m. – 10:30 a.m.	**State of Lithium Batteries in the Circular Economy** Bob Galyen | Galyen Energy LLC
10:30 a.m. – 10:50 a.m.	**Coffee Break & Meet the Experts**
10:50 a.m. – 11:25 a.m.	**The Role of Lead Acid Technology in the Future Automotive Battery Landscape** Jay Hwang | Senior Analyst, Supply Chain & Technology, Automotive, IHS Markit
11:25 a.m. – 12:00 p.m.	**BCI Update on Communications Advocacy and Essential Energy Everyday** Lisa Dry | Vice President, Strategic Communications, BCI Melissa Floyd | Vice President, Corporate Communications, Stryten Energy Deena Grabowski | Director, Corporate Communications, North America, Club Assist Charles Cooper | Managing Director, Signal Group
12:00 p.m. – 1:30 p.m.	**Lunch on Own**
	GENERAL SESSION TRACK
1:30 p.m. – 2:20 p.m.	**Industrial Batteries Forecast** Nick Starita | President of the Energy Solutions Div., Hollingsworth & Vose Co.
2:20 p.m. – 3:10 p.m.	**Lead Market Analysis Review** Farid Ahmed | Principal Analyst – Lead Markets, Wood Mackenzie
3:10 p.m. – 4:00 p.m.	**Transportation Batteries — Global Outlook to 2026** Rebecca Conway | Senior Director, Marketing & Technical Services, Clarios
	BCI TECHNOLOGY AND INNOVATION SUMMIT
1:30 p.m. – 2:20 p.m.	**Future Requirements for Energy Storage in Automotive** Bob Gruenstern | Interstate Batteries and BCI Technical Advisor Pete Stanislawczyk | Senior Vice President, Transportation Division, East Penn Manufacturing Co Jennifer Slater | Vice President & General Manager, Global Original Equipment and Products, Clarios
2:20 p.m. – 3:10 p.m.	**Future Requirements for Recharging Energy Storage** Steve Baxley | Manager, Renewables, Storage and Distributed R&D, Southern Co.
3:10 p.m. – 4:00 p.m.	**Energy Storage Grand Challenge R&D Framework Applied to Lead Batteries** Patrick Balducci | Manager, Power Systems and Markets Research Group, Argonne National Laboratory
4:00 p.m. – 4:30 p.m.	**Meet the Experts**
5:00 p.m. – 6:30 p.m.	**Closing Reception**
Wednesday, May 4	
7:00 a.m. – 8:30 a.m.	**Breakfast Honoring Quarter Century Club Members** (By Invitation)
	BCI TECHNOLOGY AND INNOVATION SUMMIT
9:00 a.m. – 9:40 a.m.	**Opportunities to Advance Active and Passive Materials** Dr. Frank Fleming | Electric Applications Inc.
9:40 a.m. – 10:20 a.m.	**Advanced Manufacturing Requirements for Next Generation Lead Batteries** Norbert Maleschitz | Chief Technology Officer, East Penn Manufacturing Co.
10:20 a.m. – 10:40 a.m.	**Coffee Break & Meet the Experts** • Sponsored by EAI
10:40 a.m. – 11:20 a.m.	**Controls and System Design** Scott Manson | Technology Director, Schweitzer Engineering Laboratories (SEL)
11:20 a.m. – 12:00 p.m.	**Roundtable Discussion: Defining the Industry Position – How Does This Lead to Industry Growth?** Rod Evans | EnerSys Dr. Tim Ellis | American Battery Research Group (ABRG) Mike Judd | President and Chief Operating Officer, Stryten Energy
12:00 p.m. – 12:30 p.m.	**Meet the Experts**

BCI executive vice president Roger Miksad has a warm convention welcome in store for colleagues from home and abroad in Naples — together with a packed program of topical presentations, insightful briefings and analysis to guide our industry through the year ahead and beyond.

A warm in-person welcome to Naples, but there's work to be done too...

"Innovation will be the lifeblood of this industry for the near future."

As BCI members and guests gather in the Florida sunshine, emerging from the dark days of lockdowns and other restrictions wrought by the pandemic, BCI chief Roger Miksad says he looks forward to a 'business-as-usual' convention once again.

At the time of this interview, just a few weeks before curtain-up in Naples, registration for the convention was on course to exceed most of BCI's pre-Covid events, according to Miksad.

"We don't have final figures as new registrations are coming in daily, but we already have well over 500 registered attendees and will share final numbers at the event.

"This shows the value the industry places on in-person events, as well as demonstrating the additional value our expanded technical sessions offer attendees at the BCI Innovation and Technology Summit at the convention. We are committed to continuing to provide the content and events that our members find provide the most value.

"We are greatly looking forward to truly getting the convention back to normal this year. I am hopeful that all our overseas colleagues are able to travel to Florida this year to join us. After too many years of interrupted convention plans, it is important for all of us to be together again."

Key themes likely to influence discussions at this year's event are expected to include US federal government interest in working with the industry to explore continued investment in the sector.

But BCI has to be constantly on the alert for moves from all quarters that could seek to impose new and unnecessary regulatory burdens on the industry — and to challenge accordingly.

"For the past several years, BCI has actively been working with state regulators in several US states as they have analysed potential changes to their regulatory health requirements for lead," Miksad says.

"While Michigan wrapped up its changes a few years ago with focused health-based changes, both California and Washington State continue to work on far more dramatic changes to other elements of the rule. That work will continue in 2022 and 2023.

"However, the focus may shift to a federal level shortly. The biggest regulatory health action on BCI's horizon has long been a promised revisitation of the federal nationwide lead health regulations from the US Occupational Safety and Health Administration — OSHA. That effort is now formally underway."

In late March, OSHA submitted the long promised ANPRM (advanced notice of proposed rulemaking) for the occupational lead regulation revision to the White House Office of Management and Budget for review.

Miksad says: "This means action is imminent. This first ANPRM is expected to take the form of a list of questions for input from the public and industry soliciting recommendations on how OSHA might update various aspects of the current rule.

"Any publication from OSHA will be only the beginning of a multi-year process. A number of very complex technical assessments have to be completed with industry's cooperation and proposals published, hearings held, and public comments

The Lead Battery Research Technical Advisory Group — now known as TAG — at a meeting held at Argonne National Laboratory

must be reviewed and considered."

Miksad says the US lead battery manufacturing and recycling industry is, collectively, "already doing an outstanding job, and excessive government interference in facility operations is unnecessary".

However, he says BCI is committed to working with regulators to ensure workers are properly protected and he "looks forward to those conversations".

Meanwhile, he says "innovation will be the lifeblood of this industry for the near future, and there is much to celebrate".

"The continued expansion, and unprecedented popularity of the BCI Innovation and Technology Summit at the BCI Convention demonstrates that the members see the same need for innovation.

"BCI also recently worked with the US Department of Energy to organize the first Lead Battery Research Technical Advisory Group (TAG) meeting held at Argonne National Laboratory. This meeting brought together experts from industry, national labs, government, and academia to discuss and analyze various potential R&D pathways for lead batteries."

The TAG meeting focused on R&D efforts that could provide the greatest benefit to the use of lead batteries for use as grid storage — but Miksad says those present recognized that many of the R&D pathways could be adopted for other battery applications.

The US lead battery manufacturing and recycling industry "is, collectively, already doing an outstanding job, and excessive government interference in facility operations is unnecessary".

Innovation and availability of batteries and energy storage are major areas of interest for Congress and federal agencies and will continue to be so, Miksad says.

"We have taken every opportunity to tell the lead battery story to key congressional committees and federal agencies including the Department of Defense and the Department of Energy. These audiences have been very receptive to our message of advanced lead batteries and their essential nature.

"Of particular interest has been the fact that our closed loop manufacturing system makes them a domestic and reliable energy source when so many other supply chains are experiencing high levels of disruption."

BCI is committed to "being a champion for one of the leading manufacturing industries here in the US and abroad", Miksad says.

"Our goals are to ensure that lead batteries are recognized for their status as the only truly sustainable energy storage product.

"When we meet with policymakers, at every level of government, we remind them of the essential nature of lead batteries and their many applications."

Miksad says it is clear that European and US regulators are reviewing each other's work. "For example, EU regulators who have been reviewing changes to blood lead regulations have relied on modeling work originally developed for use in the California regulation revisions. That is concerning because we still have questions about the quality of that model."

But he says it is yet to be seen whether and how US regulators might view the EU's REACH (registration, evaluation, authorisation and

restriction of chemical substances) evaluation of lead.

"I would anticipate that the technical analyses prepared in Europe will be of key interest to US regulators but, given our significantly different regulatory and legal regimes, it would be difficult for the US to simply 'copy' EU actions.

"US regulators will have to go through and meet all of their procedural and regulatory requirements before they could take any action here."

When it comes to regulatory reviews of lead for use in lead batteries, Miksad says it is useful to look at what happened in the California Green Chemistry review.

"As part of that, California considered whether additional product restrictions might be necessary. After exhaustively studying the situation and the alternatives, the Department of Toxic Substances Control came to recognize what industry has long known — there is no acceptable substitute for lead batteries in automobiles, and they pose little to no risk to consumers and the public when handled properly.

"I am hopeful European regulators will reach the same conclusion."

However, there are favourable tailwinds from policy chiefs in the US and across the pond for recognising the value of batteries and energy storage, which Miksad says are trends that "go beyond political landscapes".

"The changing dynamics of vehicles and renewable energy needs are driving these changes. The political landscape certainly influences how governments might encourage the speed of these transitions, but industry capabilities and consumer demands will drive the changes."

He says moves toward a more electrified future "will only increase the demand for energy storage technologies of all types".

"Lead batteries are the dominant energy storage product in the world by produced storage capacity and offer features and a cost-profile for many uses that cannot be replaced.

"These new and growing markets will require new and innovative products, and our members are engaged and working to ensure that their products meet those demands and needs."

A commitment to encouraging innovation and enhancing the value and importance of BCI membership is something being demonstrated by the board itself — not least with support for the formation of the Women in the Global Battery Industry (WGBI) organization."This has been an important step for the industry and BCI to demonstrate our commitment to supporting the careers of women in the industry," says Miksad.

"Having Gina Radke as our keynote speaker in Naples is part of that commitment; it is important that innovators and technology manufacturers better appreciate the perspective of women in STEM (science, technology, engineering and mathematics) careers, and the importance of ensuring they are encouraged to contribute meaningfully and equally to the industry."

Meanwhile, Miksad says BCI's drive to spotlight the importance of lead batteries to the widest audience possible continues.

"While much of the interest is lead batteries and transportation, we've created materials that show the uses of lead batteries from A-to-Z. All of our materials are available on our websites — *www.batterycouncil.org* and *www.essentialenergyeveryday.com*." ■

"While much of the interest is lead batteries and transportation, we've created materials that show the uses of lead batteries from A-to-Z. All of our materials are available on our websites — *www.batterycouncil.org* and *www.essentialenergyeveryday.com*"

BCI's Roger Miksad, East Penn's Chris Pruitt and CBI's Alistair Davidson at Argonne National Laboratory recently


Advanced Battery Concepts
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SOLUTIONS WE NEED FOR A CLEAN FUTURE
Advanced Battery Concepts' bipolar solutions are enabling the lead industry to meet the demands of a cleaner electric grid. ABC provides energy storage that is:
- Economically responsible
- Socially responsible
- Environmentally responsible
All of which is needed to ensure a better world.
Visit us at www.advancedbatteryconcepts.com to learn how.

Energizing essential communications every day

American author John Steinbeck is credited with saying that "a great lasting story" needs to be about everyone — "or it will not last".

If Steinbeck didn't have lead batteries in mind when he said that, he could well have had, because the lead batteries story is an enduring, never-ending narrative, about technology that impacts the daily lives of most of us in some shape or form.

In the US, communicating all that is good about the lead battery industry — and at times speaking honestly and openly when setbacks have arisen — has been deftly handled by BCI's Lisa Dry, vice president for strategic communications, since she joined the organization five years ago.

As BCI's master raconteur, she will give an update on communications advocacy and the 'Essential Energy Everyday' program in Naples on Tuesday, May 3. Dry will, as always, have a compelling story to tell during this essential event briefing.

"This year I'll be joined by Melissa Floyd, Stryten Energy, Deena Grabowski, Club Assist and our lobbyist Charles Cooper of the Signal Group. Melissa and Deena will give examples of how they use the EEE materials with their employees and stakeholders," Dry says.

"Charles will explain how he uses our information when he meets with members of Congress. The idea is to give attendees fresh ideas on how they can use the materials within their own companies, with customers, and their local community."

Dry joined the BCI headquarters team as director of strategic communications in 2017. Before her appointment, she was senior director of communications for the American Chemistry Council.

Her brief was substantial: to develop BCI's communications initiatives to enhance perceptions of the lead battery industry — while also informing and educating stakeholders on the need for continued investment in sustainable battery technologies.

Dry says she never tires of telling the story of lead. "It's exciting to look

back and see just how far we've come in five years and yes — we do have a good story to tell.

"Colleagues such as Doe Run's Tammy Stankey, Teck's Sheila Ryles, Ecobat's Bruce Murray and East Penn's Donna Snyder had already been working on Essential Energy Everyday for many months before I was hired to manage the project.

"The project was in development for at least a year before we made a formal launch to the world with our website communications, branding and so on."

"Before this, we had little visible communications presence with policymakers who have been the target audience since the inception of the program. We now have a constant flow of communications to Capitol Hill."

Arguably one of the greatest triumphs for communications efforts as part of BCI's wider campaigning on behalf of the industry was in 2021, when lead batteries were removed from the California Department of Toxic Substances Controls' danger list of potential 'Priority Products'.

"California has now gone quiet in that respect," says Dry.

Thanks to the rapid exchange of information via social media, much of the information directed at policymakers finds itself shared with the general public — which Dry regards as a bonus.

"Obviously, there may be some spill-over of information, such as when people Google 'lead batteries'… it's then highly likely they will end up on our website. We also have an increasing number of followers on Facebook, Twitter and LinkedIn."

"Once on the website, there is information that we are sure the general public will find useful and because it's a non-technical site, written using layman's terms, the information is accessible for everyone."

The Essential Energy Everyday website was relaunched in January 2021, which Dry describes as a "significant revamp and updating to keep pace with the use of technology".

"We really built out the resources section, where our member companies, consumers, policymakers — and indeed anyone — can download infographics and brochures.

"In fact, more than 3,400 pieces of information were unique views or downloads from the resources section last year alone, which is a pretty big number. That's one of the things we will cover in our presentation on Tuesday morning of the convention," Dry says.

"It will be an Advancing Lead Batteries Communications Initiative panel report out to the membership. One of the largest budget items that BCI has involves federal advocacy, so we always want to be able to report on the value to our members of what we are doing on their behalf."

BCI members are encouraged to think of the organization as their own PR firm and an extension of individual communications activities, says Dry.

"We have all this high quality material and we encourage our members to use it however they wish. And if they want to co-brand the materials with their company name and logo, we can help facilitate that."

Even in the long months of pandemic restrictions on face-to-face activities, Dry and the BCI team kept the industry in the public eye.

In 2021, BCI took part in a virtual 'national clean energy' conference, providing a speaker and distributing materials via a virtual booth, which Dry says: "generated quite a bit of interest. We also held an online webinar in 2021 focused on the supply of critical materials for batteries."

Last September's San Diego conference was BCI's first since the

One of the largest budget items that BCI has involves federal advocacy, so we always want to be able to report on the value to our members of what we are doing on their behalf

The Essential Energy Everyday website was relaunched in January 2021, which Dry describes as a "significant revamp and updating to keep pace with the use of technology"

US began to emerge from months of lockdowns, although international visitors were still largely restricted.

Towards the end of last year, there was an on-demand, pre-recorded webinar posted online for policymakers, followed up last January with another focused on electric vehicles.

"As 12V batteries are in almost every EV, this is an important market for us, so the webinar and materials we created were designed to ensure that story was told," says Dry.

She acknowledges that policymakers are "almost always surprised" when first learning about the crucial role lead batteries play in keeping most EV's rolling.

"In the US Congress, like other such bodies, people are often not experts in a particular subject because they are working on such a wide range of topics. That is why they need the information we provide. If you're a representative or senator, you probably only have a bit of knowledge about many things."

Dry says the organization's expansive communications toolkit helps to open the door and inform conversations with officials about the need for batteries in the country's future energy mix.

"I know from Roger Miksad and our people and lobbyists who work directly with organizations, such as the Department of Energy and the Department of Defense, that they find a lot of value in our material," she says.

"Officials within the federal corridors of power have also let it be known that they enjoy working with the lead battery industry in particular, because we work cohesively as a group — whereas with some of the other battery chemistries it's a case of every person for themselves."

So, what does the communications calendar for the year ahead look like after the BCI team and delegates pack up and move on from Naples?

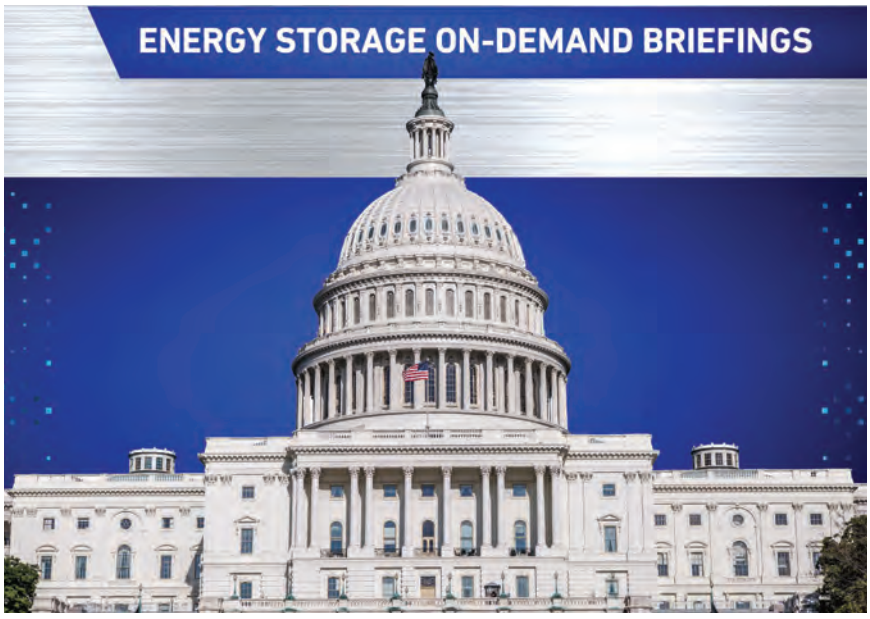
"There will certainly be more webinars and more material in support of the lobbyists and for our meetings with legislators," Dry says. "As long as the government maintains its interest in electric transformation, whether for the transportation or energy storage sectors, over the months ahead, we'll be continuing to create materials that meet that need and help to tell the story of how we have a role to play."

"We are also working on some new reports to highlight the positive impact the lead battery industry has on the economy."

Additionally, Dry says BCI will continue to promote the value of "our amazing, closed recycling system and how the lead battery industry has the benefit of an almost solely-domestic supply chain".

"It's a wonderful story to tell, it's a great American story, it's a great manufacturing story and it's a sustainable energy story too. It's also a story of our great battery manufacturer and recycling members who provide green jobs in support of their local communities and the wider country."

"This is a special industry, where we all work closely together and one where even competitors enjoy catching up and hanging out together, which is why we are all excited to get back together once more and to welcome our international visitors after a two year absence." ■



A very reasonable proposition: if you're a representative or senator, you probably only have a bit of knowledge about many things not sometimes the depths needed

"It's a wonderful story to tell, it's a great American story, it's a great manufacturing story and it's a sustainable energy story too. It's also a story of our great battery manufacturer and recycling members who provide green jobs in support of their local communities and the wider country"

Lisa Dry on USS Midway with other BCI staff at the last convention

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Shattering the battery glass ceiling

The newly formed group Women in the Global Battery Industry has hit the ground running and is bringing a recruitment drive to the Naples convention.

This year's convention will break new ground in more ways than one, as aerospace industry CEO Gina Radke flies in to be the first keynote speaker of the opening session on Monday, May 2.

Radke, whose Galley Support Innovations company provides equipment used inside aircraft, will be very much a first among equals in Naples, as the newly-formed Women in the Global Battery Industry (WGBI) will showcase their busy program of activities for the convention and the months ahead.

Radke received the Women in Manufacturing STEP (Science, Technology, Engineering and Production) Ahead Award from the US Manufacturing Institute in 2019.

The award honors women who have demonstrated excellence and leadership in their careers and represent all levels of the manufacturing industry, from the factory-floor to the higher tiers of management.

Radke's presence in Naples reflects the attention that is being focused on the role of female professionals in the industry.

WGBI director and BCI's senior vice president of operations, Pam O'Brien, says Radke is a dynamic speaker who will talk about how to attract and retain women in manufacturing. "She has worked her way up in her industry to the position she now holds and, from BCI's point of view, it's ground-breaking to have a woman keynote speaker," O'Brien says.

It will be a fitting start to a convention for which WGBI has been working at what O'Brien describes as "Mach speed" since the organization's formal inception just three months ago.

"Membership in the first month went from zero to 100 and we currently have around 160 members."

Now WGBI, whose president is MAC Engineering's chairman, Julie McClure, is stepping up its mission to tackle the under-representation of

> "Right now, we have about 160-170 members that are mostly from BCI member companies, but we have had a trickle of non-lead members too"
>
> — Pam O'Brien, BCI

ARTICLES CLUB MEETINGS

WGBI will be stepping up its scheduling soon for a series of provisionally named 'articles club' discussions.

"Members can submit a topic of interest related to the industry or career development, and we will hold informal discussions via Zoom," says O'Brien.

The first articles club was scheduled to take place in April, hosted by Ellen Maxey from Clarios, and the article under review was authored by Yale University professor Julie Shue — on the topic of why women aren't promoted due to management's underestimation of their potential.

Meanwhile, the global recruitment drive for WGBI will step up a gear later this year, when the organization will also meet at ELBC — the global lead battery innovation conference and exhibition taking place in Lyon, France in September.

Next year, in conjunction with BCI's technical group, O'Brien says a poster contest will be launched target to university students doing research in the battery industry.

"We have not formalized the program yet, but there would be WGBI recognition for women participants."

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senior-level women in leadership in the battery industry and to redress the balance.

O'Brien says the organization is also working hard to encourage the next generation of professional women to join the battery industry.

WGBI is inviting two STEM (science, technology, engineering, and mathematics) female students from Florida State University to attend and take part in the discussions at BCI this year.

"This is something we will also offer to local universities at future conventions," O'Brien says.

The organization also intends to reach out to younger students in elementary through to high school levels, to excite their interest in STEM studies and future careers in manufacturing and the battery manufacturing in particular.

O'Brien is full of praise for the commitment of the BCI board in supporting WGBI, acknowledging that the battery industry "is not super diverse from a gender perspective."

"The board is really making a move to draw more women into BCI and figure out how to attract more professional women to their own companies."

The first step was with the launch of WGBI, which has its roots in a basic networking reception attended by women at BCI's Tucson convention in 2018. The next step came with the appointment of a woman to the BCI board of directors — McClure — who has now been a board member for a year.

As a chemistry-agnostic professional body, WGBI is working to extend its membership recruitment reach beyond BCI and the lead battery industry. O'Brien says the organization has already identified professional societies and associations that will be targeted for outreach.

This approach will be welcomed by companies whose portfolio includes lead and lithium in addition to other battery technologies.

"Right now, we have about 160-170 members that are mostly from BCI member companies, but we have had a trickle of non-lead members too," O'Brien says.

"Members include professionals working in all areas of the industry including HR, marketing, engineering and the legal profession. Everyone involved is very supportive of the programme and there has been no problem in getting volunteers to engage with the work."

The organization's members will gather for a business meeting and reception during the week of the convention.

Key sponsors for WGBI at this year's event are Hollingsworth & Vose, and C&D Technologies/Trojan Battery.

O'Brien says: "In the second half of the year, we will focus on membership recruitment outside the lead battery industry. We will also continue to develop the webinar series schedule through the rest of the year. ■

BCI's next step came with the appointment of a woman to its board of directors — Julie McClure, chairman of Mac Engineering — who has now been a board member for a year.

KEYNOTE SPEAKER: GINA RADKE

photo credit: Galley Support Innovations

Gina Radke received the Women in Manufacturing STEP (Science, Technology, Engineering and Production) Ahead Award from the US Manufacturing Institute in 2019 and will address the convention with a presentation entitled Professional women in manufacturing: how to attract and develop female leaders in the industry.

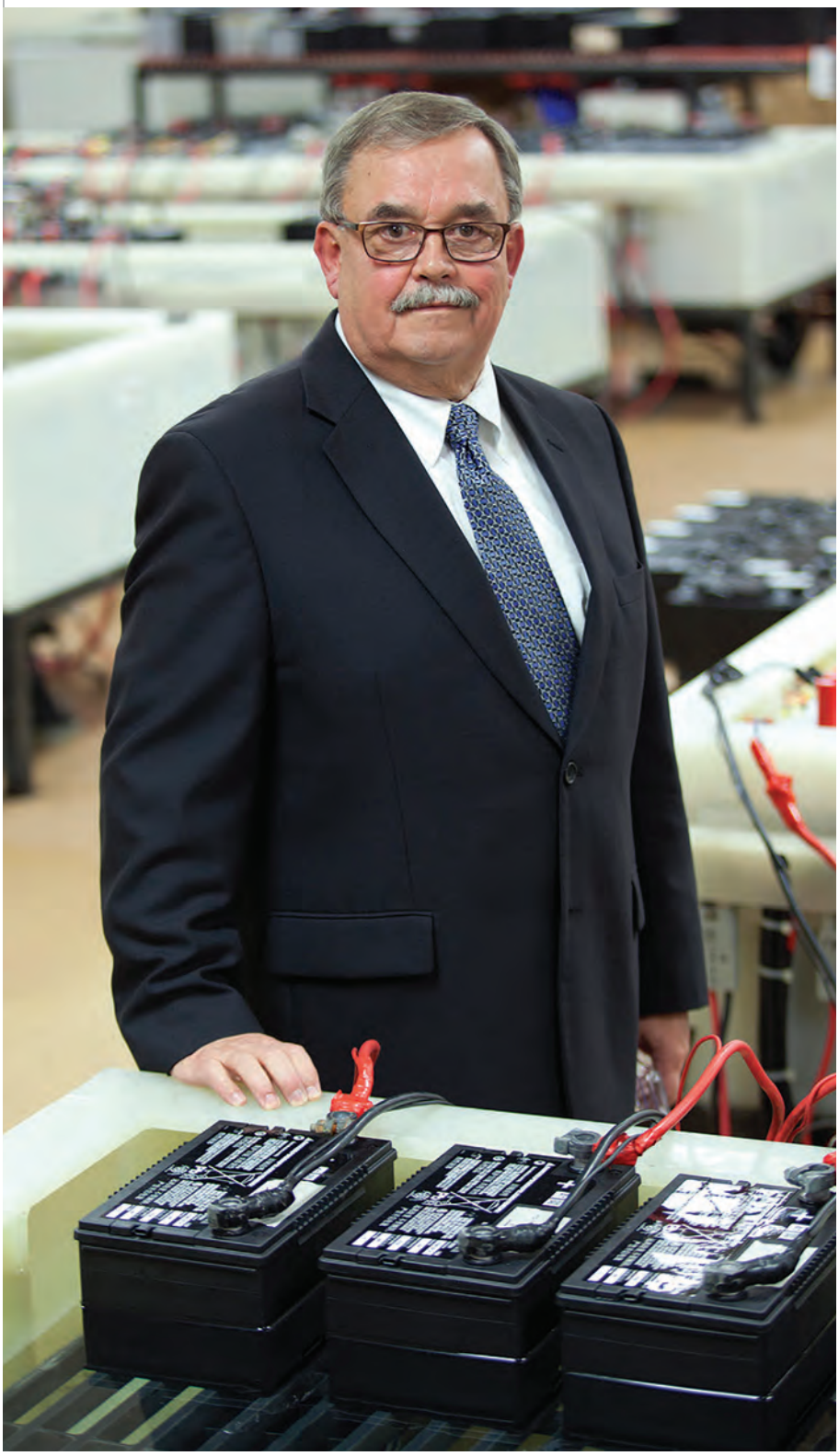
Radke is an entrepreneur and economic influencer. Owner and CEO of an aerospace manufacturing company, Galley Support Innovations, She uses her international business experience to serve as an international trade adviser to the US Congress and is well known for her involvement in community service and empowering others with economic opportunities.

Receiving awards both locally and nationally, she has been named as one of five "Women to Watch in International Business." Radke is a best-selling author, with her book, More Than, How to be Bold and Balanced in Life and Business selling out three times in a 12-month period.

"She has worked her way up in her industry to the position she now holds and, from BCI's point of view, it's ground-breaking to have a woman keynote speaker," BCI's O'Brien says.

Celebrating a half century with East Penn

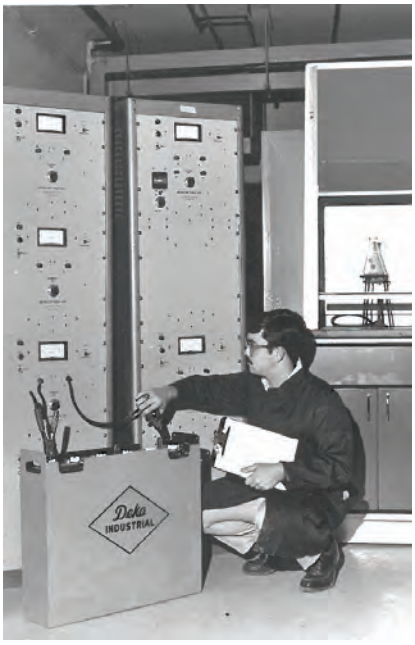
East Penn's multi-skilled, much-liked chief operating officer **Bob Flicker** is set to retire later this year.



Little did a young Bob Flicker realise that a temporary job as a punch press operator at a small to medium sized battery manufacturer in Pennsylvania known as East Penn was to result in a spectacular career. Or later for him to become part of a core team that would catapult the company into the top tier of international battery firms.

The year was 1972. And Bob, recently graduated with a degree in physics from Moravian College, and was looking to further his education. Only two short years before, he had married a young nurse called Deborah, who he'd first met at high school, and the first of his three children, Brett was already on the scene.

Little did a young Bob Flicker realise that a temporary job as a punch press operator at a small to medium sized battery manufacturer in Pennsylvania known as East Penn was to result in a spectacular career



Bob receiving the International Lead Award for his services to the battery industry at 14ABC in 2011

"In those days East Penn had perhaps less than 300 employees but was growing all the time, it had already come a huge way from when DeLight Breidegam Jr and his father had set up the firm in 1946," he recalls.

"In the midst of this expansion, it wasn't very long before I was working as a lab technician and becoming involved in the firm's development of lead calcium batteries — then the cutting edge of batteries for stationary applications and where the drive was to move it into automotive applications in a sealable form to avoid adding water and improve the safety of the design."

East Penn was developing the engineering department and decided to help fund Bob's tuition. He completed his masters in physics at Lehigh University in 1974. Times were challenging for Bob and Deborah during this period with juggling the demands of work, his academic studies and young family — that year his daughter, Amanda, was born. Their third child, Nicole, was to be born in 1979.

Bob's experimental and testing work was later to form part of the launch of East Penn's "Kare-Free" line of calcium maintenance-free batteries. The line had so much potential that the company began making plans to build a second automotive plant for its production.

East Penn too was already formulating its environmental position. To handle the wastewater created by battery manufacturing, East Penn also opened a treatment plant in 1977, that would eventually expand to be able to process over 100,000 gallons of wastewater each day.

DeLight Jr early on had seen the way the battery industry needed to go. "People thought that waste was normal," he said in a later interview. "Then in the 1960s, the environmental stuff started to come. Some people threw their hands up and said, 'There's no way.' And I always said, 'Well ... heck, we're going to try'."

And East Penn did. In line with his ever-growing responsibilities, Bob had to ensure that everything from manufacturing to recycling not just conformed to stricter regulatory standards but exceeded them. East Penn was one of the few US battery manufacturers that saw early on the way the wind was blowing — regulations were not going to stay still but get ever tighter.

To its environmental credit, in 1986 East Penn introduced a new system for scrubbing gases. It was the first of its kind in the US and six years later also became the first in the entire industry with its acid reclamation plant.

Today, the firm continues to lead the with ambient lead in the air

Dan Breidegam, chairman East Penn

The lead battery world has been blessed with some very knowledgeable engineers. Of those, I have long thought Bob Flicker to be the brightest of them all.

Of course, Bob has a great mind and understanding of technology, but my tributes are based on other things as well.

Bob knows how to innovate. He had a real understanding of what works today may not be the best technology for the future. However, he always remembers that some old ideas and theories may be valid and a possible solution.

Bob is a great leader and mentor. He, like my dad and founder DeLight, enjoys giving young engineers a chance to grow and shine. He understands the value of bringing people to their highest level. He can adjust a complex concept so that it relates to his audience. He never talks over someone's level of understanding.

Bob is personable and humble. He could never write his own biography. What he has done for East Penn and the industry is inspiring. He is someone to emulate, but will not be duplicated.

Bob knows how to innovate. He had a real understanding of what works today may not be the best technology for the future. However, he always remembers that some old ideas and theories may be valid and a possible solution

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Over the years the company has received numerous awards and certifications for its environmental work — always a particular concern of Bob. These have ranged from receiving OSHA star status for its commitment to worker health and safety to the Cevallos Award by the Pennsylvania Institute for Children's Environmental Health.

In 2020 the firm said its Lyon Station facility recycled 187 million pounds of lead, more than 8.5 million pounds of plastic, and 5.6 million pounds of acid.

To gauge the growth of the firm during the 1970s, by 1976 it had around 700 employees. That same year East Penn produced more than a million batteries. It was a far cry from DeLight Sr's ambition to be able to build 100 batteries in a day.

Dan Langdon, board of directors – East Penn Manufacturing Co

As COO, Bob oversaw not only manufacturing but also purchasing, R&D, logistics, injection molding and a secondary lead smelting operation. This was an extraordinary amount of responsibility. Bob is an outstanding and innovative leader in all of these disciplines. A true subservient leader, always reflecting the integrity and selfless vision of our founder DeLight and his family.

One of the things I admire the most was Bob's ability to relate, and connect, on a personal level with everyone he met. Bob has the mutual respect of all his fellow employees as well as the many others he touched in the industry as well as the community.

His enduring legacy will be the lasting friendships he has made during his 50-year journey of outstanding leadership. I am very fortunate to have had the honor to work closely with Bob for more than three decades and, more importantly, to enjoy the deep friendship between us.

His enduring legacy will be the lasting friendships he has made during his 50-year journey of outstanding leadership

If the 1970s were exciting times for East Penn, the 1980s and 1990s were even more so and Bob's rising star as a capable engineer and manager were on the ascendant too.

From his beginnings as an engineering technician, he was later promoted to product engineer, director of engineering, chief engineer, and vice president of engineering.

In the early 1980s, a new industrial batteries building was opened, along with a new maintenance building, to provide support services to all East Penn units. Later in the decade, a new 135,000-square-foot distribution center and adjacent technical center were opened. New corporate offices were opened in 1985.

Three years later, with the help of a state loan, East Penn opened a new automotive plant more than 100,000 square feet in size. It soon would be expanded to accommodate the production of the new gel cell batteries. In many ways Bob's job brief grew with the firm.

Groundbreaking new battery technology led to expansive growth throughout the decade and into the next, quadrupling the company's size. New manufacturing facilities were swiftly added to accommodate the growing business. Smart acquisitions delivered needed warehouse space and allowed the company to span new horizons.

East Penn expanded on a number of fronts in the 1980s. Battery design became the province of CAD (computer aided design), making the drafting tables obsolete. Engineers also turned their attention to new

Advancement in the 1980s and 90s

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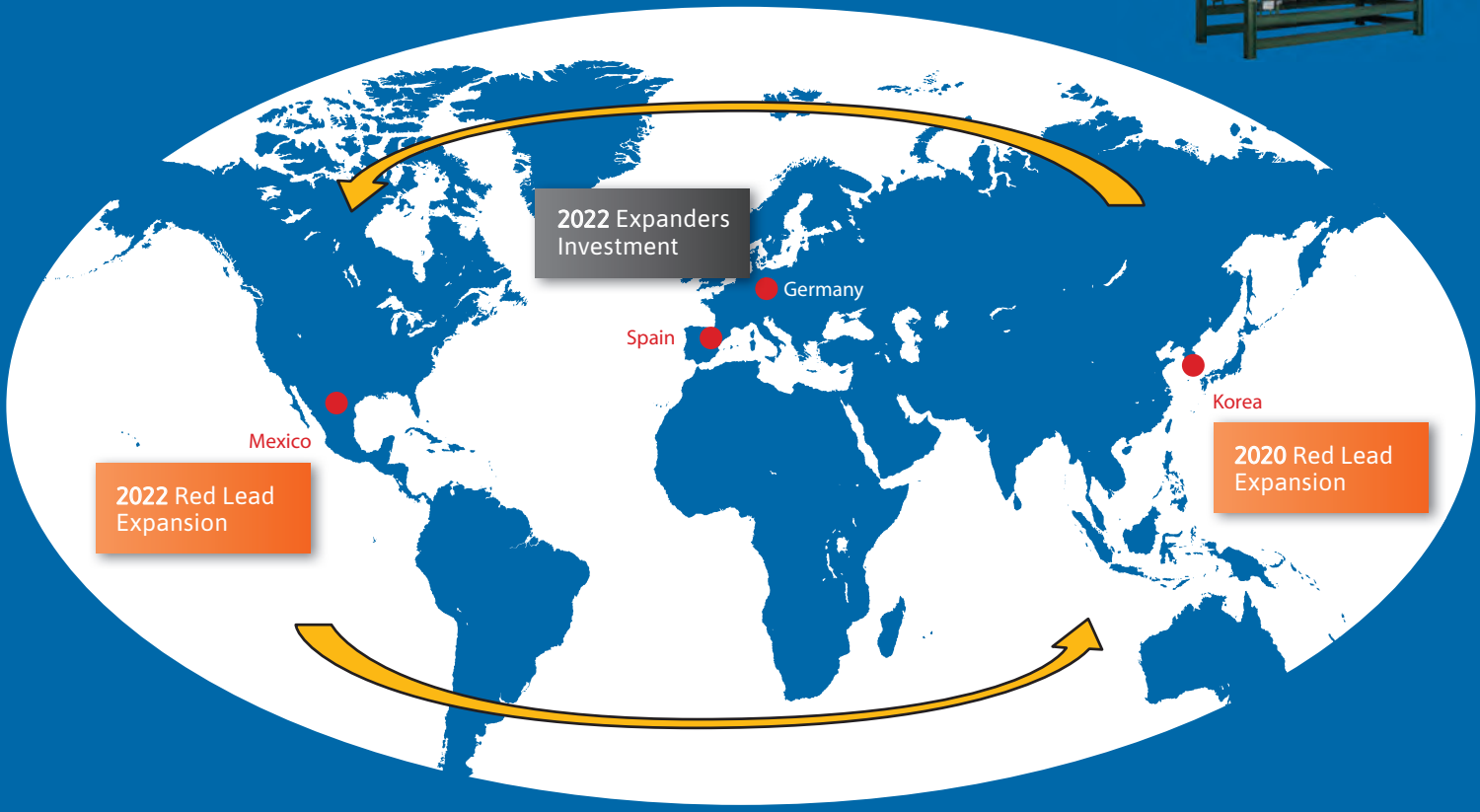

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ALL AROUND THE WORLD

battery technology in the 1980s, such as absorbed glass mat and gelled-electrolyte, non-spillable batteries, ideal for applications such as telecommunications.

"The march of technology is the introduction of change and that means we all had to adapt to them," he says. "In the 1970s and 1980s a new wave of machines for enveloping, COS, different additives and alloys changed, the way we worked was different — but better."

In 1988, East Penn began distributing in Canada, and within two years had secured a substantial segment of that market.

During the 1980s and into the 1990s Bob's talent for understanding the issues that customers wanted from their batteries and how to solve them started to come to the fore.

A classic example of this was when a prominent motorcycle manufacturer had problems with motorcycle batteries that leaked, corroding the chrome on the bike. "We've known from the beginning that we have to be the solution provider, which means that we needed to know the extent of the problem, here it was the vibration that caused the spillage so we looked at ways of developing a non-spillable battery.

"We'd already been working with more automotive sized AGM batteries, the issue was how to design a small version that would suit the manufacturer's need." East Penn automotive engineering team developed a non-spillable battery. Its use expanded to more motorcycle brands, ATVs, motorized watercraft, and ultimately cars — as a stop/start backup battery.

Dan Langdon, former president of East Penn Manufacturing, paid him tribute later. "When it comes to engineering and design in the battery world, he's the man."

By the start of the 1990s East Penn was doing about $200 million in annual sales and each day its 2,000 employees produced about 20,000 car batteries and 1,400 industrial cells. By 1992 the company was producing five million batteries a year. East Penn continued to stay in the forefront of battery technology with Bob now becoming a driving force in the launch of new brands and products,

In 1990 East Penn introduced the Deka Dominator, a highly popular gel battery used in wheelchairs, golf carts, and marine and other applications. Two years later, the company introduced solar batteries, which became the foundation for the stationary battery division. These new batteries, providing emergency standby power, were suited to wind generation units, water pumping systems, and remote monitoring systems.

A year later East Penn launched a line of stationary batteries for standby power applications such as telecommunications and UPS. Later in the 1990s stationary batteries were developed for the cable TV market. In 1995 East Penn opened a new 350,000-square-foot specialty battery plant to produce stationary and other batteries.

In 1992 Bob became executive vice president of engineering and manufacturing.

For the next few years Bob recalls a regular work pattern emerged.

Chris Pruitt CEO/President – East Penn Manufacturing Co.

Bob guided us through many choppy waters over the years. He was truly a captain of this ship we call East Penn. Bob was never reluctant to make the hard decisions when we had difficult times. Along with his remarkable technical expertise, he also had enormous financial and business acumen, and played a vital role in utilizing these talents for the success of our organization.

There are so many important lessons that I have learned from Bob over the last 28 years. There are a few of these lessons that really stand out for me and have helped make me a better leader. One in particular was Bob's very unique ability to understand the real issue at hand by taking a difficult topic, breaking it down, and coming to an effective and sensible solution from varying points of view.

Bob was great at getting others' opinions and input to resolve issues. He was patient, at the right times, and a really good listener, which enabled us to always come to a better conclusion. Bob made decisions that put the employees, customers, suppliers, and community first, and we are a better company for it.

Simply put, Bob is a great leader and a great friend!

Bob was never reluctant to make the hard decisions when we had difficult times

"Several times a week DeLight, Dan [Langdon], Sally (Miksiewicz) and I would each take turns visiting various parts of the plant," he says. "It was a great way to get to know the people who we were working with — a real pleasure — but it was also a good way to help us understand some of the difficulties that people were having to overcome. We'd all sit down for lunch together in the canteen and talk out what we learned from our visits.

"In many ways I felt that DeLight and I both grew up with similar experiences and had similar backgrounds; therefore we shared very similar values. We both believed that employees are the key to success and that you have to get to know them, have mutual respect and make yourself visible and available."

DeLight would never credit himself as being the sole instigator of the success the company he cofounded has enjoyed. "We probably wouldn't be a model for the Harvard Business School," he once joked.

In this respect East Penn has an extraordinary record as a company that is consistently rated one of the best in Pennsylvania to work for and frequently appears in Forbes' annual list of the best 500 large manufacturers in the country. "It's a family business," says Bob. "And it operates as if everyone was in the family."

One of the oddest situations Bob and the senior management had to face was in the winter of 1996. A meter of snow caused the roof of the distribution centre to collapse. This ruptured a gas line and a massive fire ensued. The result was a fire at the plant that lasted for days. This resulted in a nightmare month for the East Penn team as they scrambled to get everything up and running.

The company quickly rented an area warehouse and managed to cobble together orders, helped to some degree by competitors supplying product — a quite unusual situation showing the high regard in which the firm's commitment to the industry was held. In less than two months East Penn was able to resume normal operations.

As a result of the company's strategic succession planning for operations and technology, Larry Miksiewicz became East Penn's SVP of manufacturing and purchasing in 2015, and the company's chief manufacturing officer in 2021. Norbert Maleschitz joined the company in 2018 as the SVP of technology and innovation, and was promoted to chief technology officer in 2021. Chief financial officer, Christy Weeber, and CEO/president Chris Pruitt also work on the company's senior management level team upon Bob's retirement this March.

"We are all fully grateful and privileged to have been able to serve with the one who could be only characterized as a living industry legend during his esteemed battery career over a remarkable 50 years," said a company statement.

"Bob continues to serve on the company's board with every confidence in those who are following in his footsteps." ■

"We are all fully grateful and privileged to have been able to serve with the one who could be only characterized as a living industry legend during his esteemed battery career over a remarkable 50 years"

BALANCING COMPETING TECHNOLOGIES: MIXING BOTHE THE PRESENT AND THE FUTURE

And the future? Perhaps unsurprisingly Bob is not just an optimist on the way forward for battery manufacturing but enthusiastic.

On the lead side of the business he has been a keen supporter of the ALABC [Advanced Lead Acid Battery Consortium] from its earliest days through to its present incarnation as the CBI (Consortium for Battery Innovation). "It's absolutely vital that we continue to push out the capabilities of lead batteries, cycle life, DCA, performance…the lot."

Bob says East Penn has been at the forefront of researching potential progress in all possible forms of lead battery.

Two areas of particular interest are the development of bipolar batteries and carbon fiber electrodes.

Research into bipolar batteries has been going on since the early 2000s. Bob and chief technology officer Norbert Maleschitz are looking at the practicalities of adding bipolar technology to the product line. In 2018 East Penn partnered with ArcActive, a developer of carbon fiber electrodes which has the potential to solve the issue of improving dynamic charge acceptance without the related problems such as water loss.

Over the past few years East Penn has been working with a variety of partners — RSR Technologies, the US national Argonne Laboratory, Hammond and the CBI — exploring the further capabilities of the battery.

For a man raised in the lead battery business, many would be surprised that Bob is also so very enthusiastic about the lithium side of East Penn's work. "I'm really excited with the work we're doing with Navitas Systems," he says.

East Penn took a majority stake in the specialty lithium manufacturer Navitas Systems in August 2019. East Penn is now a full owner of their growing operations. "We see a world of possibilities in various market niches," he says. "We're looking at many types of applications now and further ways of improving energy density."

Bob continues to serve on the company's board with every confidence in those who are following in his footsteps

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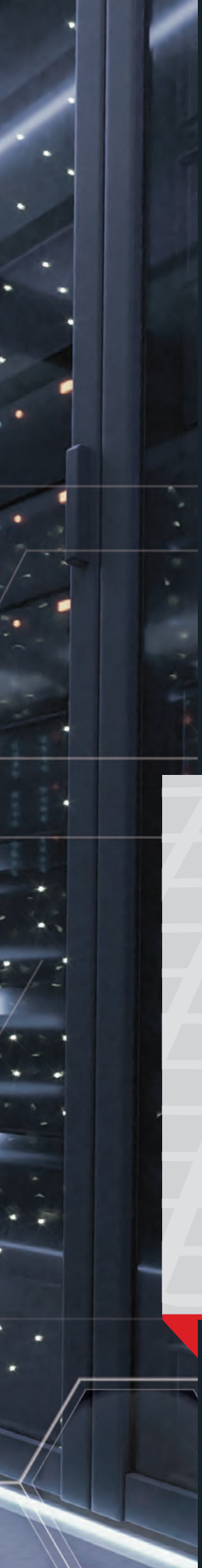

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Sally Breidegam Miksiewicz

INNOVATION AWARD

Presented by
Battery Council International

One of the most talked about features of recent BCI meetings has been the Sally Breidegam Miksiewicz Innovation Award. This was set up in 2016, as a tribute to East Penn's CEO following her untimely death in June 2014.

The award celebrates innovation in equipment, processes, services and products that advance the lead battery industry.

The range of innovations set up as candidates for the award has been startling.

Some have been as simple as a better design shape for a marine battery; others have embraced the latest technological advances in our understanding of the lead battery.

Some of the nominations have been breakthroughs in the laboratory but struggled to be commercialized. And yet others — think of advances in EFBs — have been quickly embraced as a new standard in an emerging marketplace that continues to grow exponentially.

But be they large or small, these innovations matter.

For the last decade a tonne of investment has been flung at developing better lithium batteries while lead research has been side-lined.

The revamp of the ALABC and its replacement by the Consortium for Battery Innovation is putting the lead battery back in the spotlight.

Clear advances are on their way and credit must go to CBI for pulling it all together.

That said credit must also go to a generation of lead researchers that have remained in the background — think RSR, Hammond, East Penn, Daramic and many others — that continue to shape the lead battery industry.

This year there were six firms that applied for BCI's innovation award:

ABC, Abertax, Daramic, Hollingsworth & Vose, Vivet and including a submission from retired academic Mészáros Tamás.

"Innovation is the thing that gives you the opportunity. It's the promise of our future."

Sally Breidegam Miksiewicz

The bipolar battery

Advanced Battery Concepts matched the strength of the bipolar battery it has developed with the need for emergency energy storage for households.

Advanced Battery Concepts has pioneered the development of a bipolar battery — commercialization of which had not been achieved since the bipolar battery was invented in the 1930s. Now, complete with a new filling technology, the firm has found a good use for its storage system for emergency back up in the home.

The ABC Home Emergency Energy Storage system relies on a foundation of critical technology built into the GreenSeal bipolar battery bank which holds the 18kWh of energy available to be delivered at up to 6.8kW continuous power for home energy supply in the absence of stable continuous grid power.

"Patent pending technology provides for easy integration of additional storage enclosures yielding up to 36kWh of total energy available. Licensees of GreenSeal technology now have access to a commercialized set of technologies that are demonstrating their reliability and performance in the high value emergency power market," says the firm.

"Of note, is the newest ABC proprietary technology known as "RapidFill" and "RapidForm". This is the first VRLA battery filling and formation process executed with acid flowing continuously through all cells in the battery from the start of formation to the end of it," says the firm.

RapidFill results in a complete fill and saturation of all cells in the bipolar stack, regardless of the operating voltage of the monoblock, simultaneously and in under 60 seconds. Multiple 48V batteries are filled and ready for formation in less than one minute.

From there, formation can start immediately on the entire group of batteries at the same time, as acid begins flowing throughout each of the battery cells for the entire duration of formation.

Flowing acid allows for constant specific gravity acid during the entirety of the formation process as well as maintaining constant precise temperature of the battery during the formation execution regardless of the ambient temperature.

All this is done without the use of water baths or other forms of active cooling of the battery "This is a true innovation for the lead battery industry moving continually away from flooded batteries requiring maintenance and toward maintenance-free VRLA batteries with the highest performance and lowest cost," says the firm.

moves into the home

"This innovation is facilitated by the unique GreenSeal bipolar lead battery architecture invented and perfected by Advanced Battery Concepts.

"Integrating such unique and proprietary battery advances into a commercial product for home energy delivery is a true giant step forward for the industry.

"GreenSeal bipolar battery continues to represent best in class technology, lowest cost structure, best lifetime value and best battery performance within the lead battery industry.

The HEES system is attractive and functional in addition to providing seamless power transition in the event of a grid power disruption. Taking up minimal floorspace and fitting in almost any available area in the home, the HEES system can be placed in the garage, attic, basement, utility room or even in a living space.

Expanding on the HEES initial product capability, a daily cycling system is staged for commercialization in later 2022. This daily cycling system is built on a scientific and engineering platform of first principles resulting in GreenSeal bipolar battery design rules created and validated by ABC.

Those design rules govern the performance of the GreenSeal system under controlled cycling regimes predicting cycling lifetimes with astonishing accuracy.

ABC has internally developed the Home Emergency Energy Storage System from the ground up to integrate itself with the strength of the GreenSeal battery. ■

MASTERS OF INVENTION

Edward Shaffer II

Edward Shaffer II is CEO and Founder of Advanced Battery Concepts. He has spent the past 14 years focused on developing technologies to accelerate adoption of much needed alternative energy systems. In 2009, he established ABC to commercialize ground-breaking, large-format, rechargeable battery technology termed "GreenSeal". Throughout his career, he has worked across a variety of advanced dielectrics for electronics, optical materials for displays, materials for energy storage and photovoltaics. He has held a variety of roles including new business development, global R&D manager and research scientist. He received his PhD in Materials Science from MIT.

Jon Joslin

Jon Joslin has 30 years of experience in all aspects of financial management and business consulting. He has broad experience working for both an accounting firm and both small and large companies in a number of industries, from construction, manufacturing, wholesale and retail. In addition, he has started and run a number of companies. He has also served in his local government as a past mayor for the City of Mt Pleasant and a 15 year city commissioner.

Michael Everett

Michael Everett brings over 30 years of experience in a variety of technology-based industries, most recently the senior. vice president of engineering for Trojan battery Company. His previous positions include CTO of Maxwell Technologies and senior director of engineering and research at 3D Systems Inc. While working with Trojan Battery, he was responsible for overseeing Trojan's product development and research activities including all technical intellectual property innovation.

Electrical System Specifications		Standard + 1	Standard + 2	Standard + 3
Battery Series	GS4830-1M			
Number of 48V Battery Units per battery box		12	18	24
Usable Energy (kWh)		17.3	25.8	34.5
Rated AC Power (kW)	6.8			
Max. Continuous DC Current (Charge or Discharge, A)	180			
Nominal Battery Bank Voltage (V)	48			
DC Discharge Round Trip Efficiency	>88%			

Abertax, the Maltese specialist battery product developer, has come up with a new filling process for gel batteries that promises improvements in battery quality, an environmentally sensitive process and requires low investment.

A better gel formation process

Abertax's innovation award submission is based on a new patented gel circulation process that does away with standard filling processes for gel batteries. The firm says it needs less investment in machinery, reduced production time and labour cost.

It is an environmentally friendly process — there is no acid wastage and much better quality/performance of such manufactured batteries. From the results so far, it seems that this system will be adopted as the standard by major gel battery manufacturers

"As soon as KD Merz the inventor, came up with this brilliant idea, Abertax, being a company encouraging such type of innovation, and environmentally conscious, supported his idea," says a company spokesperson.

KD MERZ

KD Merz is the vice-president for technology at Abertax Technologies and is also a council member, where, in parallel, he is also involved in research and development work on VRLA Battery improvements.

"We immediately completed an agreement with a third party company to build and install such systems to undergo field tests at a battery company, while applying for patent protection."

Below follows a description of the traditional ways of gel filling with the Abertax method.

Direct gel filling (formed batteries).

The oldest method to fill lead acid batteries with gel is the filling of the silica/acid mixture into the batteries or cells having already formed plates. The gel is pre-prepared by a homogenous mixing of fumed silica (SiO2) with sulfuric acid having a silica concentration of around 6% and filled by a vacuum filling machine.

With suitable machines and equipment, a good and uniform gel filling can be achieved. However, there is always a risk, and in particular at higher temperatures, that the gel is jellifying quite fast inside the cells and can inhibit a complete, homogeneous and consistent coverage of the electrodes.

Such dry areas on the positive and/or negative plates results in a loss of capacity and can cause premature failure.

Gel formation process

A low cost process is direct gel formation. After filling the gel into unformed cells or batteries a formation program is started. It sounds easy with no high investment in equipment, but the formation time is quite protracted — seven days or longer and needs a number of different charge and discharge steps.

Beside the very long formation time, the quality and performance of the finished product is not very good and this is one of the most expensive processes.

Two shot gel filling process

The batteries are formed with sulfuric acid. After formation the batteries are discharged to a level of 80% to 90%. The batteries are then turned upside down to drain the remaining low density acid from the battery. Shortly after the drainage, the batteries are filled with a prepared silica/acid mixture in the same acid density as the drained acid. Afterwards, the batteries need to be recharged.

This method of gel filling is the mostly used technology today, however, it has several disadvantages, such as:

- If the waiting period after drainage of the acid and gel filling takes too long, the electrodes, in particular the negative plates can dry out and may cause filling problems.
- Another negative point is to achieve a good homogenous gel distribution inside the cells.
- In particular in block batteries where the lid design causes acid to accumulate when the battery is turned upside down to drain the acid.

The Abertax gel circulation process

This new method introduced in the gel technology production of VRLA batteries follows the two shot gel filling process up to the formation step. The idea is to transform the liquid inside the cells into gel without the draining process.

This is done by a novel circulation process which circulates the liquid in the formed cells while adding the silica in the process in a gradual way until the perfect gel mixture is achieved in the cells.

After the formation, the cells are simply connected to the proposed gel circulation system and the controlled process is initiated until the right acid/silica concentration is reached.

The first step is the preparation of the gel/acid mixture in the mixing tank. The acid specific gravity and the silica content of this mixture depends on the conditions of the cells after the formation followed by an electrical discharge process to lower the acid specific gravity.

The specific gravity of the acid in the mixing tank is set to be the same level as the acid specific gravity in the discharged formed cells.

The silica content is calculated based on the electrolyte exchange volume and the required (final) silica content in the cells.

After the gel/acid tank mixture is completed (homogeneity can be tested with the syringe test), this thixotropic dispersion is ready for the circulation filling process.

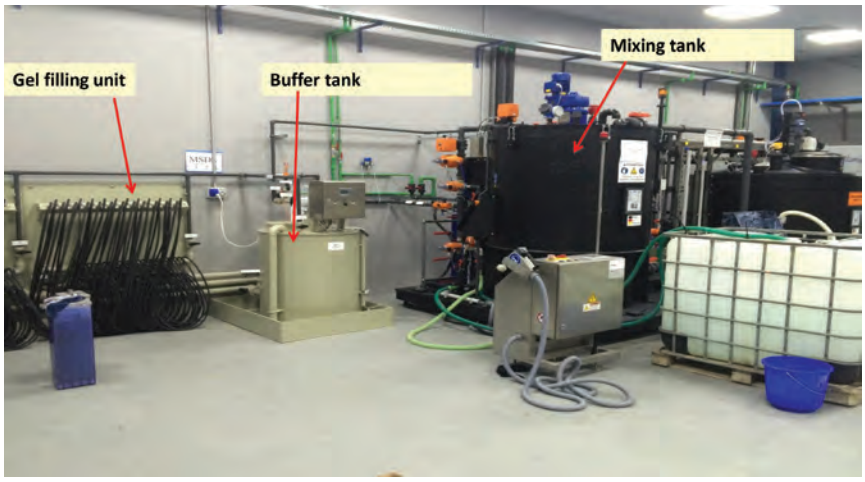
The formed and discharged cells are connected to the gel circulation unit and the gel circulation is started by activating the pump in the mixing unit.

The process will stop when the silica mixture in the tank and cells ends up to be 12%.

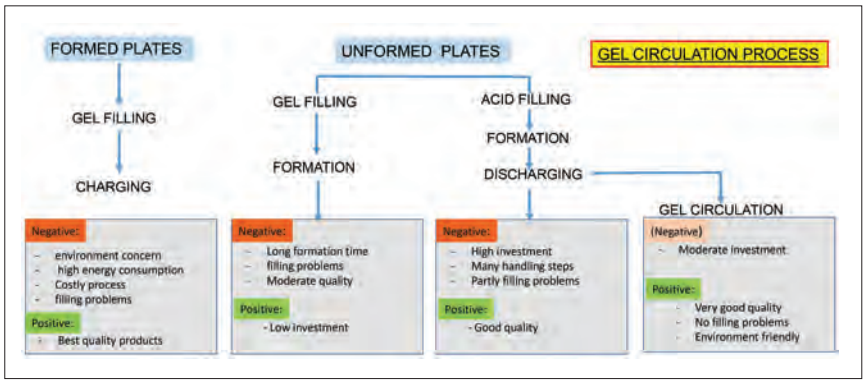
The time of the whole circulation process depends on the overall volume of the acid which needs to be replaced in the cells. In an example of 150 litres it will take about 38 minutes.

Right after the completion of gel circulation, the cells/batteries are disconnected from the unit and prepared for a recharge. The charging regime should be of a regulated IU or IUI regime with a voltage limit during the U phase of 2.45 vpc.

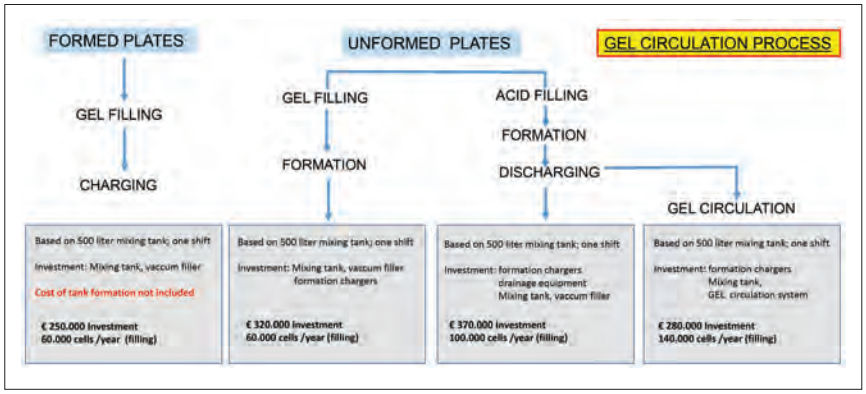
From the numerous and regular quality checks done over the production lines in the past two years, it is evident that apart from an economic and cost efficient gel filling process, much better quality cells are produced using the Abertax gel mixing process. ■



Gel Mixing and Circulation System — Actual Installation



Gel Filling Processes (Comparison)



Gel Filling Processes investment and efficiency

ADVANTAGES

Apart from offering excellent good performance and quality results, this new, patent-protected and innovative process for the filling of gel batteries, offers several remarkable advantages both financially and environmentally.

The avoidance of draining the cells in the commonly used two shot process has itself a huge impact. This offers a huge reduction in time on the overall process, no acid dumping with its risks and consequences, much less labour intensive, avoid exposure of the plates to air, and above all the elimination of possible air pockets while filling.

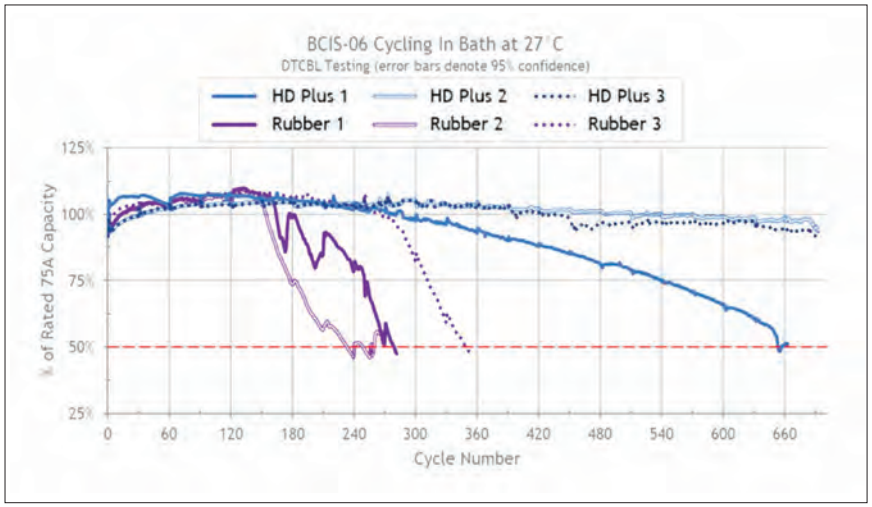
The battery lifetime is optimized hence reducing the recycling frequency and its related environmental impact and ensuring that guarantee claims due to filling problems is eliminated.

When considering a new gel filling system the capital investment using this method is cheaper and occupies less space when compared to the other methods especially the two-shot method as no drainage equipment and vacuum system are required.

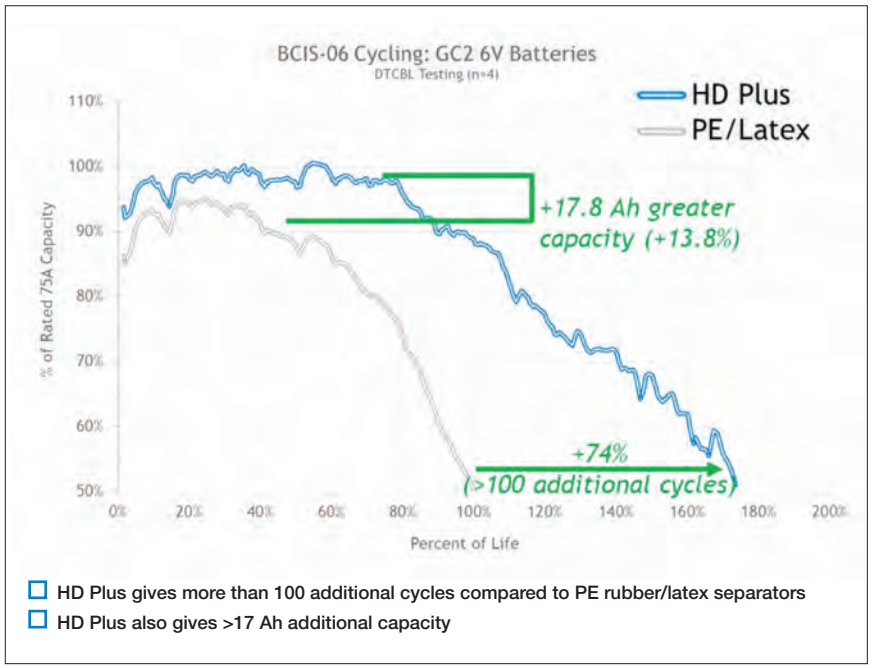
Daramic has featured in the innovation awards since their inception in 2016 and has always been a strong contender to gain top ranking. This year it presents HD plus, another step change in separator performance.

The battle for the yet better separators

Daramic has a long history as a pioneer in the advancement of battery separators. So in one respect it's perhaps fitting that the inventor of the polyethylene battery separator should unveil the next way forward in battery separator design and capabilities. The product known HD Plus is a step change in the development of deep cycle batteries and is an advancement of an early product, simply called Daramic HD.



Daramic HD Plus at least doubles cycle life



HD Plus gives longer life and more capacity than PE Hybrid separators

One of the technological problems associated with the lead-acid battery is the self-discharge of the negative plate as a result of the deposition of antimony on to the sponge lead electrode, a process known as antimony poisoning. This results in gassing and water loss and eventually a shorter battery life. Antimony, however, is a useful additive for lead batteries in that it can increase conductivity of the grid enabling deeper and better cycling.

Daramic points to five features that the new HD Plus separator provides.

These are:

- Improved polyethylene formulation suppresses the effects of antimony poisoning, yielding longer life
- New formulation provides lower internal resistance, improving charge acceptance and increasing capacity
- Sealable for both envelope or sleeve automation provides protection from short circuits and higher manufacturing yields
- High oxidation resistance
- Optional glass mat for active material retention

The key benefits of HD Plus, according to Kevin Whear, vice president of technology, is that firstly, it exceeds battery life requirements by counteracting the negative effects of antimony poisoning including superior oxidation resistance and reduced water loss. And secondly, on average, HD Plus increases capacity by 9%-13% versus standard separators, resulting in increased back-up time for users.

Daramic has always been a regular and strong contender in the BCI innovation awards.

In 2019, Daramic and Huff Technologies developed a way of better simulating how batteries

perform in the real world by simulating how they move around during everyday use. For this it received a distinguished mention.

The product was the Daramic Shuttle Table which was designed to mimic real world scenarios during testing. It was developed because the companies acknowledged that in all types of environments, vehicles and the lead acid batteries they use are constantly moving. The system allows for a direct comparison between batteries based on different working patterns and battery environments. It will enable the testing and validation of a variety of passive acid mixing devices, the company said, as well as many standard industry tests performed while the batteries are in motion. This includes the testing of tall motive power and deep cycle batteries, while providing a safer battery testing environment.

In 2018 the firm showcased its latest product using Carbon Coated Separator Technology. Developed to support operations in partial state of charge, utilizing the separator as a carbon carrier, dynamic charge acceptance is improved. It does this by reducing sulfation crystal growth, delivering a more active surface area on the plates for improved conductance of the electrode.

In 2017, using advanced computational fluid dynamics, Daramic developed two new separator solutions — Daramic EFS and Daramic RipTide. Daramic EFS is specifically designed to support start-stop vehicle batteries by reducing the battery's internal resistance and improving voltage drop and CCA. Daramic RipTide combines the latest innovations of Daramic with novel separator profile designs using advanced computational fluid dynamics computer modelling to enhance EFB durability by reducing acid stratification in a partial state of charge environment, which is more typical in start-stop applications.

Daramic's first entry to the BCI Innovation Awards in 2016 was for a product innovation invented three years ago with research continuing on further refinements. Called DuraLife, this helps protect and maintain the quality and performance in battery designs that use less lead content — a technique that many battery producers have adopted as a way of reducing the overall cost of their products. ■

Attribute	Typical value*	
	Rubber	HD Plus™
Backweb thickness (mm)	0.400	0.300
Electrical resistance (mΩ-cm2)	450	165
Porosity (%)	38	55
CMD elongation (%)	78	200

*Daramic Internal Testing

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WHY DEEP CYCLE BATTERIES MATTER

In North America, the lead acid battery industry delivers around 20 million deep cycle batteries, annually, they are used in a variety of applications and golf carts, floor scrubbers and general utility vehicles rely on lead acid batteries to deliver higher capacities for extended life on the golf course, the showroom floor and out in the field,

Alternative battery technologies, especially lithium ion are pushing the boundaries regarding what is expected of deep cycle battery performance.

As a result, lead acid batteries are facing unprecedented challenges in deep cycle markets. to close the gap on cycle life capacity and operations and partial state of charge users of lead acid. The Daramic HD Plus separator will be yet another tool challenging the in-roads of lithium into traditional lead markets.

Deep cycle batteries are pushing for longer battery life that far exceeds the warranty periods offered today. Lowering warranty return rates through a more robust battery design allows battery manufacturers to increase cost savings while meeting these shifting market needs.

In addition to longer battery life extended run times are also becoming a priority to meet this need users need higher capacity lead asset batteries to power these deep cycle vehicles.

Lead acid batteries are facing unprecedented challenges in deep cycle markets to close the gap on cycle life capacity and operations and partial state of charge users of lead acid. The Daramic HD Plus separator will be yet another tool challenging the in-roads of lithium into traditional lead markets.

Hollingsworth & Vose has nominated PowerFill for the innovation which it says is an improved and faster acid fill that can include a 12% increase in battery capacity and cycle life.

Better acid filling, better battery performance

One challenge many customers encounter during AGM battery assembly is the slow and uneven filling of acid electrolyte. Slow filling reduces the battery assembly speed while uneven acid distribution in the AGM separator and plates potentially cause dry spots and black spots on the plates during battery formation. Furthermore, uneven acid distribution can degrade battery performance.

A key factor affecting the acid filling speed is the gas pocket trapped toward the center of the plates and AGM separator. The gaseous species in the pocket is air and possibly CO2 generated by the reaction of the acid with carbonate species in the plates. The gaseous species have the tendency to hinder the flow of the acid into the center area, unless removed from the battery.

H&V has recently developed PowerFill AGM to solve these challenges by enhancing the surface of the separator to create open channels. With the open channels on the PowerFill AGM separator, the gaseous species in the pocket can escape more easily from the battery during the acid filling process, thereby allowing acid to flow quickly and evenly into the center of the plates/AGM. The PowerFill patented technology can be applied to various types of AGM, and the resultant separators still retain the same strength and compression retention behaviour of the base AGM. PowerFill has demonstrated it can increase production throughput and battery performance for a wide-range of applications.

"H&V is a global leader in filtration and energy storage solutions. Our advanced materials are used in nearly every industry and touch every aspect of modern life. Wherever you work, live or travel, chances are an H&V solution is close by, contributing to a cleaner, healthier, more sustainable world," says the firm.

"H&V is the lead battery industry's only vertically integrated Absorbent Glass Mat (AGM) producer." ■

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A key factor affecting the acid filling speed is the gas pocket trapped toward the center of the plates and AGM separator

POWERFILL — ADDS VALUE TO BATTERY PRODUCERS AND END-USERS IN THREE WAYS.

H/V PowerFill™ A Hollingsworth & Vose Innovation

First, it increases battery assembly speed and throughput. PowerFill has demonstrated electrolyte acid filling time can be reduced over 50% allowing battery producers to reduce cost.

Second, PowerFill improves the quality of lead batteries since acid filling is uniform across the AGM separator and plate/electrode. Better batteries means improved battery assembly yield.

Finally, PowerFill has demonstrated battery performance improvements to include 12% increase in battery capacity and cycle life.

ZHIPING JIANG

Zhiping Jiang holds a PhD in Chemistry from Rensselaer Polytechnic Institute (1990) and MBA from University of Massachusetts at Lowell (2005). He began his industrial career in 1992 after a two-year's post-doctoral study at Materials Processing Center/Massachusetts Institute of Technology.

Over the years, he has worked on product and technology development in various areas including batteries, battery materials and separators. In 2012 he joined Hollingsworth & Vose Company as the chief scientist in the Battery Division.

He has been awarded with 32 US patents, and received R&D Magazine's Year 2000 R&D 100 Award for technology innovation.

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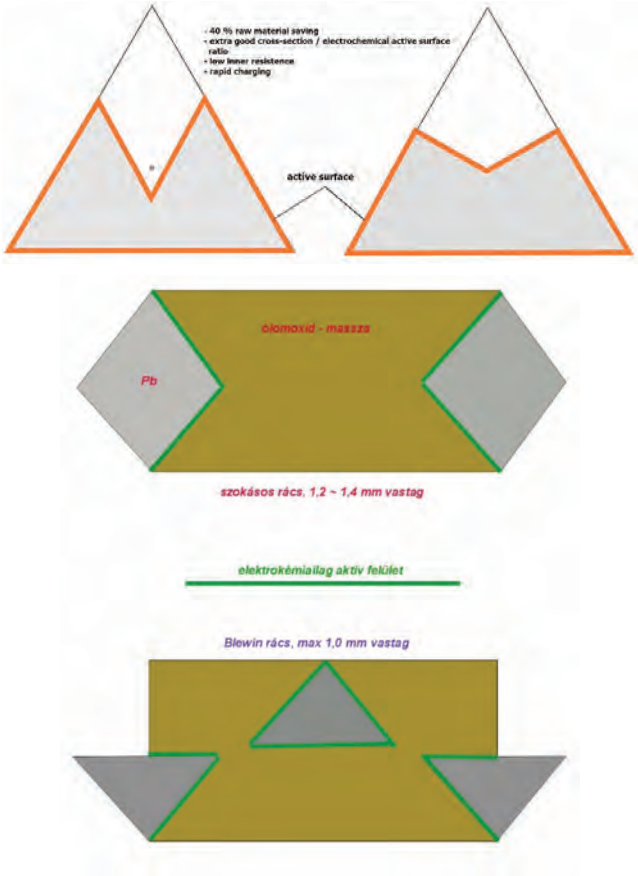
Make our planet great again

This year Meszaros Tamas submitted an entry suggesting that a radical new grid design using ultrafine fibres could dramatically improve battery performance.

Breaking through the 100Wh/kg power barrier

An unusual entry from retired Hungarian academic Meszaros Tamas looked at what he named Uff (ultra-fine fibre) technology tied with a manufacturing process he called the Blewin System — the intellectual property of both of which are his.

The Uff solution keeps the geometry of the grids unchanged with the already known in-plane arrangement, but in the third dimension it transforms the now-usual convex quadrilateral and the already improved triangle cross-sections into concave polygons.



Figures 1 and 2 above: note the extended electrochemical active surface ratio and there is a 40% raw material saving in lead, there is also lower internal resistance allowing for more rapid charging

Research on these grids — which had even achieved a specific power of around 80Wh/kg at the turn of the 21st century — was halted. At this level r, the system resulted in 30% lead savings / batteries, as well as a reduction in internal resistance that reduced the previous charging time to less than a third, eliminating unnecessary heating and acid vapor emissions.

"Optimized current paths and extremely low internal resistance have made it suitable for handling extreme power fluctuations and much more, making the four variants capable of performing virtually any energy storage task for a quarter of the price of a Li-base of the same power (capacity)," says Tamas.

The internal elasticity of the Blewin system is important because it can accommodate parameters that are not uniform but fit in an internal structure.

Figure 3 above illustrates the size and design of the smallest (moped) battery grid and the magnified detail of the microporous surface waiting for the paste.

"The grid manufacturing system is capable of producing any shape that is suitable for an acid lead-acid battery grid and produces better results than current products," Tamas says.

"It can be seen that the grid is still built of ubiquitous convex cross-section elements, so the ratio of the electrochemical surface area to the fiber cross-section (mass) is still not optimal.

The cross-sections in figures 1 and 2 improve the cross-section-to-surface area ratio by more than 25%. The effect of this can be demonstrated by mathematical modelling, any solution will bring the value of the specific power above the value of 100Wh/kg (102~105).

Mathematical modelling also offers additional curiosities, as the use of grids with such a cross-section results in a lead saving of over 40% (with the same performance), e.g. it results in a weight loss of over 4kg for a normal (60Ah) starter battery, which costs ~ $8 in lead.

The extremely high electrochemically active surface results in extreme load-bearing capacity and a significantly shorter charge (also) with a higher current. This presupposes, for example, an outstanding recuperation capacity for urban cycle vehicles and the ability to withstand extreme current changes in wind turbines, says Tamas.

The material of the grids is pure lead, but it can be hardened with an alloy that does not cause internal damage (Na), any Ca alloy should be avoided due to its tendency to form gypsum.

The production of Uff solution grids requires the transformation of a previous machine system operating on a similar principle, primarily by entrusting process control to more precise artificial intelligence and transforming it into an automated process, he says. ■

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Michigan-based manufacturing technology developer Vivet has designed a novel manufacturing process that it says can be applied to a number of industries, including for the production of lead acid batteries.

Where repetition leads, costs decrease, profits rise

Vivet co-founder and director of R&D, Amjad Hashem, is leading R&D engineering efforts to find, develop, and build unique projects that aim to disrupt manufacturing industries.

In its innovation award submission, Vivet says its 'Repeating Layer Process' (RLP) manufacturing system reduces costs as equipment is scaled up.

RLP is suitable for products that have a multiple of sub-components or operations, which repeat for a defined number.

The system design is scalable, enabling companies to add more machines to expand production at any time, while keeping downtime to a minimum and with no changes to the existing equipment being used.

In a case study prepared by Vivet, the company shows the build of a single system to build a battery module. The system is later scaled to seven times the initial capacity for four times the initial cost.

According to the study, the first build of the assembly system could produce more than 40 battery modules an hour and a total of 205,000 in the course of a year. This is for an initial estimated investment of $1.5 million.

The second layer would increase the capacity by 1.9x (390,000 modules a year) for a total of 1.3x the initial cost (an estimated $2 million).

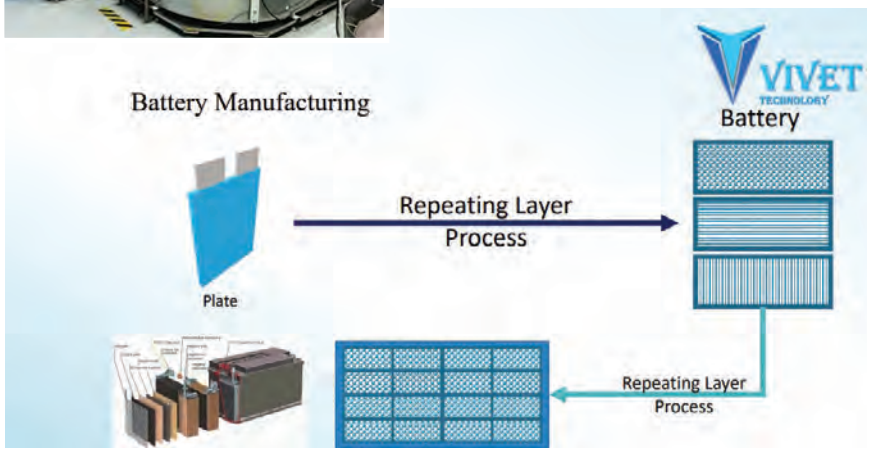
The third layer would increase to 3x the capacity (615,000 modules a year) for a total of 1.7x the initial cost.

As the system is scaled further, total costs and the final manufacturing cost per unit "will fall to levels the market has never seen before", Vivet says.

RLP systems are configured to continually perform operations until a specified number of layers is completed and then remove the product from the system. The repeating layer may include one or multiple parts.

The capacity of the production system can be scaled to over 5x the initial capacity.

Vivet says it can provide several options of manufacturing operation capabilities through its manufacturing branch and partners.



"The process is an alternative to the linear method of manufacturing and offers a totally different level of manufacturing efficiency." Says the firm.

"Our process not only improves production, but also quality, efficiency, scalability, modularity and more."

The company says its process also introduces the concept of 'zero system downtime', with production able to 'bypass' any individual machine that is out of operation such as for repair or maintenance.

This in turn eliminates bottlenecks and increases utilization of equipment.

Vivet says its process is the first to give companies the option of increasing investment incrementally in line with its production requirements — providing an ability to build a low-capacity system for low investment, without existing equipment becoming obsolete. ■

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Advanced Battery Concepts

Advanced Battery Concepts
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Advanced Battery Concepts is commercializing energy storage systems based on its advanced, proprietary bipolar technology. The result is safer, lower cost and longer lasting energy to meet the evolving needs of several new, high-growth markets.

Specifically, Advanced Battery Concepts is solving the biggest issue in today's electric grid, namely, 0.25-to-8-hour duration daily storage applications, capturing a multi-billion-dollar market and enabling broad-scale adoption of intermittent renewables, like wind and solar. Transforming renewables into a firm, dispatchable resource results in a lower-cost and cleaner energy future.

To ensure this future for everyone, our energy storage solution is the most economically, socially, and environmentally responsible solution today.

So, when we say "Better Batteries, Better World®" we mean it.

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Daramic

Booth: 229

DARAMIC®

Daramic is the world's largest manufacturer and supplier of battery separators for automotive, industrial and specialty lead-acid applications. As the inventor of polyethylene separator, Daramic has led the way in developing innovative technology for the global lead-acid battery industry nearly 90 years

- **Innovation:** Our scientists and engineers continue to break new ground in the development of advanced separator technology. Our 3 global innovation centers in Owensboro, US; Sélestat, France and Bangalore, India are dedicated to innovation to meet ever-changing industry needs
- **Local Supply From A Global Perspective:** 10 Manufacturing facilities and 7 Sales offices located in 8 different countries provide local service from a global perspective
- **Reliability:** State-of-the-art processes and manufacturing equipment deliver consistent, reliable product quality
- **Full Automotive Solutions:** Leverage the innovation synergy from its sister companies, the world's largest li-ion battery separator makers, that position us to provide full solutions for automotive battery applications from basic SLI to Start-Stop to Hybrid and Electric Vehicles

Contact details
Website: www.daramic.com

Dross Engineering

Dross Engineering

Manufacturer of furnaces and special equipment for the recycling of non-ferrous metals, Dross Engineering is one of the few manufacturers to design and build industrial equipment only for the recycling of non-ferrous waste (lead-aluminum-zinc-copper).

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Eagle Oxide

Booth: 112

EAGLE

AUTOMATION - OXIDE PRODUCTION - MATERIAL HANDLING - SERVICE

EAGLE, a global leader in the design and manufacture of production and automation equipment. With over 25 years of experience working with battery manufacturers, material handling and oxide production systems, Eagle has the expertise to meet your battery production needs. We are the lead oxide experts!

From barton to ball mill systems, red lead and litharge furnaces, melt pots, ingot conveyors, pneumatic transfer systems, and integrated controls, to automated assembly cells, palletizers, and material handling systems, Eagle is your equipment and service team provider.

Competition in energy storage continues to increase. The ability to produce batteries with higher performance, at lower cost, and with lower environmental impact is a constant challenge. Eagle's knowledge of lead oxides and manufacturing automation makes Eagle the strategic business partner you need in this competitive market!

Contact details:
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Email: sales@eagleoxide.com

Entek

Booth: 210

ENTEK
RAISING EXPECTATIONS. KEEPING THEM THERE.

For more than 35 years, ENTEK has been an innovator and leading world-wide designer and producer of highly reliable microporous polyethylene battery separators for lead-acid and lithium batteries. Its separators are used in automotive, golf cart, and a wide range of industrial applications, and are also in great demand for products that require high energy or high voltage systems such as secondary batteries in portable devices and primary batteries in critical systems. ENTEK also manufactures the production equipment used to produce ENTEK's high quality separator products.

ENTEK is a leader in the design, production and installation of twin-screw extruders and other production equipment to support our customers engaged in plastics compounding, including recycling, custom compounding, specialty sheet lines, and other products such as including bioplastics and other high demand goods that support the growing consumer demand for recyclable and biodegradable containers.

ENTEK is headquartered in Lebanon, Oregon, USA, with facilities in the United Kingdom, Japan, China, and Indonesia. Its products are sold through its sales offices and distributors worldwide. For more information, visit www.entek.com.

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Frötek

FRÖTEK

FRÖTEK–Kunststofftechnik GmbH is a global, family-owned company with seven facilities spread over four continents. With our global presence in Germany, Hungary, Ukraine, China, South Africa and the US we assure world wide customer satisfaction by offering local manufacturing, support and quick deliveries.

FRÖTEK is the leading designer and manufacturer of intercell connectors for industrial, stationary and Li-Ion applications. Since introduction of our welded intercell connectors in 2001 we have been able to convince all major battery companies to use them. Since then FRÖTEK continues to further improve the quality and performance of this product range.

Besides intercell connectors FRÖTEK is well known for: watering plugs, electrolyte circulation, vent plugs, level indicators, wiring harnesses and various other battery accessories. Molding, extrusion, welding and clean room production is our daily business. Quality is our top priority.

FRÖTEK has been certified according to IATF 16949:2016 since 2001. FRÖTEK product development engineers are available to solve your problems and you will always find in FRÖTEK a competent partner for your development needs. Our experienced engineering development is looking forward to find the lest solution for your application or problem.

Put us to the test and we will convince you too.

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Farmer Mold & Machine Works

Booth: 234

FARMER
Mold & Machine Works Inc.

Family owned and operated since 1938, Farmer Mold & Machine Works specializes in the design and manufacturing of any type of machinery, including battery assembly equipment, parts casting equipment, and plant automation and process engineering.

Further, if you need something that's not already in our current product line, Farmer can work with you to create custom machinery for your specific applications — whether a new technology or refining an existing process.

Our portfolio of machinery not only sets the standard within the industry but is ever-growing. Plus, Farmer provides sales and support for acid dilution systems, plate curing ovens, and semi- and fully automated material handling equipment to several industries worldwide.

Our highly interactive and innovative approach to automated machine, tool and die, and mold design follows precise safety standards and utilizes the best materials to produce top-of-the-line machines and equipment that are built to last in 24/7 environments.

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Bringing the industry together www.batteriesinternational.com

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advertising director

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Hammond Group, Inc.

Booth 108

Founded in 1930, Hammond Group, Inc. (HGI) is a battery additives/oxides and specialty chemical company that is advancing hybrid automotive and renewable energy markets through proprietary battery chemistry. HGI supports these emerging markets with two US manufacturing operations in Hammond, IN and another in Pottstown, PA. HGI also has International operations in Gateshead, England; and another in Kuala Lumpur, Malaysia.

Be sure to stop by our booth and talk with our specialists about how HGI can help your company overcome technical challenges. We offer technical assistance programs which allow our customers to utilize our experts to augment their research efforts, reduce capital expenditure and fixed costs, and rapidly develop new products.

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Tel: +1 219 931 9360 • www.hmndgroup.com

Sorfin Yoshimura

Sorfin Yoshimura is the largest independent trading company serving the worldwide lead acid battery industry.

Sorfin Yoshimura has offices in the USA, Japan, China, France, and Brasil in addition to agency cooperation in several other countries around the world.

We are a global company sourcing the best machinery, materials, and technical services for your battery factories specific needs.

Sorfin Yoshimura offers our customers the benefit of our decades of lead acid battery industry experience. We serve hundreds of customers throughout the world each year and customize our services for each and every factory.

We are constantly combing the world for the latest innovations in both materials and machinery; seeking to add vendors to our already vast network. When you choose Sorfin Yoshimura, you will quickly identify the unique combination of commercial savvy and engineering know-how that has enabled us to become the company that we are today.

We look forward for you to contact Sorfin Yoshimura.
The Source of Power!

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MAC Engineering

Booth: 136

MAC Engineering has supplied the lead acid battery industry with high quality downstream battery making equipment since 1965.

We offer complete systems for feeding, pasting, flash drying and stacking any continuous or gravity cast plate making technology.

From motorcycle and automotive batteries, to industrial and traction, we have equipment to handle any size of battery production.

New equipment solutions are now available for punched grids. MAC also offers finishing line equipment for automated Cast on Strap, acid filling, leak testing, heat sealing and more.

Contact us today for more information on what we can do for you.

Contact details:
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www.mac-eng.com

WIRTZ Manufacturing

Booth: 206

The WIRTZ group of companies provides global solutions to the world-wide battery manufacturing industry.

With state-of-the-art equipment designed and developed by; WIRTZ (gravity-cast, continuously-cast and rolled, punched grid and plate production); OXMASTER (ball-mill and barton oxide production systems, and paste mixing equipment); LEKO (semi-automatic and high speed fully-automatic battery assembly lines); CONBRO (battery filling and formation plants); and BATTERYRECYCLING (turnkey battery breaking lead and plastic recycling systems, including paste desulphurisation).

At BCI, WIRTZ will demonstrate their commitment to automatically control, and continuously improve critical process variables, in order to ensure that their resulting battery products are of the highest QUALITY, DURABILITY and PERFORMANCE.

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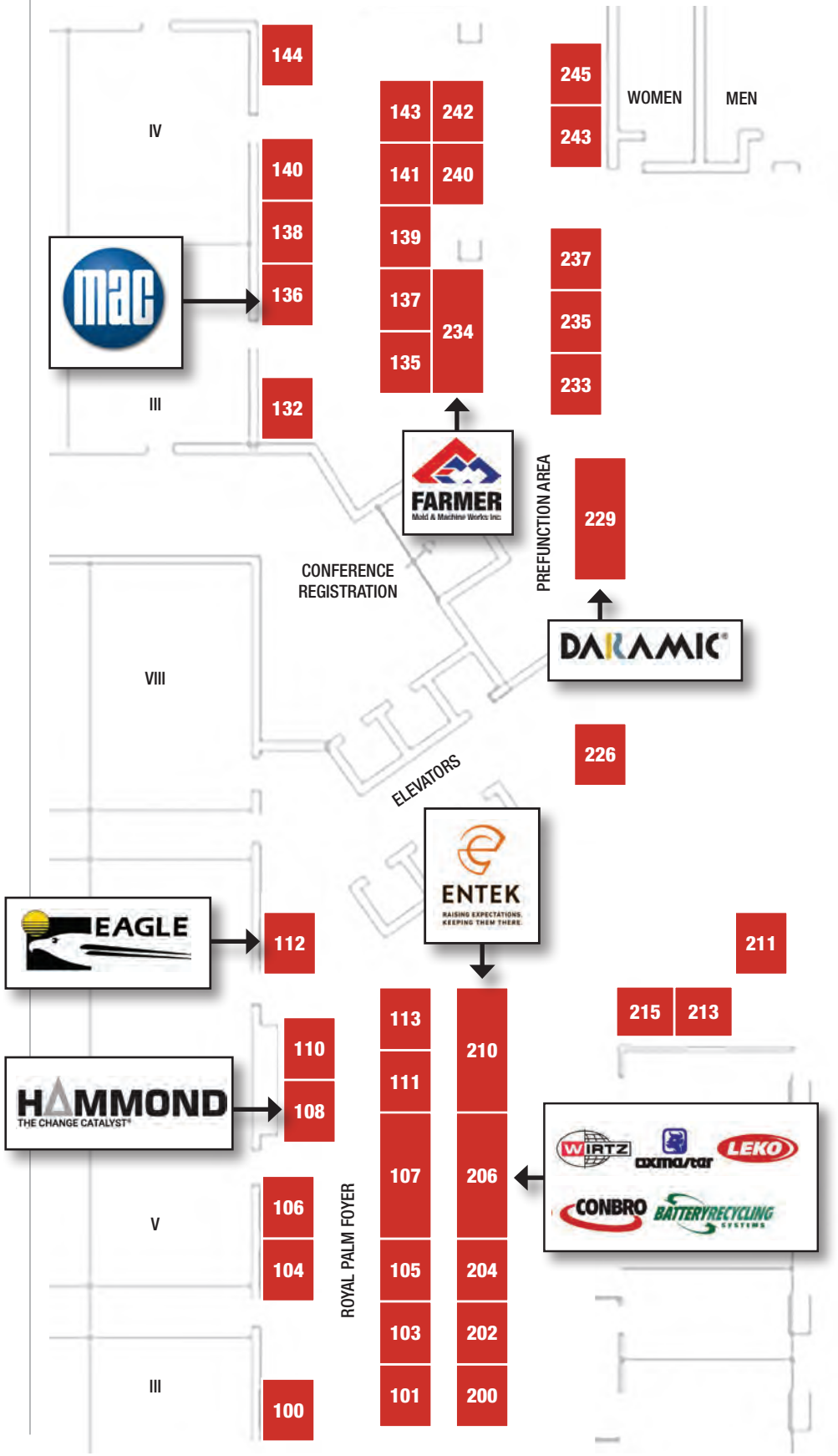
2022 BCI CONVENTION + POWER MART EXPO – EXHIBITORS AND FLOORPLAN



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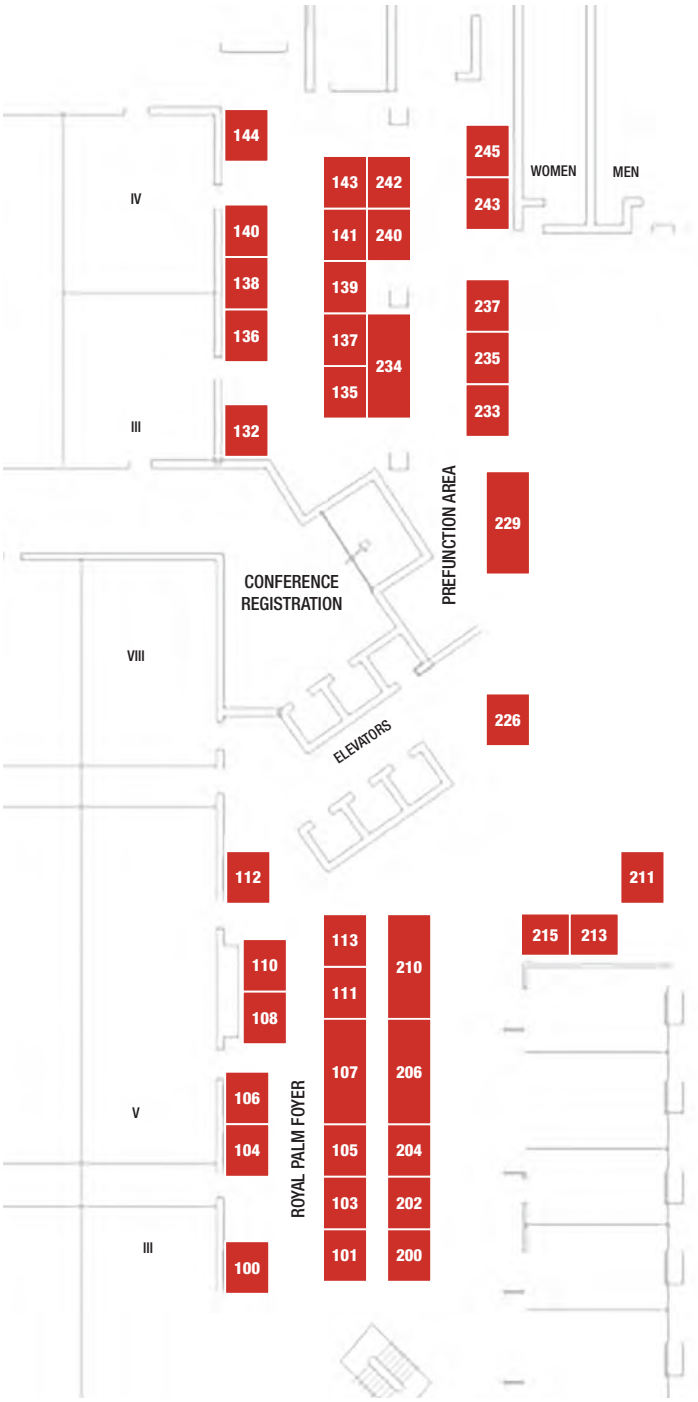
2022 BCI CONVENTION + POWER MART EXPO – EXHIBITORS AND FLOORPLAN



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215	International Thermal Systems
226	CG Thermal
229	Daramic
233	Tamarac Medical
234	Farmer Mold & Machine Works
235	Amer-Sil S.A.
237	Navita Marketing

During the BCI Convention + Power Mart Expo, the council's committees hold scheduled meetings. Committee meetings are held behind closed doors and are by invitation only.

BCI Committee Meetings

Data Book Committee

The Data Book Committee supervises the compilation of the yearly Data Book, working with the organization hired by the Council. It also recommends any necessary new group numbers. It meets three times a year — in January before the publication of the printed book, at the annual convention and in October during Committee Week.

Deep Cycle and EV Committee

The Deep Cycle and Electric Vehicle Battery Committee is responsible for a broad scope of activities related to EV technology including among others, testing, safety, and statistics. It acts as a focal point for the application of lead-acid technologies in the emerging electric vehicle market. It meets twice a year — at the annual convention and in October during Committee Week.

Environmental, Health and Safety Committee

The Environmental Health and Safety Committee maintains an awareness of, and reports to the BCI board of directors, developments related to:

- Acceptable methods of waste disposal from battery factories and related operations such as lead smelter operations; and control of the establishment of allowable limits of pollutants in both air and water;
- Lead absorption in the bodies of workers and others exposed to lead and like materials including the means of controlling lead in working areas; and, materials pertaining to the safety of batteries and related products which affect the industry, including packaging and labelling as required by US federal regulations or deemed helpful by the committee.
- Product safety education programs, working with the technical and other BCI committees, to disseminate product safety information.

Industrial Battery Charger Committee

The Industrial Battery and Charger Technical Committee considers all matters of a technical nature affecting the industrial battery industry. It updates and establishes standard test specifications and procedures for industrial battery chargers, motive power and valve regulated standby batteries.

The committee works with the Industrial Battery Committee and other committees in developing and distributing, through publications and other channels, information on the design, manufacturing, marketing, distribution usage and disposal/recycling of industrial batteries. It meets two times per year — at the annual convention and in October during Committee Week.

Marketing Committee

The Marketing Committee analyzes industry trends and practices; it identifies gaps in communication within the lead battery industry as well as between the lead battery industry and external parties such as consumers and regulators. It also works to establish and disseminate lead battery labelling standards to their companies.

The committee is responsible for the production of BCI's newsletter, *The Energy Beacon* and has a subcommittee dedicated to educating lead battery retailers and scrapyards about the dangers that occur when lithium-ion batteries enter the lead battery-recycling stream. It meets twice a year – at the annual convention and in October during Committee Week.

Product Information Committee

This committee contains the former Marketing and Statistical and Traffic Committees in an expanded role. The committee provides all factions of the industry the opportunity to comment on product releases. It also considers all matters pertaining to traffic problems within the industry, and represents the industry at all hearings and meetings called by the proper authorities for consideration of rates, rulings, etc. It meets twice a year at the annual convention and in October during Committee Week.

Technical Committee

The Technical Committee considers all matters of a technical nature affecting the industry.

It continues to establish and update standard test specifications and procedures for all classes of batteries manufactured for which the membership has a need and works in conjunction with other committees to develop and distribute, through publications and other channels, information on the design, manufacturing, marketing, distribution usage and disposal/recycling of lead-acid batteries.

It meet four times per year — late-January/early-February, at the annual convention, late-July/early-August, and in October during Committee Week. ■

Battery Council INTERNATIONAL

Save the Date

2023

BCI Convention + Power Mart Expo

April 23-26, 2023

Louisville Marriott Downtown
280 W. Jefferson St.
Louisville, KY 40202

Learn more at www.BCIConvention.com.

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Dave Beidler, Yacht Battery Co. Ltd.
Tammy Cooper, Yacht Battery Co. Ltd.
Ami Lee, Yacht Battery Co. Ltd.
Joel High, Yuasa Battery, Inc.

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Mike Fraley, Crown Battery Mfg. Co. (Vice Chair)
Matthew Lum, AAA National Office
Dwayne Shumate, AAA National Office
Jim Harper, AutoZone Inc. Andrew Kallfelz, B2Q Technologies
Scott Vlatkovich, B2Q Technologies
Yoshiaki Machiyama, Battery Association of Japan
Bill Walter, Battery Innovation Center
George Brilmyer, Batt-tek Consulting
Elaine Raterman, Bitrode Corporation
Steven Swogger, Black Diamond Structures
Jon Anderson, CD Trojan
Jesus Perez, CD Trojan
Shawn Peng, CD Trojan
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Joe Liedhegner, Clarios
Negin Salami, Clarios
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Terry Agrelius, U.S. Battery Mfg. Co.
Zack Cox, U.S. Battery Mfg. Co.
Marvin Ho, U.S. Battery Mfg. Co.
Sales PA, Yacht Battery Co. Ltd.
Nicholas Shelton, Yacht Battery Co. Ltd.

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The quarter century club — battery heroes reunited

What is it with the US obsession with crack-of-dawn meetings? And breakfasts too. Was a whole nation raised on farms in the mid-West? This year, BCI, has consulted the meteorologists for Naples and set the time for 7am, "6.49am is sunrise so we'll all have caught up on our emails by then but we're adding another 10 minutes for the East Coast softies and the Europeans to get up," says one of the organizers

This year the quarter century club — those BCI members who have supported the institution for 25 years and not forgetting the few that have even clocked up a half century — will listen to George Brilmyer, a lead battery veteran, expert and inventor, who is presenting what should be a memorable talk on the history of the lead battery in energy storage.

"The quarter century club is a fine tradition to uphold," one BCI veteran told Batteries International. "It's more about friendship than anything else. We get together and have a good time!"

ROLL OF HONOR

A J BROGAN
A M HARDMAN
ACHIM LULSDORF
AKIO WATANABE
AL O'NEAL
AL SCHMIDT
AL VINCZE
ALAN COOPER
ALAN KOHLER
ALBERT BRICE
ALFRED C LAZAGA
ALFRED J PAUTLER
ALLAN COOPER
ANDY WADDELL
ANNIE ZHENG
ARDELLE E MILLER, SR
ARNIE O NILSSON
ARNIE Y SAKAI
ARNOLD FISCHER
ARTHUR G KOCH
ATTILA CARUSO
AYKAUN OKUMA
B A HILL
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BOB LINDSAY
BOB PEPPERS
BOB SLAUTTERBACK
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BUD DeSART
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CARMEL M CLEMENTSON
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CHARLES K McMANUS
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CHERYL MINOR, PHD
CHI-HWA LU
CHRIS PRUITT
CHUCK FOWLER
CHUCK GIESIGE
CLEVE BENNETT
CLIFF J CROWE
DAN DUFFIELD
DANIEL A MELVILLE
DANIEL D BREIDEGAM
DANIEL P ASKIN
DARRELL HIMMESOETE
DARYLL RARDON
DAVE YANIK
DAVID A WINTERBOTTOM
DAVID BEIDLER
DAVID LONGNEY
DAVID LUND
DAVID M SHAFFER
DAVID MCMULLEN
DAVID RITTENHOUSE
DAVID WEINBERG
DAVID WILLIAMSON
DAVID WILLIS
DENIS S HOWARTH
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DON PRIEBE
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DONALD A MASSELLE
DONALD A WOJTON
DONALD L OKESON
DONALD L PIERSON
DONALD RABON
DONALD WALLACE
DONNA SNYDER
DOUG BORNAS
DOUG BORNAS
DOUG BRADLEY
DOUG LAMBERT
DOUGLAS BROWN
DOUGLAS F HUTTON
DOUGLAS GORDON RIST
DOUGLAS J BOUQUARD
DOUGLAS R TUPLING
ED FINK
ED FREY
ED PUCKETT
EDDIE BRICE
EDUARDO BURGIO
EDWARD M KSENIAK
EDWARD M MARWELL
EDWARD PUCKETT
ELLEN MAXEY
EMMETT R JAMIESON
ENRIQUE CARREON
ERIC HOLTAN
EUGENE P FINGER
EVAN R WESCOE
FARID AHMED
FELIX TESHINSKY
FOLCO GIBELLINI
FRANCISCO TRINIDAD
FRANCOIS GONNARD
FRANCOIS STEFFENS
FRANK DUMAS
FREDERICK TESHINSKY
FROSTY TUNNELL
G A CLERICI
GARY G BRYAN
GARY MITCHENER
GARY SANTASPIRIT
GARY TAYLOR
GEOFFREY J MAY
GEORGE BRILMYER
GEORGE COLLINS
GEORGE NADER-LATUFF
GEORGE NOEL
GEORGE SMITH
GEORGE STRATIS
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GORDON BECKLEY
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JOE McKINLEY
JOHANNES SCHNEIDER
JOHN A BITLER
JOHN A MILLS
JOHN BLACKBURN
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JOHN CONNELL
JOHN DEVITT
JOHN E MANDERS
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JOHN TC KAN
JOHN WERTZ
JOSE M PUIG
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K D MERZ
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MICHAEL R HARRISON
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N KENNETH CAMPBELL
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ROBERT D SEMMENS
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ROBERT J GRACE
ROBERT J PENSYL
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ROBERT W FRITTS
ROBERT W GREENFIELD
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ROGER BARR
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ROLF BECKERS
RON MIKSIEWICZ
RUDY RENFROW
S CLARK OTTERNESS
S K MITTAL
S TUCKER ROE
S WILLIAM MEEHAN
SAM JASSIN
SCOTT CRERAR
SERGIO MALACON
SERGIO PEZZOTTI
SHEILA RYLES
SHEILA RYLES
SHUJI KAWATA
SILVANO GELLENI
SIMON BASTACKY
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STEVE BARNES
STEVE BOLANOWSKI
STEVE McDONALD
STEVE WICKMAN
STEVEN RAU
STUART W ORR
SYNG L PAIK
T W ANTHONY
TAKAOMI TAKII
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WILLIAM H WESTON, JR
WILLIAM J KENNEDY
WILLIAM M PALLIES
WILLIAM PICCIOLO
WILLIAM T POLLARD
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WILLIAM WALTER
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Z UYTIEPO

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SERGIO PEZZOTTI
R. DAVID PRENGAMAN
EDWARD PUCKETT
ROBERT N. QUENELL
RALPH TIEGEL
KEITH TOLL
ROGER WINSLOW

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ART BALCERZAK
DANIEL J. FETHEROLF
DANIEL LANGDON
DAVIS KNAUER
DICK AMISTADI
EARL E. BUSDIEKER
GLENN PERRINI
GRAHAM G. ANDERSON, JR.
HAROLD J. EBERLY
JAMES R. JESKIE
JAN WINSLOW
JOHN O. WIRTZ
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KEITH TOLL
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LEE COWAN
MALCOLM J. GAVANT
MICHAEL O'MALLEY
MICHAEL SHAW
MIKE TOLE
NAWAZ M. QURESHI
PETER MALONEY
R. DAVID PRENGAMAN
RICK LEIBY
ROBERT D. SWAIN
ROBERT FINN
ROBERT FLICKER
RODNEY SHANE
ROGER WINSLOW
TOM MINNER
WAYNE KRICK

SADLY NO LONGER WITH US

ANDREW C HARDTKE
ANDY DIETRICH
ARTHUR SINGER
ARVIN WELCH
BEN McKINNEY
BERNARD SCHEINBAUM
BILL SZAKACS
BILL YEDLICKA
BIRKE M LUCKENBILL
BYRON A WADDELL
CELWYN HOPKINS
CHARLES E JUSTICE
CHARLES GRAVES
CHARLES R ROGERS
CLYDE D ELIUM
DAVID P BODEN
DeLIGHT E BREIDEGAM
DICK GODBER
DON BRANDT
DON KEMPTER
DON WENSINGER
DONALD C MELNIK
E B CORNETTE
EARL E STOUT
ED TAYLOR
ED TURNER
EDWARD N MROTEK
EGON E NURMET
ELLSWORTH P DAVIS
EMIL KOVACIK
ERNEST GEORGE TIEGEL
FRANK DRAVES
FRANK MORGAN
G E TURNER
GEOFFREY CLEMENTSON
GREG STEVENS
GUY CLUM
HARRY CHANNING
HECTOR VALDEZ AGUILAR
HENRY SCHEINBAUM
HOMER H WOODRUFF, JR
IRA C (BUD) BAERINGER
J GEORGE GANGE, JR
J T LAWRIE
JAMES H ENGLISH
JAMES H KELLETT
JAMES K MASON
JAMES V STUPPIA
JERRY BOYLAN
JIM MILLER
JOHN A BRUZAS
JOHN ANDERSON
JOHN CORCORAN
JOHN EDGAR FARMER
JOHN J SURRETTE
JOHN KOSSOW
JOHN R PIERSON
JOHN RICKOLT
JOHN SEARCY
JOHN W WIRTZ
JOSEPH A ORSINO
JOSEPH GATTO
JOSEPH J NOBLES
JUAN DORIGA
KATHRYN R BULLOCK
K N PIKE
LARRY BENNETTS
LAURENCE FRY
LAWRENCE HAHN
LAWRENCE R BARTLETT
MALCOLM E ROSS
MARK A KNOWLTON
MARK KNOWLTON
MARVIN SCHEINBAUM
MAX CORNBLATT
MICHAEL MAYER
MICHAE WEIGHALL
NED L STAUFFER
NORMAN HOYT
PAUL S GODBER
PAUL STAAB, JR
PAUL STAAB, SR
PAUL-ARMAND GAMMENTHALER
PETE VIVIANO
PETER C ASPINALL
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RICHARD B YOUNG
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WILLIAM RASMUSSEN
WILLIE BEASON
WIN REINEMANN

Battery Council International started in Chicago in the 1920s. And although the organization's name is relatively new, and its host locations have been varied, it has consistently championed the lead acid battery industry.

Changing times

It all started one wet, gray day on January 29, 1924. That day — one of the warmest that month hitting a still unbeaten record 3˚C above zero — a small group of battery manufacturers met in Chicago.

Their objective: to consider whether the organization of a battery manufacturer's association was worth the effort. And if so what would be its initial remit and purpose.

Interestingly enough, nearly a century later, the two topics of discussion that day are still relevant to what was later to become the BCI: how to promote a better understanding among battery manufacturers through an open discussion of their common problems; and, how to educate US consumers on the proper care of their batteries.

A more formal meeting took place two months later and was attended by some 25 manufacturers and battery suppliers — where the manufacturers were called 'active' members and the suppliers 'associates'.

In June the association took its name as the National Battery Manufacturers Association (NBMA).

The association soon started to prove its worth. In the US, battery manufacturing employed some of the most dangerous practices in the world — hand painting lead paste on to plates, for example.

At the turn of the 1920s, for example, lead poisoning was accepted as a risk that went with the job; even though it was reckoned that it was six times more dangerous to work in a US plant than a UK one and 18 times more dangerous working in the US than in Germany.

One of the earliest studies moving to mitigate the risk: *Lead Poisoning in a Storage Battery Plant*, was commissioned by the National Battery Manufacturers Association in 1933 and — unusually at a time when ethnic and racial background was ignored, made a point of showing that the dangerous work in the mixing room of the plant was done by African Americans or migrants (93%) versus the 7% by white Americans. Although the US had lagged behind Europe in industrial hygiene in the 1910s, by the 1930s it had become a global pacesetter in working practices and the NBMA, to its credit, was one of the instruments for such change.

But this is not to say that the early founders or members of the NBMA were saints. US Light and Heat (which helped found the association) as well as the Lead Industries Association were roundly criticized — along with other well known US and UK brands — when they set up operations in Australia where health standards were allowed to be as lax.

In echoes of the present situation in China, the reason for the shift to production in Australia was simple: it was an uncomplicated way to circumvent federal import tariffs on batteries. The difference of course being that BCI members are now on the side of the angels and are helping China's battery industry to adopt international work and safety rules.

In May 1940 the association changed its name to the Association of American Battery Manufacturers reflecting its focus on the continent. Battery industry participation from Europe — then engulfed in war — would have been slight.

To better reflect the post-war environment and increasing global reach of the organization, the association changed its name again to Battery Council International. Four years later it held its first overseas convention in London. Attendance was huge: 32 countries were represented with some 600 delegates.

In 1976, BCI came full circle and returned to relocate its headquarters in Chicago — in the intervening years, the organization had set up operations in Ohio, New Jersey, and California.

At that time the management firm of Smith, Bucklin and Associates was retained to manage the affairs of BCI.

Today BCI membership consists of corporations representing almost 100% of North American leading lead acid battery manufacturers, recyclers, marketers and retailers, suppliers of raw materials and equipment as well as expert industry consultants. ■

BCI'S INFORMATION GOALS

BCI provides a governmental, legislative liaison service for the industry and has established itself as the collective voice of its members and an authoritative source of battery-related information.

BCI maintains an extensive statistical programme. BCI compiles raw data on automotive battery production shipments (original and replacement) at the manufacturer level and inventory level.

This compilation enables members to gauge their performance against those of the industry as a whole. BCI also provides its members with annual distribution reports that allow members to keep abreast of ever-changing channels of distribution.

Since 1990 BCI has been collecting and disseminating a monthly report on US industrial battery and charger sales.

The programme consist of five active reports.

- Motive power battery sales
- Net sales of diesel locomotive starting batteries
- Industrial truck battery charger sales
- Standby power battery sales
- Stationary battery cell report

Members only receive the industrial battery reports in which they participate. In 2001, BCI began reporting North American sales data.

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