

Batteries International

20ABC, Siem Reap, Cambodia September 5-8, 2023



Post Covid: lead batteries power on

Technology to the fore
as new advances listed

Full listing of speakers,
exhibitors, booths

Inside track on main
conference themes

The International Lead
Award: heroes recalled

Bringing the industry together
www.batteriesinternational.com

PLAYING IT BIG WITH SORFIN YOSHIMURA



No Steam Curing Required.

Accelerate TTBS Crystal Growth with Less Time and Energy Use

Improve your product AND your bottom line. Treated SureCure is a fundamentally better way to create TTBS crystals, with more uniformity and more efficiency in, both, time and energy use, compared to steam curing and other methods. Battery manufacturing and performance will benefit from tested and proven enhancements like stronger plates, more-consistent curing, increased cycle life, and improved charge acceptance — all while providing verifiable savings.



INDUSTRY NEWS

Hammond Bolsters Asian Production Capacity With New Treated SureCure® Manufacturing Line

With full-scale operations of its North American Treated SureCure® manufacturing line underway, Hammond Group announced increased production capacity at its Malaysian plant. The facility in Kuala Lumpur is capable of making just over 4.1 million pounds of Treated SureCure® per year. Demand for one of its most effective additives had risen to such a degree that the company doubled capacity by bringing



production online in the US in early 2023. In addition to SureCure® products, Hammond Malaysia produces Advanced Negative Expanders tailored to assist with SLI, Deep-Cycle, PSOC and



Energy Storage needs. The plant is ISO:9001 Certified and allows for quick turnaround on orders to customers throughout Asia. Read more at HammondGlobal.com/news.



INFO@HAMMONDGLOBAL.COM

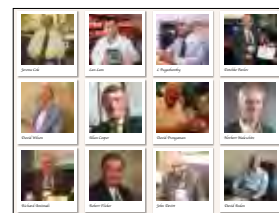
HAMMONDGLOBAL.COM



20TH ASIAN BATTERY Conference and Exhibition



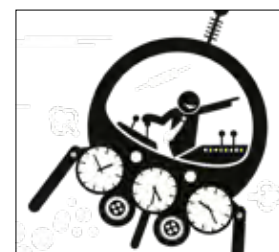
View from the chair: Mark Stevenson talks ABC 8



International Lead Award – a blast from the past 14



Dong Li: Insights from a global and Chinese perspective 29



A short history of the past 20 years of battery progress 40

WELCOME TO 19ABC 1

Chad Schuchmann, president of Daramic, the giant separator firm, will provide a brief overview of the firm's perspective on the rapidly changing lead battery world

EDITORIAL 4

A three-pronged defence of lead

AGENDA 6

Full day-by-day guide. Three days of learning, networking but... fun too

VIEW FROM THE CHAIR 8

An important agenda and much to discuss

Conference organizer Mark Stevenson discusses the build-up of the Asian Battery Conference, from its beginnings in the 1980s until this virtual edition

WHAT TO EXPECT 12

Enter the virtual world of The 19th Asian Battery Conference and Exhibition

INTERNATIONAL LEAD AWARD – HEROES FROM THE PAST 14

Because the International Lead Award ceremony cannot happen this year, we bring you a selection of some of the recent winners and a snapshot of their contributions through the years

- Brian Wilson
- Bob Nelson
- Herbert Giess
- Frank Fleming

ABC PRESENTATIONS 20-35

Into the fray ... Our blow-by-blow look at the presentations that will be the highlights of the week

PRESENTATION FOCUS 24

Lead silicate as a performance additive for lead acid batteries

Marvin Ho, Maureen Sherrick, Jason Trgovich, Gordon Beckley and Thomas Wojcinski, Hammond Group

We look at four of the presentations in depth:

- Neil Hawkes, CRU 30
- Peter Stevenson, GS Yuasa 33
- Farid Ahmed, Wood Mackenzie 34
- Matt Raiford, Consortium for Battery Innovation 35

A SHORT HISTORY OF BATTERY TIME 40

A quick run-through of the main lead battery events of the past 20 years

Publisher

Karen Hampton
karen@batteriesinternational.com
+44 7792 852 337

Editor

Michael Halls
editor@batteriesinternational.com
+44 7977 016 918

Advertising director

Jade Beevor
jade@batteriesinternational.com

Deputy editor

Debbie Mason
debbie@batteriesinternational.com

Contributing editor

Frank Millard

Researcher, journalist

Hillary Christie
hillary@batteriesinternational.com

Finance administrator

Juanita Anderson
juanita@batteriesinternational.com

Subscriptions, enquiries

subscriptions@batteriesinternational.com
admin@batteriesinternational.com

Production/design

Antony Parselle,
aparselledesign@me.com

International advertising representation

advertising@batteriesinternational.com

The contents of this publication are protected by copyright. No unauthorized translation or reproduction is permitted • ISSN 1462-6322

© 2021 Mustard Seed Publishing • UK company no: 5976361

Disclaimer: Although we believe in the accuracy and completeness of the information contained in this magazine, Mustard Seed Publishing makes no warranties or representation about this. Nor should anything contained within it should be construed as constituting an offer to buy or sell securities, or constitute advice in relation to the buying or selling of investments.



In defence of lead

Pollution and climate change has a price tag. And that price — as one of the major themes lurking in the background behind the 20th Asian Battery Conference — comes in various shapes, forms and, most importantly, compromises.

Air pollution in Delhi, India's capital, is, according to a WHO survey of 1,650 world cities the worst in the world. The now almost-annual heat waves in the north of India with the temperature frequently stuck in the 40s is also claiming a dreadful toll on human life.

It's a similar tale in China. In the north, according to a recent study, the poor air quality is shortening the average life of its citizens by five years. Desertification, one fourth of the country is technically a desert, is increasing and the last drought in 2022 cost some \$33 billion in lost agricultural production.

Progress in manufacturing — with China and India already vying to be the world leader — is not cheap from any kind of environmental perspective.

While North America and Europe are already making progress in reducing carbon emissions, though specific targets look likely to slip, Asia as a whole continues to be in a mad dash for growth,

China hopes to be carbon neutral by 2060 and India by 2070.

Meanwhile manufacturing firms across the region — from Pakistan in one direction to Vietnam and Indonesia in another are ramping up their carbon emissions.

For a long time Asia as a whole — and China in particular — paid scant attention to the environment in a mad dash for growth. It made little sense to be ecologically diligent when you are creating industrialized economies from scratch.

It was the price you willingly paid to put yourself on the economic map. In China's case the price for putting environmental concerns on the back burner was to create a middle class of half a billion people in a bare couple of decades.

This new middle class has a political clout totally

different from its agrarian roots. People aspire to the standards, values and health of the west.

So at a certain point the economics of disregarding the environment no longer make sense politically. Or economically too.

Recent studies show that one can take around four percentage points off China's gross domestic product figure as the price the country pays — from the massive strains on health care, to the tens of millions of days of work lost, to providing clean drinking water and much more — for this explosive growth.

All this means is that Asia's energy storage industry is having to face up to tremendous challenges in the way that it does business. Importantly, every indication is that the environment has steadily moved up regional governments' agenda in terms of its importance.

In China's case, the crack-down on battery manufacturers a few years ago, was just the first shot across the bows in an engagement that, in the end, only the government can win. Tighter legislation is being drawn up, a rethink of how resources will be used is resulting in a dramatic shift to renewables.

The country could be self-sufficient in electricity by 2030 just from wind generation, or some studies say.

Likewise one cannot help but admire the way that India has some of the most aggressive and determined renewable targets for PV generation.

The question facing the entire region is a difficult one, especially if you put it in the context, for example, of the 1.6 million Indian citizens who died due to polluted air in 2019, according to Bloomberg.

What price is worth paying for progress?

Within a generation Asia has become the most important battery manufacturing region in the world, the challenge is to maintain that lead as well as maintain the clean-up.

Mike Halls, Editor



Come and
see us at
booth 79



TOGETHER

WE ARE STRONGER



Automation • Oxide Production • Material Handling • Service



Sorfin Yoshimura LTD
100 Crossways Park West,
Suite #215
Woodbury, NY 11797
Tel: + 1.516.802.4600
Email: sorfin@sorfin.com

Eagle Oxide Services Inc.
5605 W 74th Street
Indianapolis, IN 46278
Tel: 317.290.8485
Email: sales@eagleoxide.com
www.eagleoxide.com

Accurate Products
Hvidsvaermelvej 135
DK-2610 Roedovre
Denmark
Tel: +45.4453.4546
Email: accurate@accurate.dk

Welcome to Siem Reap!

The Angkor temple complex is one of the heart-stoppingly exquisite marvels of Asia's rich ancient heritage. Its gateway, Siem Reap, looks set to be a superb location for this year's Asian Battery Conference. **Julia Berg** reports.

Siem Reap was little more than a village when gritty French explorer, Henri Mahout “discovered” nearby Angkor in 1860. It boasted a vast temple area — at 400km² in size it's roughly half that of New York City — consisting of ancient terraces, pools, moated cities, palaces and temples, the most famous of which is Angkor Wat.

In truth Mahout didn't need to be “discovered” (the Khmer people that lived here had never lost it). Yet the publicity following his discovery brought a huge flood of visitors keen to find out more about this huge temple complex. In the ensuing centuries Siem Reap has grown exponentially. It has become Cambodia's second largest city.

The history surrounding the region of Siem Reap and the Angkor complex is tortuous, bloody and barbaric. Terrible events have happened here even up to the closing decades of the last century.

Although most of its early days are lost in the mists of time it is known that temples were built from the 9th century onwards. Around AD1120 King Suryavarman II — later known as Paramavishnuloka — decided to build Angkor Wat.

For the next eight centuries the area was fought over by a succession of complex and largely unpronouncably-named kings and kingdoms with the neighbouring rulers of parts of Siam (Thailand) and until the advent of French colonial expansionism in the 19th century.

In 1863, in a surprising fit of

international goodwill the French declared Cambodia a protectorate and generously annexed Siam by force taking control of Angkor in the process.

In 1896 the British (equally generously) ratified the French colonial right to that part of the region in return for maintaining their burden of ownership of Burma, Malaysia Singapore, Borneo, Ceylon and India.

This situation remained largely unchanged until the Second World War with the Japanese invasion of huge swathes of Indochina.

In the new spirit after the war ended Cambodia was given independence but, turmoil over the region persisted and today's Cambodia was essentially formed in 1993 with the restoration of a titular monarchy and the first free post-war election.

Cambodia now is a modern democratic Asian state where the rule of law is respected. It is one of the safest Asian countries for tourism as shown by the ever-growing number of international visitors. The Angkor Wat temples are Cambodia's most popular tourist attraction. ■

Take notes we'll ask questions later

Tales of palace intrigues from centuries past make Game of Thrones seem like a nursery squabble. The ability to follow the plots' twists and turns requires not just a good memory but an obligatory degree and a much-needed non-dysgraphic skill in lexicology, phonology and orthography.



Take the case of 16th century Siamese king Chairacha who was poisoned by his concubine, Lady Sri Sudachan, while he was away leading a campaign against the Kingdom of Lan Na.

Sudachan wanted Worawongsathirat, a commoner, to oust Chairacha but Sukhothai clan loyalists (to the Suphannaphum Dynasty assassinated the couple and their one-month-old daughter, Worawongsa.

An elephant was involved at this point but let's not overcomplicate things.

So Assicuratisi Thianracha became king, and conspirators Khun Inthorathep, Mün Ratchasaneh and Luang You Yot, led by Prince Khun Phiren Thorathep were amply rewarded.

(We do hope your note-taking has been thorough.)



Things to do ...

An elephant ride and a sunset

For an elephant ride in Siem Reap, go to Phnom Bakheng where elephant rides are available (ask at your hotel reception for details). Phnom Bakheng is a Hindu and Buddhist temple built at the top of the hill at the end of the 9th century. It is also a popular tourist spot for sunset views of the much bigger temple Angkor Wat.

Ride a tuk-tuk

The tuk-tuk is Asia's most popular form of public transport. Typically these serve as mini-taxis and are cheap — you can always ask for the cost of the fare before you get in — and will carry up to three passengers (occasionally many more) and the driver.

In Cambodia, these three-wheelers are sometimes called a "lemorque" (a legacy of the French "remorque" meaning a trailer). They come in two forms: a three-wheeler all in one auto-rickshaw (pictured) and as a motorbike pulling a small roofed carriage.

Visit the Angkor Archaeological Park

All travellers need an admission pass (an 'Angkor Pass') to visit the temples and sites in the Angkor Archaeological Park. Buy them at the main entrance on the road to Angkor Wat. A three-day pass is good to cover all the major temples.

Don't forget to carry a passport sized photo to save time at the booking point.

QUIRKY THINGS

- Good luck could be coming your way courtesy of the chirrups of your gecko. If it chirps seven times something good will happen. Any more than that can signal an imminent marriage.
- Cambodia's flag is the only one in the world with a building on it; behind the red, white and blue there is the outline of Angkor Wat.
- The massive Angkor Wat complex is the world's largest religious structure covering 1,626,000 square metres, or about 400 acres. Angkor Wat is more than double the size of the world's second-largest religious complex, Sri Ranganathaswamy, a Hindu temple in India.
- The construction of Angkor Wat — the main temple in the Angkor complex — took 30 years, 300,000 laborers and 6,000 elephants, according to inscriptions. Five million tons of sandstone were used and the blocks, some of them weighing 1.5 tonnes, had to be moved 50 kilometres from the quarry. Not quite up to Stonehenge's 30 tonnes but impressive all the same.

Dollar supreme

Cambodia's own currency, **the riel**, is rarely used. It has been replaced by the **US dollar**. Restaurants, hotels and shops will give you the bill in dollars. **The riel has many notes of small value, but anything below \$1 must be paid in riels. US coinage is not accepted.**

Fine dining Siem Reap style...

Cambodian cuisine is elegant, occasionally perfumed and rich in spices. Tourist guides like to point out some of the oddities of the national dishes but for reasons of price, the commonest meats are chicken and beef.

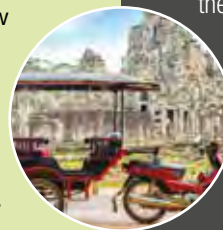
While in Siem Reap, try "**beef on a stick**" and a noodle dish called **nom tra chuk**, which is made of a broth featuring traditional Cambodian kreung (turmeric, garlic, galangal and other spices cooked with fish meats) poured over tender vermicelli noodles and topped with banana blossoms, herbs and chillies.

Another Siem Reap delicacy is a paste called **prahok**. This is made by crushing or grinding fresh fish after de-scaling, gutting and cleaning them. After the fish is crushed, it is left in the sun for a full day, then salted. The prahok is fermented in large clay jars covered with a lid made of woven bamboo strips. Afterwards, the prahok can be eaten just after 20 days of fermentation, but the best quality prahok is left to ferment for up to three years.

Below: 'beef on a stick' and right: 'prahok'

...And not so fine dining à la Cambodie

- Cambodia is one of the few countries in the world **without a McDonald's**. Don't think you're safe from fast-food outlets though — you're never too far away from a Burger King or KFC.
- Yum, yum. Forget your Lays, Pringles or Walkers. If it's crunch you want then **grasshoppers — battered, barbecued or deep fried** — are the ideal snack when you're feeling peckish. High in protein too.
- **Try the 'A-Ping'**. They're a local specialty full of protein and can be had for breakfast, lunch or dinner. If you don't like the warm liquid centre ask for them to be made extra crunchy. A-Ping, just fyi is the local word for tarantula. Connoisseurs say the best are when you bite into the eggs of a pregnant female.



Tourism in the city is concentrated in the center and its famous Pub Street which — guess what — is lined by countless dozens of bars and restaurants. Local draught beers can be as cheap as \$1.

Adding a helping hand



20TH ASIAN BATTERY
Conference and Exhibition



SORFIN
YOSHIMURA

And now for something different for the ABC

The ABC conference committee and Sorfin Yoshimura have once again set up an initiative — the ONE minute giveback — to support a local children’s charity hospital in Siem Reap. The initiative is set to run throughout the entire 20ABC.

After the very successful 18ABC in Bali in 2019, the ONE Minute Giveback will continue in Siem Reap! In partnership with Sorfin Yoshimura Conference Works, the organizer of ABC will be working towards a HUGE CSR effort to raise funds for Angkor Hospital for Children so they can continue to improve the health and lives of those most in need.

In a difficult world post Covid now more than ever our giveback activity has a real chance of helping the lives of those less fortunate than us!

- One in five Cambodians survive on less than US\$2.70 a day. (*Cambodian Ministry of Planning, 2020*)

- A child born in Cambodia is five times more likely to die before their fifth birthday than a child born in a wealthy country. (*World Health Organisation, 2015*)
Cambodia is one of the poorest countries in the Asia and Pacific region and is still emerging from decades of conflict.

This year the ONE Minute Giveback will be supporting Angkor Hospital for Children with all proceeds directly improving the lives and health of local children in Siem Reap and help ensure families living in poverty have access to healthcare for their children via the free medical services the hospital provides.

FIVE GREAT WAYS YOU CAN GIVEBACK

1. JOIN AS A PARTNER

If you are able to make a donation to support Angkor Hospital for Children through the ONE Minute Giveback we would love to hear from you. To deliver our aims of the Giveback we are looking to partner with organisations that will help make a difference in Siem Reap!

Contact:

Mark Richardson, mark@conference-works.com.au, +61 412 160 133

Scott Fink, sfink@sorfin.com, +1 917 773-3675

2. DONATE ONE MINUTE

Donate ONE Minute of your time onsite during 20ABC and drop by the giveback area in the foyer of the main exhibition hall. We will be sorting, packing and stacking goods and items that the hospital has identified as critically needed.

3. DONATE ONE DOLLAR

Delegate’s partners will be out taking onsite donations with the help of our event team. Any cash donation from the value of ONE United States Dollar is greatly appreciated and will be gifted to the Hospital onsite during the event.

4. DONATE ONLINE

Information about Angkor Hospital for Children is available on AHC’s charity page www.angkorhospital.org. Delegates are able to donate to AHC directly via their websites

5. ONSITE

We will be accepting donated items onsite. We will share a ‘Wishlist’ of items our charities have requested. Should you wish to donate larger amounts of items please contact the team to discuss.

to those less fortunate



THE ANGKOR HOSPITAL FOR CHILDREN

Every child — rich or poor — deserves to be healthy.

Angkor Hospital for Children (AHC) is a leading children's healthcare organization based in Siem Reap, Cambodia. We're a teaching centre of excellence inspiring a new generation of health workers. We're working in some of Cambodia's poorest communities to empower caregivers with vital health information. Our community is made up of hospital staff, board members, volunteers, partners and supporters, united under a common mission: improving healthcare for every child in Cambodia.

Why we're here

Over the last 20 years healthcare in Cambodia has improved significantly. However, children still die from preventable causes. Access to quality healthcare within Cambodia is not universal. There is a lack of care available for children with long-term, rare or acute conditions — particularly for those in the poorest and most remote villages.

Last year in numbers

- **97,978** Total treatments were provided from outpatient care to specialty services.
- **1,447** Children received life-saving emergency treatment in our specialist PICU.
- **40** Government health facilities received our support to set up systems to improve patient care, install life-saving equipment and provide training and mentorship to health professionals.
- **2** Doctors completed their three-year sub-specialty training programme to become a paediatric specialty doctor, to address the gap in specialty care in Cambodia.
- **63,919** Virtual and in-person attendances were recorded in AHC's educational sessions for external healthcare professionals, nursing and medical students, and AHC staff.
- **142,446** Attendances were recorded in AHC's prevention and health education activities in villages, schools and communes.



The conference agenda

Tuesday September 5 - Wednesday September 6

Tuesday September 5, 2023

6:00 pm – 8:00 pm **Welcome reception to be held at the Sokha Siem Reap Resort & Convention Centre**

Wednesday September 6

Day 1

9:00 am – 9:10 am. **Conference opening** – Mark Stevenson , 20ABC Conference Chair

9:10 am – 9:35 am. **Mind the Energy Storage Gap – is there Room for ‘Grey’ Battery Metal Lead to Play a Bigger ‘Green’ Role in Global Decarbonisation?** – Neil Hawkes, CRU

9:35 am – 10:00 am **Lead–Acid Batteries in Asia** – Dong Li, Leoch International

10:00 am – 10:25 am **Can lead battery makers be assured of future lead supplies?** – Huw Roberts, CHR Metals

10:25 am – 10:40 am **International Lead Medal Presentation**

10:40 am – 11:00 am **Morning break**

11:00 am – 11:25 am **The EU Battery Regulation-Setting the new Standard for Sustainable Battery Value Chains** – Steve Binks, ILA

11:25 am – 11:50 am **Battery Roadmap for India – R&D, Manufacturing, and Deployment** – Debi Prasad Dash, IESA

11:50 am – 12:15 pm **Polyethylene Separators Must Survive High Temperature Endurance Testing**
– Jörg Deiters, Daramic

12:15 pm – 12:40 pm **A Golden Age for Battery Technologies with Future Opportunities for the Lead acid Battery**
– Alistair Davidson, CBI

12:40 pm – 1:30 pm **Lunch**

1:30 pm – 1:55 pm **Development of New Additives for Valve-Regulated Lead-Acid Batteries** – Francisco Trinidad

1:55 pm – 2:20 pm **Improvement in AGM for the Lead–Acid Battery to Assist China’s Target of Carbon Neutrality by 2060** – Du Xiaoying, Hua Yang Industry

2:20 pm – 2:45 pm **Gelled-electrolyte for Lead–acid Battery Energy Storage Michael Glenn ,David Brown, Battery Energy Power Solutions** – Russell Newnham. Electric Applications Incorporated

2:45 pm – 3:10 pm **An Update on ArcActive Developmeny** – Shane Christie, ArcActive

3:10 pm – 3:30 pm **Afternoon tea**

3:30 pm – 3:55 pm **Research and Optimization of Paste Formulation for Parking Air Conditioner Batteries Used for Heavy Duty Commercial Vehicles** – Pengfei Cui Shandong, Jinkeli Power Sources Technology

3:55 pm – 4:20 pm **Low-Cost, Safe and Sustainable Bipolar Batteries for Energy Storage Systems** – Ed Shaffer, Advanced Battery Concepts

4:20 pm – 4:45 pm **Fiber-based solution for thermally stable separator improving battery safety** – Marcus Ulrich, Raoudha Haddad, Ahlstrom

4:45 pm – 5:10 pm **Battery Water Loss – Counter Measures Outside the Plate** – Ingo Koch, Frötek-Kunststofftechnik

5:10 pm – 5:35 pm **Presentation title to be confirmed** – John Wirtz – Wirtz Manufacturing Company

Agenda correct at time of going to press • For further details go to: www.asianbatteryconference.com/agenda

ASIAN BATTERY CONFERENCE

ONE MINUTE GIVEBACK

A CSR initiative supported by



SORFIN YOSHIMURA



Asian Battery Conference, with Sorfin Yoshimura, is raising funds for Siem Reap's Angkor Hospital for Children.

Angkor Hospital for Children is a flagship hospital pioneering specialty treatments and care rarely available elsewhere in Cambodia, with some of the most sophisticated facilities and clinicians in the country.

Specialty care offered at AHC includes long-term conditions like asthma, diabetes and epilepsy, neonatal and paediatric intensive care and over 30 types of cancer treatments, especially eye and blood cancers.

All proceeds will be used to help ensure families living in poverty have access to healthcare for their children via the free medical services the Hospital provides.



20th Asian Battery Conference & Exhibition

SIEM REAP 2023

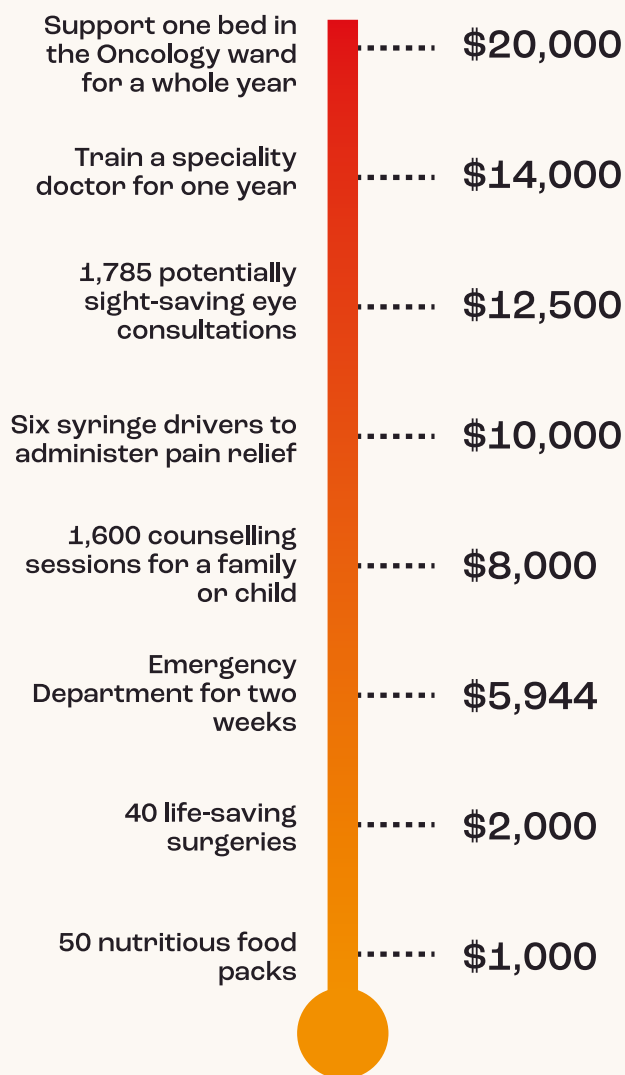
Tuesday 5 — Friday 8 September 2023

Sokha Siem Reap Resort & Convention Center



Angkor Hospital for Children

The impact we can make



Want to get involved? Contact Scott Fink from Sorfin Yoshimura or Mark Richardson from the 20ABC organising team as we would love to hear from You!

asianbatteryconference.com/giveback

The conference agenda

Thursday September 7

Thursday September 7

Day 2

9:00 am – 9:25 am	How Do We as an Industry Seize the Energy Storage System Opportunity? Outlook and Efforts in Lead-Acid Battery ESS – Matthew Raiford, CBI
9:25 am – 9:50 am	A New Manufacturing Approach to Lead-Acid Battery Separators – Richard Pekala, ENTEK International
9:50 am – 10:15 am	Finite Element Simulation of Deformation of Lead-Acid Battery Positive Plates – Jun Furukawa, Attila Palfalvi, Tamas Poloskei Furukawa Battery and related bodies
10:15 am – 10:40 am	LME - Driving Sustainability and Managing Price Risk in Battery Metals – Edric Koh London Metal Exchange
10:40 am – 11:00 am	Morning tea
11:00 am – 11:25 am	Transportation Battery Forecast to 2030, Plus the Top Apps for Advanced Lead-Batteries – Ray Kubis, Gridtential Energy
11:25 am – 11:50 am	Lead-Acid Technology for E-Rickshaw Application – The Way Forward Subhankar – Chakraborty, Exide Industries
11:50 am – 12:15 pm	Dual Chemistry Power System, Michael Glenn, Battery Energy Power Solutions – Vaishnavi Yuvaraj, David Brown, Battery Energy, Australia
12:15 pm – 12:40 pm	Highly Electrochemical Stable Lead Carbon Interface for Enhanced High-rate Cycle Performance of Lead-Carbon Batteries – Shu-Huei Hsieh – Huwei, Yunlin, National Formosa University
12:40 pm – 1:30 pm	Lunch
1:30 pm – 1:55 pm	Automating GEL Circulation Technology for Continuous Processing – KD Merz, Abertax
1:55 pm – 2:20 pm	Thin Tubular Lead-Acid Battery Technology (Flooded & Gel) – Workhorse for Long-Life Residential Energy Storage: Back-up Power with/without Solar in India, Africa. and the Middle East – Amlan Kanti, Das Luminous Power
2:20 pm – 2:45 pm	New Modular Machine Design for Production Lines – Michael Wipperfuert, CMWTEC Technologie
2:45 pm – 3:10 pm	Innovative Separators for Extending Deep-Cycle Lead-Acid Battery Performance – Hi-Sep Endura, Mahadevaswamy Kodimole Mahadevappa, Hollingsworth and Vose
3:10 pm – 3:30 pm	Afternoon tea
3:30 pm – 3:55 pm	Impact of Lead-Acid Battery Cell Imbalance on Pack Performance for e-Rickshaw and Telecom Applications – Sundar Mayava, Central Electrochemical Research Institute
3:55 pm – 4:20 pm	Utilizing High-Energy X-Ray Imaging for Investigating Lead-Acid Battery Electrodes – Chad Stone, Peter Mahon, Rosalie Hocking, Russell Newnham, Electric Application Inc, Anthony Hollenkamp, CSIRO
4:20 pm – 4:45 pm	Electrochemical Evaluation of Pb-Ca-SnSr alloy for Positive Grid of Lead-acid Battery – Ali Alagheband Hosseini, Sarv Sanat Toos (SST Co.), Iran
4:45 pm – 5:10 pm	Existing Situation Analysis of Intelligent Equipment and Intelligent Manufacturing of Storage Battery – Alex Huang, Better Technology Group
6:30 pm – 9:30 pm	Gala Dinner. Whoop, whoop!

Agenda correct at time of going to press • For further details go to: www.asianbatteryconference.com/agenda

VISIT BOOTHS 41 & 42

A SEPARATOR FOR EVERY BATTERY

ENTEK has over 35 years of innovative solutions for today's demanding energy storage needs.

And a growing, global footprint that includes our newly commissioned high-speed PE Silica line in Indonesia and recently announced Lithium-ion separator plants in the United States.

Making ENTEK the most reliable and sustainable partner for every battery need.

US +1 541 259 3901
UK +44 191 268 5054
Singapore +65 6956 6119
India +91 738 883 3999
Japan/China +81 584 24 3733



ENTEK
PE • AGM • LITHIUM

entek.com



The conference agenda

Friday September 8

Friday September 8

Day 3

9:00 am – 9:25 am	New Methods to Extend Service Life of Lead–Acid Batteries in Stationary Energy Storage and Deep Cycle Applications, and Increase their Total Energy Throughput – Boris Shirov, WaveTech
9:25 am – 9:50 am	The First Step to Developing the Next Generation Lead-Acid Battery: Positive Paste Structure – Enqin, Hammond Group
9:50 am – 10:15 am	Assessment of Carbon/Lignosulfonate Interactions on Lead-Battery Performance in the Absence of Cold-Crank Constraints – Carter Abney, Tim McNally Borregaard
10:15 am – 10:40 am	Consortium for Battery Innovation Technical Program – Begüm Bozkaya, CBI
10:40 am – 11:00 am	Morning tea
11:00 am – 11:25 am	Contemporary Applications for MOLECULAR REBAR Products – Paul Everill Black Diamond Structures, USA
11:25 am – 11:50 am	Advanced Red Lead and its Benefit for the Lead–Acid Battery Formation Process – Rainer Bussar PENOX
11:50 am – 12:15 pm	Proposal for the Manufacture of a Lead-acid Auxiliary Battery – Chen Yingming Jiangsu, Xiante Intelligent Equipment
12:15 pm – 12:40 pm	Design Improvements and Manufacturing Processes for Achieving Ultra-Low Internal Resistance in Lead Acid Batteries – Kalyana Sundaram, Mark Stevenson, Eternity Technologies
12:40 pm – 1:05 pm	Innovation of Separation Technology to Meet the Need of Future Lead–Acid Batteries – Ming Zhang, Huakang Eco-materials
1:05 pm – 2:10 pm	Lunch
2:10 pm – 3:00 pm	Panel Session – Aspects of Lead-Acid Battery Technology and Performance – Doug Lambert, Wirtz Manufacturing; Stuart McKenzie, ArcActive; Eckhard Karden, Ford Motor Company' Michael Glenn, Battery Energy Power Solutions, Francisco Trinidad

Agenda correct at time of going to press • For further details go to: www.asianbatteryconference.com/agenda

Visit us at
Booth Number 107



COST SAVINGS



RELIABILITY



QUALITY



ABERTAX[®] BMS 2.0

for motive power and standby applications

Save on maintenance and operation costs.

*Increase reliability and quality of your operation
and extend the lifetime of your battery!*

*No interface cables:
Download data via Bluetooth using
your smart device.*



www.abertax.com



info@abertax.com



+356 23678100



@Abertax



Abertax Technologies

Welcome to the 20th Asian Battery Conference, held for the first time in Cambodia and next to one of the marvels of the Asian world: the temples of Angkor!



Time to reflect on an inflection point in the battery business

The thinking behind the Asian Battery Conference has always been clear: its purpose is has always to be a positive force in the lead battery industry.

We do this in many ways and in many levels. We provide a forum for networking, of letting distant parts of the industry meet and get together. We are a remarkable industry in that at events like these our business rivals can often also be our friends.

And this frequently translates into business opportunities. One of the strange facets of our meetings in the past has been the enormous amount of business that goes on in the sidelines. Literally tens of millions of dollars of deals are concluded over a

beer or a coffee.

But equally importantly it's an opportunity to learn, an opportunity to share our learning and, of course, to provide a venue where the commercial and technical side of the industry meets our counterparts and clients. The result is that we all get to understand a broader and more inclusive picture of the industry.

This is particularly important to me as I've spent over four decades within the industry and in the last few years I feel that parts of it are either burying their heads in the sand or are looking in the wrong direction while real challenges are knocking at our door.

So, yes, we've seen rival chemistries come and go. Most of us can

remember when fuel cells or supercapacitors were going to put our lead world out of business.

But there's a threat ahead with the arrival of lithium batteries on a huge scale to the detriment of lead. In many ways we're reacting to this in the right way — I don't think I've ever seen such a boom of innovation and ideas.

But I do wonder if we're losing sight of a longer term threat to our industry and something that we at this year's meeting should at least discuss formally and informally.

The fact is that a whole generation of experts ranging from titans such as Ken Peters or Detchko Pavlov through to some extraordinary



THE INTERNATIONAL SECONDARY LEAD CONFERENCE (ISLC)

The International Secondary Lead Conference (ISLC), which targets lead producers, technical and environmental experts, equipment producers and suppliers in this part of the lead industry specifically, starts the Monday before the ABC opens. This will be the sixth time the conference has appeared.

The first conference was held in Macau in September 2009, followed by Hyderabad in 2011, Singapore in 2013, Bangkok 2015, Kuala Lumpur in 2017 and Bali in 2019..

This series of conferences has been well attended with the programs receiving much positive feedback from attendees including researchers, academia and end users and operators at plant level.

The aim of this conference is to share and increase knowledge over all segments of this vital industry, producing over 65% of the world's lead supply.

No other metal industry comes close to our mark. We bring together all aspects of secondary lead smelting; discussing plant design, smelting regimes, refractories, burner design, slag formation and structures, pollution and environmental control amongst other presentations.

It is a further aim of the conference to open up for discussion all aspects of plant operations and control as to give not only operators, but people interested in secondary smelting a better understanding of the processes involved in the industry."

This year we will have a special focus on slag — a subject that is increasingly relevant to the recycling industry given that this is still a largely unresearched area, there's still so much to be learnt about it and the fact that there is greater economic cost for its disposal.

brains, think Mike Weighall, Michael Mayer, David Boden and the like, are no longer with us.

Some of these men — Dave Boden, for example, knew what to do when things went wrong. They were as able to talk to machine operators on the plant floor in fixing a problem as they were to explain to management the science behind the fix.

Too often nowadays we're seeing the electrochemist alone. The man in the white laboratory jacket rather than the person equally at home in overalls hunched over a casting machine in a suit and tie.

The main point here is that the well of knowledge is steadily being diluted and a lifetime of experience and

experimentation is also vanishing. Talk to some of today's veterans and it is surprising to find that many of the industry's problems had been investigated, tested and resolved years ago.

A case in point is Ken Peters, who I remained in close contact up until his death a few years back.

Ken followed with keen interest the research of the former ALABC now CBI. His experiments working for Chloride a generation ago suggested to him that the ALABC should spend less time on positive grid corrosion related to weight loss, which he regarded as a waste of time. Instead he considered that positive grid failure/breakup was due to stress

corrosion in grain boundaries or casting defects.

Whether he was right or wrong on this is less important than the fact that Ken, even at the age of 90, was keen to further the industry and mentor the next generation of experts to follow.

My question which we need to think about on the sidelines of our meetings is a simple one — where are our mentors for the future generation and where is the next generation of technical and practical experts coming from?

This year's agenda

And moving on to this year's meetings. I believe we've got the

right mix of presentations this year — there will be a balance between the practical, the theoretical, the commercial and not losing sight of the broader industry-view.

Across the ABC and the International Secondary Lead Conference (ISLC which targets lead producers), technical and environmental experts, equipment producers and suppliers in this part of the lead industry specifically, we're expecting as things stand, over 1,000 delegates and around 170 exhibitors.

Delegates can expect 75 speakers over the five days of the two events. We have also had record numbers of papers come through for both the ABC and the ISLC. Interest in both events has definitely continued to increase.

We have increasingly looked to push out the boundaries of what people can expect. The fact is that Mark Richardson and his team at Conference Works, who bear the brunt of the administration and organization of the events, are continually striving to get it better year-on-year.

One thing I have learnt from Mark



Despite the name of the event and the fact it is always held in Asia, the conference is effectively a world event. It just happens to be in Asia!

Mark Stevenson

and his team is how conferences from other industries are run, for example we had a huge positive feedback about our audio and video system at Kuala Lumpur a couple of years back which was “inspired” from a telephone company function. It really helps improving the delegates' experience — I think it's exactly what an audience as distinguished as ours deserves!

While the ABC will continue to cover a multitude of themes and topics — ensuring there is something for everyone attending the event driven by the speakers — there are certain sectors of the industry which have been gathering momentum globally and increased interest in some of these specific themes may also be driving attendance.

One of these notable themes is the increasing role of additives and separators; the other, and probably the biggest, is large scale energy storage. This is now a huge topic globally and a growing sector with investment pouring into many aspects of it.

I know that a lot of conferences like to pick an overarching theme and



One of the strange facets of our meetings in the past has been the enormous amount of business that goes on in the sidelines. Literally tens of millions of dollars of deals are concluded over a beer or a coffee.



ASSEMBLY LINE

The line is available to process all common (flooded and AGM) SLI sizes in the 6x1 cell layout at a speed of up to 5 batteries a minute. A fully automatic supply requires only one supervisor.



Precise

Critical motions in the line are done by servomotors to ensure the highest accuracy, reliable operation as well as quick and fast changeover. The standard supply is provided with 23 servo motors.



| User Friendly

Each station of the machine is provided with jigs for easy and quick changeover. Poka-yoke design features enhance the reliability of the operation. The line is CE compliant.



| Flexible

The line can be configured at varying layout and utility requirements. BATEK battery palletizing solutions and data collection & monitoring system can be integrated into the supply.



Optimised processing features

The line is incorporated with several systems for enhancing the reliability of the processing.



Efficient support services

The line is supplied with the well appreciated BATEK after-sales support.



We have increasingly looked to push out the boundaries of what people can expect. The fact is that Mark Richardson and his team at Conference Works are continually striving to get it better year-on-year.

revolve things around that. I prefer to ensure we cover many topics and allow speakers and delegates to dictate what is happening in the industry. We prefer to mix things up and make a little more eclectic.

But it is also true that sectors such as energy storage are very topical right now and to a certain extent a rising tide lifts all boats in all chemistries. I see the energy storage phenomenon as very significant and similar in some ways to the e-bike phenomenon in China. But this is certainly not an Asian thing — it is a global sea-change.

While energy storage is being encouraged and backed by governments across the world, thereby kick-starting energy storage projects in many forms, its momentum will transcend that — and is relevant to every country on the planet.

Last, despite the name of the event and the fact it is always held in Asia, the conference is effectively a world event. It just happens to be in Asia!

Most of the presentations and issues are global in their nature. Any of the trends you see on the global stage are reflected in what is happening in Asia and people continue to see great potential in this part of the world.

To some extent we are seeing more companies from outside the region attend this event as they see it as a good way to network with Asian executives and better understand the dynamics in this part of the world. ■

FROM 1ABC TO NOW

The Asian Battery Conference has always been a maverick affair. As the earliest major conference that focused solely on lead batteries in the region it was the forefather, if by 18 months, of its European equivalent, the ELBC.

The origins of the ABC started in 1986 through an organization called ZALAS, the Zinc and Lead Asian Services which was based in Singapore. It was sponsored by the major primary zinc and lead smelting companies of Australia and Pacific Rim countries.

ZALAS's main objective was to promote the use of zinc and lead through technically supporting customers and educating them around the use of the elements. They even started a zinc galvanising conference which today is still running, the Pacific Galvanizers Conference.

Since those early days we've grown enormously.

When I took over as chairman 24 years ago, it was a very scientific/technical conference. It was a lot smaller and very much a cosy family affair, in fact at the closing event Colin Woodcock from Britannia used to bring a guitar and it would turn into a sing-a-long of the national anthems of the represented countries.

Since those early days the battery business in Asia has changed enormously — nowadays around two-thirds of the world's lead batteries are made in the Asian region.

At the time of the first ABC in 1986, the world lead consumption was

5.5 million tonnes with 65% of that entering the battery market, today we consume over 13 million tonnes with 85% being converted into batteries.

The range and types of batteries we now produce have also changed during this period and, of course, the way we make the battery.

It's a far cry from that first conference when the market was dominated by the use of antimonial alloys and when many Asian producers were only starting to think about converting the negative into a calcium alloy and producing their first hybrid battery.

We have kept many of the early aspects to those conferences in place — we still strive to keep it a family affair, even though the family is much, much larger and spreads across the world.

It's important too that we keep that technical thread running through the majority of the presentations but balanced with an understanding of the future of the market, environmental aspects and of course ways to help the industry such as product breakthroughs.

But it is also about the industry just getting together, making new friends and networking. There is a whole range of things that we offer around the exhibition that are useful in this respect.

It is about offering people a whole package. Our aim is to provide the lead battery community of not only Asia, but worldwide with a forum that is truly useful to attendees.



Stevenson: Speaking at 17ABC in Malaysia.

Sectors such as energy storage are very topical right now and to a certain extent a rising tide lifts all boats in all chemistries. I see the energy storage phenomenon as very significant and similar in some ways to the e-bike phenomenon in China. But this is certainly not an Asian thing — it is a global sea-change



ATOMIZED PRODUCTS GROUP, INC.

EXPANDING THE POSSIBILITIES

TEXEX® NEGATIVE EXPANDER



Your Trusted Partner

APG produces our TEXEX® Negative Expander in our Texas and Virginia locations using the best raw material components from around the world. We export our products to over 20 countries where they are used by many of the largest battery manufacturers.

We offer a comprehensive line of expander formulations designed for a variety of battery applications. After 25+ years of business, we are still proudly family owned and operated!



QUALITY



SERVICE



VALUE



atomizedproductsgroup.com
info@atomizedproductsgroup.com



The Asia Battery Conference has come a long way since its inception. As the first full lead battery conference it had to invent itself from scratch. But its special flavour — mixing the community aspect of the industry with a firm grounding of hard-hitting presentations — remains.

The way we were ...

Looking back at the presentations and delegates for the first ABC gives a surprising viewpoint on how the industry has changed since 1986.

Perhaps the most striking is the almost complete lack of involvement with, or by, China.

Although the first attempts at market socialism had already started by China's leader Deng Xiaoping in the early 1980s, the country was a long, long way from becoming the industrial giant of the future.

In the regional presentations — India, Indonesia, Japan, the Philippines and Taiwan were featured — the lack of China to today's viewer looks astonishing.

And out of the 137 delegates just two were from China.

Meanwhile non-China — Taiwan and Hong Kong (1ABC was held 11 years before Hong Kong became part of the People's Republic) accounted for 19 delegates. It's strange to think that today's battery giants from China were not even gleams in their founders' eyes.

Equally interesting in another direction was how prescient some of the thinking was behind the presentations.

Some 30 years before today's excitement about linking renewables from sources such as solar panels to modern electricity grids was being debated — Kaiichi Shimizu from Furukuwa Battery was presenting on *Lead Acid Batteries for Photovoltaic Systems* and Rainer Kiessling from Hagen Batterie was talking about *Lead Acid Batteries for Load Levelling Applications*.

And, of course there's so many companies that are now little more than names from the past.

Hagen Batterie being a case in point. Two years after Kiessling gave his presentation, the family firm had become part of Spanish battery firm, Tudor — which again slipped into Exide Technologies' embrace in 1995.

But there are also a few familiar



Founding members of ABC hard at work planning the technical programme. From left to right: John Manders, Jerry McAuliffe, David Rand

companies and brands among the delegates — Bitrode, Digatron, Sonnenschein, Wirtz, Yuasa as well as the fading network of the once mighty Chloride.

And, although the firms had yet to merge Paul Fink from Sorfin was at the conference as was his eventual partner Takahiro Yoshimura, from Yoshimura Products, (now the firms are best known as SF, Sorfin Yoshimura).

And some things haven't changed either — and that's for the good. All the 1ABC papers were vetted and edited by David Rand, then principal research scientist at Australia's CSIRO.

Looking beyond the papers was the social life surrounding the ABC which soon developed into a regular theme of the conference.



“One of the enduring qualities of the ABC is that there's still a family spirit to the event,” says one battery veteran who has been to virtually every meeting from ABC's inception. “It's one of the things that came out in the early meetings — and that's despite the fact that the event has grown in size enormously.”

“One of the traditions in the early conferences after the closing gala dinner was a sing-song where delegates of each country would stand up and sing a national song. “It was hilarious as well as being warm-spirited,” he says, “You'd've been amazed at the songs we sang , the barracking, the cheering and fun.” ■

House advert

Hammond Bolsters Asian Production Capacity with New Treated SureCure[®] Manufacturing Line



The building blocks of improved battery performance are contained in the modified tetrabasic lead sulfate seed crystals, Hammond Group's next-level generation of positive paste additives, Treated SureCure[®].

With the recent launch of full-scale operations at Hammond Group's new state-of-the-art Treated SureCure[®] manufacturing line in North America, the company announced increased production capacity for its Malaysian plant as well. The facility in Kuala Lumpur is capable of making just over 4.1 million pounds of Treated SureCure[®] or 1900 metric tons per year for the Asian Pacific markets.

Demand for Treated SureCure, one of Hammond's most effective additives, had increased to such a degree that Hammond invested in doubling its production capacity to meet the needs of battery manufacturers worldwide.

Hammond holds a patent on the SureCure manufacturing process and has produced a variety of these additives for years. The new Treated SureCure is rapidly being adopted by major battery manufacturers. This next-level positive additive facilitates the controlled growth of uniform tetrabasic lead sulfate crystals and has gained manufacturing integration by Hammond customers since its introduction.

What Are the Advantages of Treated SureCure?

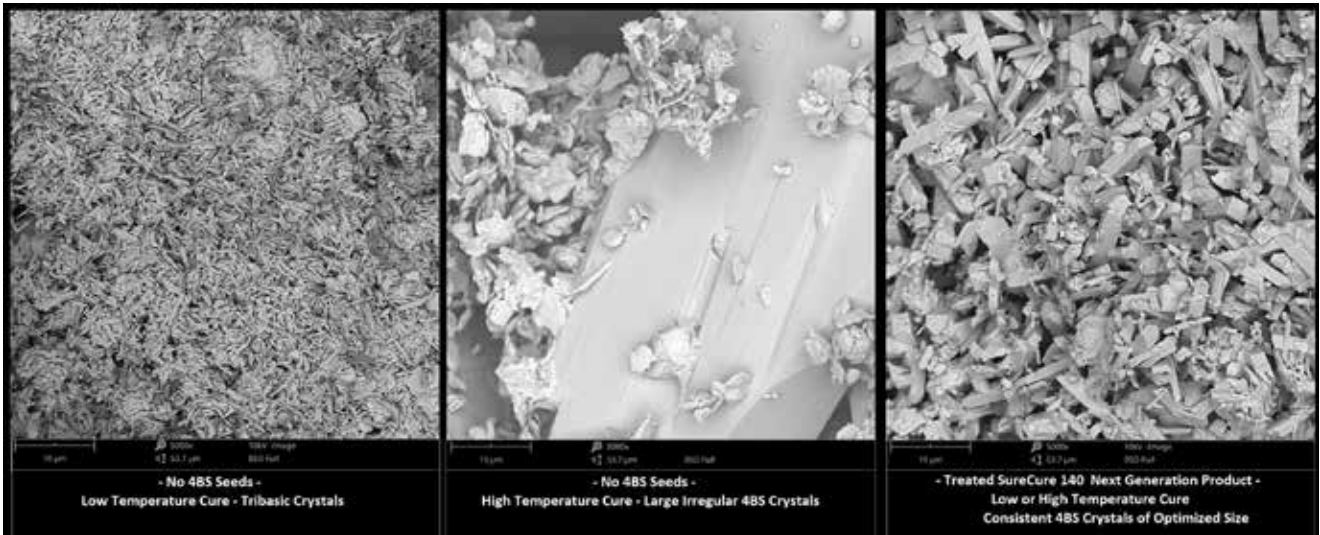
Treated SureCure allows for greater crystal growth control and consistency in the manufacture of 4BS morphology in the battery active material. Also, the additive provides better energy efficiency during the curing process since 4BS can be created at lower temperatures WITHOUT any use of steam.

No Steam Curing Required

Steam curing requires increased energy to maintain the high temperatures needed to grow the 4BS. "You put in a great deal of resources, in terms of energy and equipment, and end up with an inconsistent product," said

Tom Wojcinski, Hammond's Senior Research and Development Chemist. "One of Treated SureCure's benefits for battery manufacturers is taking the guesswork out of crystal growth. It eliminates the activation energy needed for 4BS formation and allows for a consistent optimized final product in terms of conversion to 4BS and in controlling the final particle size of the crystals achieved in curing.

"To put it simply, Treated SureCure is to the battery what steel reinforcement is to concrete. It provides an extra layer of durability to your material and even allows you to use less since what you have is stronger." More specifically Wojcinski says "Treated SureCure is a micro-milled



SEM images at 5000X comparing the crystal structures of cured positive material showing the differences between Tribasic curing, Tetrabasic curing without seeds and Tetrabasic curing with Treated SureCure®.

seed crystal that facilitates, controls, and improves the growth of tetrabasic lead sulfate, often called 4BS, which strengthens the positive active material allowing for extended cycle life and cost savings due to the ability to reduce the density of lead in your paste formulations.”

Enhance Battery Performance

Battery performance is also enhanced with the use of Treated SureCure. “Customers using Treated SureCure have noted increased charging efficiency, allowing the batteries to perform better with less overcharge,” says Wojcinski. “All these improvements translate to better battery performance in cycling, in some cases up to 70% improvement in cycle life, over 3BS and older SureCure additives.”

Ng Ming Yeow, General Manager at Hammond ALSB-Malaysia, elaborates: “The smaller, more consistent crystal structure formed in the cured positive material using Treated SureCure will then provide benefits to production in terms of shorter formation times and greater formation efficiency over steam cured plates. Also, the more durable active material will enhance battery performance by extending cycle life compared to traditional tribasic cured material.”

Reduce Costs

The additional durability provided by Treated SureCure means some manufacturers can even save money by using less material to achieve the same performance. Treated SureCure can improve the cohesion/adhesion of

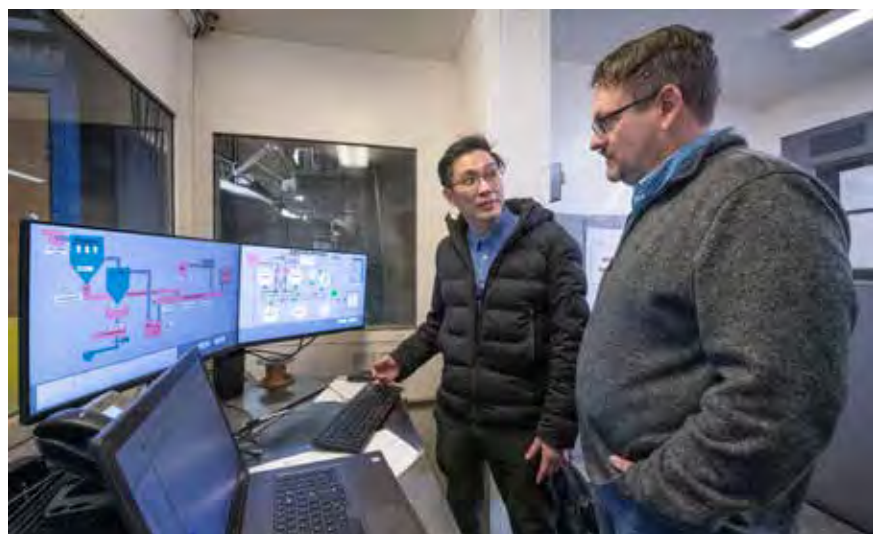
the active material and grid components of the positive plates.

“Some of our customers have been able to reduce costs by lowering their paste densities to use less lead — up to 5%,” said Ming Yeow. “That can be a large cost savings with no loss of battery performance using the additive. Not to mention that our new Treated SureCure also helps form batteries quicker and more efficiently than traditional 4BS curing methods and even our older line of standard SureCure. Customers who have adopted Treated SureCure have seen increased post formation voltages and higher initial capacities as well as greater PbO2 content and higher surface area in their formed positive plates using our additive.”

Uniform Tetrabasic Crystal Size

Treated SureCure has improved in other ways over past methods of creating 4BS seed additives. Treated SureCure undergoes a final finishing step during production that modifies the additive to provide better crystal size control during curing. Since the improvements in formation efficiency are all linked to controlling the final crystal size of 4BS in the cured material, it is important to note that increasing or decreasing the loading can affect this final crystal size. More seed sites through higher loading means smaller final crystal sizes, and lower loading equates to less seed sites and a larger final crystal size.

“If the crystals are too big, you lose the benefits in formation



Ng Ming Yeow, General Manager of Hammond Group's Malaysia production facility, provides his expertise on Treated SureCure® manufacturing during a visit to observe the operation of the new production line in the United States.



Hammond Group's Treated SureCure® production line in Kuala Lumpur, Malaysia is capable of producing 1900 metric tons of product per year. Their recently completed Treated SureCure® line in Hammond, Indiana USA doubled production capacity.

efficiency, and if your 4BS is too small, you will not improve your cycling performance," said Wojcinski. "With the improvements in crystal size control offered by the finishing treatment of the new Treated SureCure and Hammond's experience in optimizing the loading rates of the additive to achieve the best balance of efficiency versus durability, our recommended loading is at 1% of the weight of the lead oxide used in a customer's formula to gain the benefits."

Global and Regional Distribution

"Treated SureCure is a fully commercialized product from Hammond. We have a production line capable of making just over 4.1 million pounds or 1900 metric tons per year at our Malaysian facility in Kuala Lumpur," said Ming Yeow. "Typical shipping times to customers in Asia are about one week from time of pick up to receipt at local ports."

Hammond is a global manufacturer of battery expanders, specialty chemicals, red lead, oxides and additives backed with full product technical support. With over 90 years experience in service to automotive, industrial, telecommunications, data center, and renewable energy storage battery manufacturers, Hammond has developed a range of other breakthrough products, like Gravity Guard™, an additive designed to reduce acid stratification.

Hammond Malaysia offers all of the products and solutions found at their parent location in the USA to customers in Asia. "In addition to Treated

SureCure™ products, we produce our full line of Advanced Negative Expanders tailored to assist with SLI, Deep-Cycle, PSoC and Energy Storage needs," said Ming Yeow. "We have tested and developed new ingredients and formulations aimed at better high temperature performance for batteries in extreme climate locations, like India and southern China. We also have the ability to produce lead oxides such as red lead and orthorhombic PbO in Malaysia."

Hammond's facilities in Asia, the USA, and the UK are ISO:9001 certified for quality. "Our US location is IATF certified to help conform to the more strict requirements needed for our automotive industry customers," said Wojcinski. "We provide full traceability on all our products including Treated SureCure at all our production locations."

Advanced Customer Support

Beyond in-house research and product development, Hammond's state-of-the-art research and development lab offers technical support to customers. "Hammond is very customer-focused in our approach to technical support," said Wojcinski. "We engage with customers directly and leverage our experience to provide the best options for them. Or we can even partner more closely through our Technical Assistance Programs to help them address specific needs or goals. We like our customers to think of us as an extension of their own research efforts." Hammond is involved in large-scale battery research consortiums like the

CBI and BCI to stay informed of the needs and concerns of the industry to help drive product development and recommendations.

In 2022 Hammond advanced its customer commitment even further by forming the Innovation Leadership Council to provide operational solutions for its global customers. Council members include John Miller, recently Senior Director of Engineering for Stryten; Dr. Francisco Trinidad, recently the Director of Battery Technology for Exide Europe; Rosalind Batson, President of Clear Science Inc.; and Lash Mapa, Professor of Industrial Engineering and Technology Purdue NW.

"This group represents some of the best minds in the battery industry drawing on decades of experience in materials research, advanced technology, chemical and industrial engineering, manufacturing, logistics, and more," said Gordon Beckley, Chief Operating Officer at Hammond. "Through their extensive battery industry knowledge base, our innovation group is proving invaluable by enhancing our solutions-based customer approach with timely resolutions of operational issues, and contributing to Hammond's continued efforts towards the industry's goals of advanced energy storage solutions." ■

Readers who would like more information about Hammond Group Inc. product offerings or to schedule a call with the Hammond Technical or Customer Service Team, may visit www.hammondglobal.com

Irrespective of the uncertainties of the modern world, the lead battery industry must stay true to its core values, writes Andy Bush, managing director of the International Lead Association.

Being part of the solution in an unstable world

As we gather in Asia there are common themes that in one way or another impact the worldwide lead and lead battery industries.

Global instability is inevitably something that impacts businesses from East to West. Whether it is war in Europe — with no obvious end to the conflict between Ukraine and Russia — or concerns about China's domination of natural resources and tensions over Taiwan. Events dictate and influence markets.

When you add to these pressures economic instability and supply chain insecurity, alongside aggressively ambitious incentives such as the Inflation Reduction Act in the US, it amounts to a significant backdrop of uncertainty. And that's before we start discussing existential threats such as climate change.

Experienced legislators are fond of saying that everything is local. But for business, everything is global, because what happens in India amid a vast and growing economy, impacts on Europe and vice versa. And major decisions made in Washington inevitably affect us all.

In Europe in particular we can add to this complex array of issues a raft of legislative pressures from regulators. Efforts by EU policymakers seeking to create a toxic free environment by reducing or removing hazardous materials, present very real obstacles to battery manufacturers.

At the same time Europe seeks to create an economic advantage by becoming the first 'truly green' manufacturing battery value chain.

To remain competitive businesses not only need to navigate regional issues.



It has never been more important to demonstrate our value, both economic and social — our industry offers the three Rs, that's reliability, recyclability and relevance

Success depends on an ability to adapt to a dizzying array of global pressures and barriers.

For the lead battery value chain, future success also depends on continuous innovation as demand for long-lasting, safe and high-performance batteries continues to grow exponentially.

Our industry must demonstrate how it is contributing to a low carbon future while also generating solutions that help policymakers achieve the transition.

Above all we must continue to set the standard in our commitment to responsible manufacturing and recycling — helping those countries with poor records improve performance, as well as supporting

efforts to eradicate substandard and often dangerous practices.

While our industries' benefits and ability to make a difference may be familiar to us — it is clear we need to share these messages more widely, raising awareness and understanding. From being one of the world's most recycled products to making advanced batteries for renewables energy storage, our industry — the entire value chain — has a major and important role to play.

And we need to make sure decision makers know that.

We all have a significant role to play, to demonstrate that we are part of the solution, making products that are critical to so many other applications and services.

It has never been more important to demonstrate our value, both economic and social. Our industry offers the three Rs – reliability, recyclability and relevance. Our products are also safe, innovative, and cost-effective. It's the assurance you need in an unstable world. ■

We must continue to set the standard in our commitment to responsible manufacturing and recycling — helping those countries with poor records improve performance, as well as supporting efforts to eradicate substandard and dangerous practices.

20ABC Presentations

It's only when you start reading some of the introductory abstracts for the presentations does one realise the breadth and depth of knowledge, experience and raw commerciality that the speakers will be presenting over the coming days. Full details of the abstracts can be found on www.asianbatteryconference.com but here is a synopsis of what lies ahead.

Wednesday September 6

9:10 am-9:35 am

Mind the Energy Storage Gap — is There Room for Grey Battery Metal Lead to Play a Bigger Green Role in Global Decarbonization?

Neil Hawkes — Principal Analyst, CRU

Metals are an essential enabler of a sustainable future, and as global demand for metals increases, so will the expectations on sustainable standards. I will (i) share LME's sustainability strategy; (ii) how CRU aim to provide the metals industry with the option of gaining greater transparency of, and access to, sustainably produced metal; (iii) as well as to metal that itself plays a significant role in global decarbonization and the circular economy — such as EV materials and scrap metals.

Metals are an essential enabler of a sustainable future, and as global demand for metals increases, so will the expectations on sustainable standards.

9:35 am-10.00 am

Lead Acid Batteries in Asia

Li Dong — Founder, Leoch International Technology Co., Ltd, Singapore

This presentation describes the status of the Asia market. This includes North Asia, China, ASEAN, South Asia and Australia as the key manufacturers and customers. The future trend, opportunities and challenges facing the lead acid battery is considered via analysis of three aspects, namely: network power battery, SLI battery, and motive power battery.

10.00 am-10.25 am

Can lead battery makers be assured of future lead supplies?

Huw Roberts — Director, CHR Metals Limited, UK

Since 2000 CHR Metals estimates that the use of lead in batteries has increased an estimated 6.9 million tonnes, at an average annual growth rate of 4.3%. Use in SLI batteries has grown by 3.1 million tonnes, increasing by 3.0% per annum but industrial batteries have witnessed a

larger increase, 3.8 million tonnes, at a growth rate of 6.9% per annum.

This presentation will set out some scenarios for the potential growth in lead supply through primary and secondary production circuits to demonstrate that, in the event lead batteries play an expanded role in our electrified future, there should be little concern about any likely constraints due to a shortage of lead raw materials, unlike a number of other battery chemistries.

10.25 am-10.40 am

International Lead Medal Presentation

11.00 am-11.25 am

The EU Battery Regulation-Setting the new Standard for Sustainable Battery Value Chains

Steve Binks — Director Regulatory Affairs, International Lead Association, UK

The proposed new EU Battery Regulation is the first holistic piece of legislation covering the entire life-cycle of a product that was prepared under the Green Deal program of the Commission of von der Leyen. It



Neil Hawkes
— CRU



Li Dong — Leoch
International Technology



Huw Roberts
— CHR Metals Limited



Steve Binks — International
Lead Association

DROSS ENGINEERING

Celebrating 50 Years of Engineering Excellence



**battery recycling equipment respects nature
benefits the economy.**



Breaker



Charge machine



Dust Filter

Competitively priced.

**Advanced ULAB breaking &
separation system
with desulfurization**



Tilting Rotary Furnace

**We also fabricate machine
to cast and stack the ingots**

We are looking for a sales agent for South America and Sub-Saharan Africa
Please send your applications to: info@dross-engineering.com



www.dross-engineering.com



will have a significant impact on the sourcing of raw materials, battery design, manufacturing, product information and stewardship, and end-of-life management. It is the intention of the Battery Regulation to guarantee that Europe's decarbonization efforts will in future be supported by sustainable batteries.

This presentation examines the key measures foreseen by the regulation.

A compulsory carbon footprint declaration and label for electric

11.25 am-11.50 am

Battery Roadmap for India — R&D, Manufacturing, and Deployment

Debi Prasad Dash — Executive Director, India Energy Storage Alliance (IESA), India

Domestic battery manufacturing in India is gearing up significantly to cater to the domestic and global demand for Advanced Chemistry Cells batteries. IESA estimates that around 140 GWh and 550 GWh of ACC manufacturing capacity is expected by 2030 and 2035. To support the manufacturing capacity, a cumulative requirement of 175 KT, 650 KT, and 2520 KT for battery materials has been estimated by 2025, 2030, and 2035. Materials like battery-grade copper, aluminum, manganese, graphite, iron, nickel, cobalt, lithium, vanadium, sodium, zinc have a huge demand in the emerging battery industry.

Domestic battery manufacturing in India is gearing up significantly

11.50 am-12.15 pm

Polyethylene Separators Must Survive High Temperature Endurance (HTE) Testing

Jörg Deiters — Director of application & customer engineering in the Americas and EMEA, Daramic, Germany

As the environment shifts to higher temperatures, batteries must survive a hotter situation. Battery tests conducted at 75°C will be added as new standards, one of which is the High Temperature Endurance (HTE) test. This laboratory test reflects real world failure modes of batteries in actual applications. Daramic has conducted two rounds of HTE testing, with special attention on the battery failure mode and the PE separator condition during and after 75°C battery testing.

This presentation will discuss potential battery failure modes arising from HTE testing. Furthermore, evaluation of PE separators after battery testing will be the basis to discuss the definition of PE separator oxidation resistance and its importance in the future.

12.15 pm-12.40 pm

A Golden Age for Battery Technologies with Future Opportunities for the Lead acid Battery

Alistair Davidson — Director, Consortium for Battery Innovation, USA

This presentation will discuss the work that the Consortium for Battery Innovation is undertaking to ensure the lead acid battery can meet ever increasing end-user requirements

through advanced research and innovation. New research results will be reported and explained how they are linked to significant performance enhancements.

1.30 pm-1.55 pm

Presentation title to be confirmed

1.55 pm-2.20 pm

Development of New Additives for Valve-Regulated Lead-Acid Batteries (VRLAB)

Francisco Trinidad — Independent Advisor, Exide (formerly), Spain

VRLAB have an increased demand for new automotive and industrial applications. Automotive requirements are changing due to progressive vehicle electrification (higher charge-discharge power); therefore, energy storage requires longer cycle-life under partial state-of-charge (PSoC) conditions. However, the additives used for the most advanced VRLA designs are remarkably similar to the already established materials for flooded batteries.

Positive Active Mass (PAM) additives have not been extraordinarily successful due to the highly oxidative conditions, particularly during the formation process. Carbon materials are not stable, but graphite increases porosity and PAM utilization, thereby being relatively stable during the cycle-life. Silica compounds have also been assessed as porosity enhancers. Nevertheless, PAM failure modes (softening and shedding) require



Debi Prasad Dash — India Energy Storage Alliance (IESA)



Jörg Deiters — Daramic,



Alistair Davidson — Consortium for Battery Innovation



Francisco Trinidad — Independent Advisor, Exide (formerly)

Give-Back Sponsor



**Visit Us
at Booth
#40**

**SORFIN
YOSHIMURA**

**WE'VE GOT
YOU COVERED**

www.sorfinyoshimura.com



USA: sorfin@sorfin-yoshimura.us



JAPAN: tokyo@sorfin-yoshimura.jp



CHINA: qingdao@sorfin-yoshimura.cn



FRANCE: paris@sorfin-yoshimura.fr



BRAZIL: vendas@sorfin.com.br



MEXICO: dbortoni@sorfin-yoshimura.us



THAILAND: jiroyoshimura@sorfin-yoshimura.jp



INDIA: sales@sorfin-yoshimura.in



SY Innovations: agurevich@sy-innovations.com

that expansion should be restricted by high pressure cell designs (spiral wound and/or reinforced boxes).

Negative Active Mass (NAM) formulations are based on the experience acquired with automotive batteries under overcharge conditions. New expanders have been developed with flooded cells assessed under PSoC conditions, where high-water losses are not so critical for battery life. These expanders may not be adequate for VRLAB because oxygen recombination reduces overpotential and thereby oxidize carbon and organic materials.

VRLAB performance is limited by the available amount of electrolyte amount. Rechargeability and deep-cycle life can be enhanced by PAM, but also influenced, by NAM additives. Carbon is limited by two counteracting effects: electrochemically active surface-area and water loss. Composite NAM lead-carbon additives reduce hydrogen evolution and, in combination with PAM porosity enhancers, may improve performance and cycle-life of high-pressure VRLAB designs.

2.20 pm-2.45 pm

Improvement in AGM for the Lead acid Battery to Assist China’s Target of Carbon Neutrality by 2060

Du Xiaoying — General Manager, Hua Yang Industry, China

This presentation will be in three parts: (i) analyze the impact of the two-carbon strategy on China’s lead acid battery industry, forecast the market segment development, and the demand for new products; (ii) point

out what solutions should be made in raw materials, manufacturing and AGM; (iii) research and development to improve AGM.

This presentation will emphasize changes in the Chinese lead-acid battery, and the new future of industry development under the background of carbon neutrality.

2.45 pm-3.10 pm

Presentation title to be confirmed — Don Karner

3.30 pm-3.55 pm

Research and Optimization of Paste Formulation for Parking Air Conditioner Batteries Used for Heavy Duty Commercial Vehicles

Pengfei Cui — Senior Engineer & Project Manager, Shandong Jinkeli Power Sources Technology Co., Ltd, China

Our research with additive materials designed respectively for positive and negative paste has improved battery charge acceptance at low voltage charging. Consequently, cycle-life can be significantly improved. Further work will be undertaken on these batteries for specific applications such short- or long-distance commercial vehicles.

Our research with additive materials designed respectively for positive and negative paste has improved battery charge acceptance at low voltage charging

3.55 pm-4.20 pm

Low-Cost, Safe and Sustainable Bipolar Batteries for Energy Storage Systems

Ed Shaffer — CEO & Founder, Advanced Battery Concepts, LLC, USA (video link)

This presentation will show how bipolar designs — specifically, the Advanced Battery Concepts second generation EverGreenSeal bipolar technology — enable lead chemistry to compete in the energy storage market. It will also be explained how present scale manufacturing and recent performance enables a direct cost comparison of bipolar energy storage systems to lithium counterparts.

4.20 pm-4.45 pm

Fiber-based solution for thermally stable separator improving battery safety

Marcus Ulrich — Head of Business Development, Energy Storage, Ahlstrom

Ahlstrom has developed FortiCell LIB separators, a thermally stable product, which inherently improves the cell safety. The reason is that the separator neither does melt nor shrink when exposed to high temperature or internal shorts. No thermal runaway or undesired chain reactions will occur. The cell provides thus a much higher safety. The stability of the separator is a result of choice of the fibers used for the microporous structure. The pore size and distribution will remain unchanged during the entire operation range of the battery.



Du Xiaoying — Hua Yang Industry



Pengfei Cui — Shandong Jinkeli Power Sources Technology



Ed Shaffer — Advanced Battery Concepts



Marcus Ulrich — Ahlstrom

House advert

Thursday September 7

9:00 am-9:25 am

How Do We as an Industry Seize the Energy Storage System (ESS) Opportunity? Consortium for Battery Innovation (CBI): Outlook and Efforts in Lead-Acid Battery ESS

Matthew Raiford — Senior Technical Manager, Consortium for Battery Innovation, United States

This presentation will discuss the research in battery management and battery materials for ESS, and the design characteristics and considerations for lead acid batteries in fully fledged ESS solutions.

First, a discussion of alternative battery management sequences and considerations will be covered by exploring results from two CBI projects, one in state-of-the-art overcharging improvements from Electric Applications Incorporated (EAI) in Arizona and the other in an exploration of lead acid battery ESS performance in the laboratory and field conducted by Narada Power Source.

This presentation will discuss the research in battery management and battery materials for ESS, and the design characteristics and considerations for lead acid batteries in fully fledged ESS solutions.

9:25 am-9:50 am

A New Manufacturing Approach to Lead-Acid Battery Separators

Richard Pekala — Chief Technology Officer, ENTEK International LLC, US

Lead acid battery separators have traditionally been manufactured from the extrusion, calendering, and extraction of ultrahigh molecular weight polyethylene /silica/ oil mixtures to form microporous ribbed sheets that are processed into ‘envelopes.

As environmental regulations and emission standards become more stringent, there is a need to investigate alternative approaches.

Separator manufacturers utilize trichloroethylene or hexane for removing most of the process oil during the extraction step. After evaporation in the drying oven, these solvents are then recovered through low temperature condensation or adsorption/desorption onto activated carbon. As environmental regulations and emission standards become more stringent, there is a need to investigate alternative approaches to the manufacture of lead acid battery separators.

This presentation discusses a novel approach in which isotactic polypropylene (i-PP) is combined with lesser amounts of silica, naphthenic process oil, surfactant, and a nucleating agent at elevated temperature in a twin screw extruder. The extrudate is cast onto a heated roll to form a non-porous flat sheet that is then biaxially oriented.

9:50 am-10.15 am

Finite Element Simulation of Deformation of Lead-Acid Battery Positive Plates

Jun Furukawa — Senior Adviser, The Furukawa Battery Co., Ltd., Japan

The main failure mode of an EFB in a hot temperature region is the corrosion of the positive grid that, in turn, grows and causes a short-circuit

The Furukawa Battery has produced a positive grid alloy with high corrosion resistance. Also, Furukawa Battery has developed a finite element simulation to predict the growth deformation of the positive grid. For a better understanding of these phenomena, our study proposes a simulation model for the analysis of this undesired deformation.

10.15 am-10.40 am

LME – Driving Sustainability and Managing Price Risk in Battery Metals

Edric Koh — Head of Corporate Sales, Asia, London Metal Exchange, Singapore

This presentation will (i) share LME’s sustainability strategy; (ii) how its aim to provide the metals industry with the option of gaining greater transparency of and access to sustainably produced metal; (iii) as well as how plays a significant role in global decarbonization and the circular economy — such as EV materials and scrap metals.



Matthew Raiford — Consortium for Battery Innovation



Richard Pekala — ENTEK International



Jun Furukawa — The Furukawa Battery Co., Ltd



Edric Koh — London Metal Exchange

MACTM

ENGINEERING & EQUIPMENT

Your partner in Asia



MAC engineering offices and installations across the globe

Americas

Sorfin Yoshimura, New York, U.S.A.

Tel: 516-802-4600

Email: sorfin@sorfin.com

Asia-Oceania

Sorfin Yoshimura, Tokyo, Japan

Tel: +81 3 3595 0722

Email: tokyo@sorfin-yoshimura.jp

China

Sorfin Yoshimura, Qingdao, China

Tel: +86 532 85971191

Email: qingdao@sorfin-yoshimura.cn

Europe

Sorfin Yoshimura, Paris, France

Tel: +33 1 70 29 49 07

Fax: +33 1 73 79 18 16

Email: paris@sorfin-yoshimura.fr

Thailand

Sorfin Yoshimura, Bangkok, Thailand

Tel: +662-626-5965

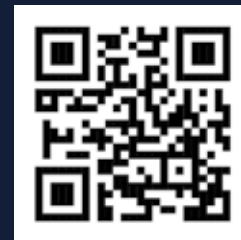
Email: sorfin@sorfin-yoshimura.co.th

New York, U.S.A

SY innovations, New York, U.S.A

Tel: +646-620-5037

Email: agurevich@sy-innovations.com



20TH ASIAN BATTERY
Conference and Exhibition

Visit us at Booth 32



**MAC ENGINEERING &
EQUIPMENT COMPANY, INC.**



Women in the
Global Battery Industry
SUSTAINING SPONSOR

Visit www.mac-eng.com to see how we can bring the MAC Advantage to you!

11.00 am-11.25 am

Transportation Battery Forecast to 2030, Plus the Top Apps for Advanced Lead Batteries

Ray Kubis — Chair, Gridtential Energy Inc., US

The presentation will deliver a global transportation forecast that will encompass the batteries used in all vehicle options, including in terms of both the energy content and value out through 2030.

Also, a brief will be given on the best applications for growth with advanced lead-acid batteries as taken from a global survey completed in the Summer of 2023.

11.25 am-11.50 am

Lead acid Technology for E-Rickshaw Application — The Way Forward

Subhankar Chakraborty — Vice President, R&D, Exide Industries Ltd, India • **Indrajit Majumdar** — Senior General Manager - R&D, Exide Industries Ltd, India

The electric mobility market in India is witnessing an exponential growth as estimated by market researchers and stake holders. The majority in this market is attributed to a low speed, 3-wheeled, EV solution

The electric mobility market in India is witnessing an exponential growth as estimated by market researchers and stake holders.

catering to the first and last mile connectivity popularly known as the E-Rickshaw.

The choice of energy storage for this has been mostly a lead acid system that has served the purpose but needs to be significantly improved if it must remain viable and in contention. In a broad view, the application is similar to the motive power and other Material Handling Equipment (MHE) applications. However, in this presentation, the primary and secondary research shows that the application departs significantly from the standard controlled environment operation of a traction battery system.

The ageing mechanism and failure modes of the batteries have been analyzed and improvement pathways have been charted through understanding of the problems, Furthermore, the necessity of developing a proper endurance test protocol to be conducted in the laboratory has been realized.

11.50 am-12.15 pm

Dual Chemistry Power System

Michael Glenn — Principal Technical Development Officer, Battery Energy Power Solutions Pty Ltd, Australia • **Vaishnavi Yuvaraj** — Product Development Engineer, Battery Energy, Australia • **David Brown** — R&D Consultant, Battery Energy, Australia

This presentation discusses the unique configuration that combines favorable characteristics from both lithium ion and lead battery chemistries.

Recent literature has demonstrated that separate lead acid and lithium-ion batteries can be connected in

parallel to a common busbar and cycle together without the need for electronic control, e.g., DC-DC converters.

Furthermore, this can produce the lowest total cost of ownership when operating over a broad time window that is covering a range of applications from ancillary services to daily cycling.

A key aspect of this dual chemistry system is that the lithium-ion battery discharges first, followed by the lead acid battery. This is achieved by using a slightly higher nominal voltage for the lithium-ion battery (~5-12%). Both chemistries are charged together. Here, the profile is analogous to a typical lead acid remote area power system.

This work combines gel lead acid batteries with lithium iron phosphate (LFP) and lithium-ion batteries. There is an inflection point when the lithium-ion battery approaches full-discharge. This coincides with a sharp voltage knee, which is characteristic of LFP batteries.

It also demonstrates that a dual chemistry duty cycle can extend the service life of lead acid batteries.

12.15 pm-12.40 pm

Highly Electrochemical Stable Lead-Carbon Interface for Enhanced High-rate Cycle Performance of Lead-Carbon Batteries

Shu-Huei Hsieh — Huwei, Yunlin, National Formosa University, Taiwan

Adding carbon to negative active materials or electrolytes shows potential in lead acid batteries for energy applications. Nevertheless, their sudden degradation due to



Ray Kubis — Gridtential Energy



Subhankar Chakraborty — Exide Industries



Michael Glenn — Battery Energy Power Solutions



Shu-Huei Hsieh — Huwei, Yunlin, National Formosa University

Tried and tested **Improved inside**



Our genuine system - your first choice

- Highest quality
- Constant improvement
- Excellent performance
- Reliable service

Over 40 years of developing and perfecting battery filling products allow us to provide you with the most reliable system focusing on innovation and usability – a valuable contribution to an extended battery lifetime.

bfs batterie füllungs systeme GmbH
info@bfsgmbh.de

Mitterweg 9/11 | 85232 Bergkirchen | Germany
bfsgmbh.de | +49 8131 36400



sulfation during fast discharging and positive electrode grid corrosion restricts their further advancement.

This presentation addresses lead carbon (fibre) composite plates with 100% Pb coverage on a monolithic and flexible carbon cloth. Experimental results show that the success of plates prepared by hot pressing oxidized carbon fibres is close to 100%.

1.30 pm-1.55 pm

Automating GEL Circulation Technology for Continuous Processing

KD Merz — VP Technology, Abertax Technologies, Malta

Gel Circulation Technology is the latest and most efficient process to change flooded lead-acid batteries to VRLA products. It makes both acid drainage and time-consuming vacuum filling obsolete and results in a better product quality. The first installation of such a system was six years ago and is now used by some major battery manufacturers. The latest development of this well proven technology has been the move from batch process to a continuous operation. The main advantages are: (i) no time limitation to connect cells to the system, (ii) no preparation of the Gel mix before starting the circulation process, (iii) continuous

Gel Circulation Technology is the latest and most efficient process to change flooded lead-acid batteries to VRLA products.

and time-independent connection and circulation of cells. This presentation describes this improved process compared to the standard ‘two shot’ and batch circulation in terms of efficiency and costs.

1.55 pm-2.20 pm

Thin Tubular Lead acid Battery Technology (Flooded & amp; Gel) – Workhorse for Long-Life Residential Energy Storage: Back-up Power with/without Solar in India, Africa. and the Middle East

Amlan Kanti Das — Senior Vice President, Battery Operations & R&D, Luminous Power Technologies, India

The lead acid battery is one of the longest-serving battery types in the energy storage market. Characteristics such as being less expensive, having higher recyclability percentage than rival battery technology, and ability to cope with sudden thrust for higher power have been major factors driving their adoption across various application sectors. With the Governments’ policy support and less cost of power generation, accordingly, as shown by market reports, the demand for household energy storage systems is growing worldwide.

Commonly, AGM VRLA batteries have been used widely in South and South-East Asia and Africa homes for backup energy storage from solar systems. Although these batteries are maintenance-free, poor cycle-life is insufficient to meet user requirements. Similarly in Indian, battery markets for home application in urban, rural, and semi-urban areas must be

categorized and customized according to their energy needs.

2.20 pm-2.45 pm

New Modular Machine Design for Production Lines

Michael Wipperfuert — Vice President Sales, CMWTEC Technologie GMBH, Germany

Machine reliability is the most important feature in a production line. In addition, nowadays the requirements for user-friendliness and ease of maintenance are becoming increasingly important to ensure reliability. This presentation details a new generation of machines that meet the requirements for user-friendliness, ease of maintenance, and a low spare parts inventory.

2.45 pm-3.10 pm

Innovative Separators for Extending Deep-Cycle Lead-Acid Battery Performance: Hi-Sep Endura

Mahadevaswamy Kodimole Mahadevappa — Senior Scientist, Hollingsworth and Vose, India

Hi-Sep Endura is an innovative separator that has been developed to meet the challenging demands of lead-acid batteries in deep-cycle applications.

This presentation will show how the product is designed to withstand the extremely harsh conditions associated with charge and overcharge, deep discharge, high current charge (fast charging), and water top-up anomalies.



KD Merz — Abertax Technologies



Michael Wipperfuert — CMWTEC Technologie GMBH



Amlan Kanti Das — Luminous Power Technologies



Mahadevaswamy Kodimole Mahadevappa — Hollingsworth and Vose



8th International Secondary Lead & Battery Recycling Conference

SIEM REAP 2023

Monday 4 & Tuesday 5 September 2023
Sofitel Angkor Phokeethra Golf & Spa Resort



We collect, we break, we recover!

The only conference dedicated to the world of recycling and recovery of lead-acid, lithium-ion and other battery chemistries.

The conference will hear from leading international speakers on the latest recycling & smelting methods, breakthrough research and health, safety and environmental topics. Whether it be a lead-acid or lithium battery, we still have to collect, break, recover the valuable elements and dispose of the waste in an environmentally safe manner protecting all workers.

AGENDA

27 + presentations covering topics that are critical to the full end-to-end battery recycling industry.

NETWORKING EVENTS

Join us for our Ice-breaker drinks on Sunday evening and our Dinner event at a very special restaurant in Siem Reap Monday evening.

VENUE

Join us at Sofitel Angkor Phokeethra Golf & Spa Resort; Siem Reaps leading conference resort.

Sponsor



Partners



REGISTER NOW

recycle100.events

3.30 pm-3.55 pm

Impact of Lead acid Battery Cell Imbalance on Pack Performance for e-Rickshaw and Telecom Applications

Sundar Mayavan — Principal Scientist, CSIR- Central Electrochemical Research Institute, India

Lead acid cells or batteries are often grouped to form battery packs that deliver a higher voltage and capacity for various applications. This presentation investigates two of those applications, the e-Rickshaw and telecom, and the effect of battery cell imbalance in the typical 48-volt battery pack.

3.55 pm-4.20 pm

Utilizing High-Energy X-Ray Imaging for Investigating Lead acid Battery Electrodes

Chad Stone — PhD Student, Swinburne University of Technology, Australia • **Peter Mahon** — Senior Lecturer, Swinburne University of Technology, Australia • **Rosalie Hocking** — Senior Lecturer, Swinburne University of Technology, Australia • **Russell Newnham** — Chief Scientist, Electric Application Inc., Australia • **Anthony Hollenkamp** — Principal Research Scientist, CSIRO, Australia

The application of high-energy X-ray in-situ or in-operando imaging has proven to be a useful tool in the study of secondary battery electrode materials, particularly in Li-ion and Li-S batteries. However, the potential benefits of these techniques

This presentation reports the effectiveness of using custom-made cell designs paired with high-energy synchrotron X-ray transmission imaging in investigating the inner workings of lead acid battery electrodes.

for lead acid battery research have not been fully realized. This presentation reports the effectiveness of using custom-made cell designs paired with high-energy synchrotron X-ray transmission imaging in investigating the inner workings of lead acid battery electrodes.

4.20 pm-4.45 pm

Electrochemical Evaluation of Pb-Ca-SnSr alloy for Positive Grid of Lead acid Battery

Ali Alagheband Hosseini — Technical Manager, Sarv Sanat Toos (SST Co.), Iran

High content of calcium in a Pb-Ca-Sn alloy causes premature capacity loss, while reducing its content brings about losing hardness and casting ability. This issue can be solved by using strontium as the fourth element in the positive grid alloy. In this study, we prepared four

different alloys with Sr contents of 0.012% to 0.060% and the same Ca and Sn values for comparison with a reference sample without Sr. Cyclic voltammetry, potentiostatic coulometry electrochemical impedance spectroscopy and hardness tests were conducted on all samples.

4.45 pm-5.10 pm

Existing Situation Analysis of Intelligent Equipment and Intelligent Manufacturing of Storage Battery

Alex Huang — Technical Director, Better Technology Group Limited, China

With the implementation of the development concept of Industry 4.0 and the continuous promotion of the goal of Made in China (MIC) 2025, large-scale enterprises in China's battery industry have moved forward to truly realize the goal of an intelligent plant.

The penetration rate of intelligent manufacturing in China is increasing rapidly, and the application scenarios are gradually expanding. After over 10 years of development that relied on the mature battery technology, the intelligent equipment in China that really meets the needs of the industry is constantly innovating.

With the implementation of the development concept of Industry 4.0 and the continuous promotion of the goal of Made in China (MIC) 2025, large-scale enterprises in China's battery industry have moved forward to truly realize the goal of an intelligent plant.



Sundar Mayavan — CSIR- Central Electrochemical Research Institute



Chad Stone — Swinburne University of Technology



Ali Alagheband Hosseini — Sarv Sanat Toos



Alex Huang — Better Technology Group



20th Asian Battery Conference & Exhibition

SIEM REAP 2023

Tuesday 5 — Friday 8 September 2023
Sokha Siem Reap Resort & Convention Center

Designed for the global lead-acid battery industry

Join us in Siem Reap, Cambodia to hear new and emerging technologies in the lead-acid field, see future directions, meet new suppliers, conduct business, network, and find new ways to stay ahead of the competition at Asia's #1 Lead-acid Battery Conference and Exhibition.

PROGRAM

45 + papers showcasing the latest updates, technical improvements, research and innovations in the lead battery field.

ONE MINUTE GIVEBACK

Our sights are set on a target of USD 20,000.00, which will go toward adding a bed to the Oncology department at Angkor Hospital for Children for an entire year.

EXHIBITION

The Hub of Activity @ 20ABC.
Get in fast - limited expo spaces available!



Executive Platinum Sponsor



Platinum Sponsors



Gold Sponsors



Gala Dinner Sponsor



ONE Minute Giveback



Silver Sponsors

REGISTER NOW

asianbatteryconference.com

Join us immediately prior for RECYCLE100
8th International Secondary Lead and Battery Recycling Conference

Monday 4 & Tuesday 5 September 2023
Sofitel Angkor Phokeethra Golf & Spa Resort

recycle100.events



Friday September 8

9:00 am-9:25 am

New Methods to Extend Service Life of Lead acid Batteries in Stationary Energy Storage and Deep Cycle Applications, and Increase their Total Energy Throughput

Boris Shirov — Senior Battery Lab Manager, WaveTech

WaveTech Group is offering an innovative approach for enhancing lead acid battery power performance — called Crystal Control Technology. It is based on providing a periodic electric signal to batteries under charge. The signal is generated by an electronic device (BEAT) connected to the battery. The BEAT is a self-managing microprocessor-based unit which can be powered by the battery or by externally by any charger. CCT helps increasing the reversibility of the electrochemical charge and discharge reactions, and thereby extends service life and increased capacity.

This presentation will share the following new results from extensive laboratory and field tests.

CCT helps increasing the reversibility of the electrochemical charge and discharge reactions, and thereby extends service life and increased capacity.

9:25 am-9:50 am

The First Step to Developing the Next Generation Lead-Acid Battery: Positive Paste Structure

Enqin Gao — Director of R&D, Hammond Group Inc., USA

In this presentation, the crystal structure of the cured positive paste is evaluated to understand improving the impact on performance. This includes positive plates with the following paste: regular 3BS paste, steamed-cured 4BS paste (not seeded by 4BS crystals), cured-seeded 4BS paste, and cured paste seeded by chemically treated 4BS paste. Full characterization of cured and formed positive active material has been undertaken with XRD, BET, SEM, Helium Pycnometry, Mercury Porosimetry, Simultaneous Thermal Analysis (TGA/DSC), and wet chemical (PbSO₄, PbO₂).

9:50 am-10:15 am

Assessment of Carbon/ Lignosulfonate Interactions on Lead Battery Performance in the Absence of Cold-Crank Constraints

Carter Abney — Technical Application Manager for Batteries, Borregaard USA
 • **Tim McNally** — Senior Strategic Advisor, Borregaard

It is well known that battery compositions must be optimized for their target applications, as improving one performance metric generally has a negative effect on others. To these ends, Borregaard has previously used 'Full Factorial Design of Experiment' approaches to explore

The research undertaken investigated the interaction of lignosulfonate expanders — Vanisperse A and Vanisperse DCA — with eight commercially available carbons.

the effect of carbon in lignosulfonate ratios on the performance of lead batteries. Thereby, identifying optimal ranges to afford a balanced performance portfolio.

Consequently, this permits re-evaluation of the optimal carbon to lignosulfonate ratio for batteries that will not be employed in SLI applications and allows for greater priority to be assigned to charge-acceptance. The research undertaken investigated the interaction of lignosulfonate expanders — Vanisperse A and Vanisperse DCA — with eight commercially available carbons.

10:15 am-10:40 am

CBI Technical Program

Begüm Bozkaya — Technical Manager, Consortium for Battery Innovation, Germany

Consortium for Battery Innovation has developed a technical program to advance the lead battery technology to deliver reliable, safe, cost-efficient, and sustainable batteries. The technical program focuses on energy storage systems, 12V automotive batteries and motive power applications to improve the lifetime, charge acceptance/recovery and energy throughput of lead batteries.



Boris Shirov — WaveTech



Dipak Sen Choudhury, Exide Industries



Carter Abney — Borregaard USA



Begüm Bozkaya — Consortium for Battery Innovation

YOUR PARTNER IN PLATE PRODUCTION



FRIMAX
BATTERY EQUIPMENT

Customized
complete solutions

**TURNKEY
PROJECTS**



Our skilled technical team
gives solutions to your
specific product needs

Plate making
and handling

EQUIPMENT



Quality and efficiency
Great choice options
Excellent performance

Complete and
fast support

SERVICES



Technical assistance
Maintenance and Retrofitting
Consultancy and innovation

**WE WILL BE EXHIBITING AT ELBC EXPO IN LYON (FRANCE)
VISIT US IN BOOTH #6**

Informática, 22
19200 - Azuqueca de Henares
Guadalajara (Spain)

Phone: +34 949 260 653
Email: info@frimax.es
Web: www.frimax.es



11.00 am-11.25 am

Contemporary Applications for MOLECULAR REBAR Products

Paul Everill — Chief Technology Officer, Black Diamond Structures, USA

The lead-acid battery industry is changing, and Black Diamond Structures intends to support the transition from a heavily automotive-focused industry to a more general energy storage market. In our presentation, we will share new data from manufacturers deploying MOLECULAR REBAR detangled carbon nanotube products in application spaces that are predicted to grow strongly in the next five to 10 years.

11.25 am-11.50 am

Advanced Red Lead and its Benefit for the Lead Acid Battery Formation Process

Rainer Bussar — Head of Global R&D, PENOX, Germany

Our enhanced generation of leady oxides, called ‘Advanced Oxides’, offers the following characteristics: (i) specific particle size to support a stable porosity of the active mass that is beneficial for enhanced mass utilization, (ii) adjusted content

‘Red Lead Plus’ (RL+), introduced to the European market by PENOX in 2021, is one example of such innovative, functionalized oxide to be used in the PAM

of beta-PbO to support a strong backbone of the formed positive active mass (PAM) for high cycle-life, (iii) improved tetrabasic structure by surface functionalization of the oxide with tetrabasic seeding crystals in the PAM, and (iv) the option of improved conductivity by functionalization of the leady oxides. ‘Red Lead Plus’ (RL+), introduced to the European market by PENOX in 2021, is one example of such innovative, functionalized oxide to be used in the PAM.

11.50 am-12.15 pm

Proposal for the Manufacture of a Lead Acid Auxiliary Battery

Chen Yingming — President, Jiangsu Xiante Intelligent Equipment Co., Ltd., China

This presentation gives an in-depth description of a comprehensive lead acid battery assembly line and how it is strategically designed to leverage digitisation and achieve intelligent manufacturing that is both stable and dependable. By integrating cutting-edge technology and automated processes, the assembly line significantly reduces manual labor requirements, with only five personnel required to operate the entire line effectively.

By integrating cutting-edge technology and automated processes, the assembly line significantly reduces manual labor requirements, with only five personnel required to operate the entire line

12.15 pm-12.40 pm

Design Improvements and Manufacturing Processes for Achieving Ultra-Low Internal Resistance in Lead Acid Batteries

Kalyana Sundaram — Technical Manager, Eternity Technologies • **Mark Stevenson** — CEO, Eternity Technologies

Achieving ultra-low internal resistance is essential for improving battery performance and extending battery life to offer advantages such as fast charging, extended runtime, cold storage, and energy savings.

Several factors contribute to ultra-low internal resistance, such as the use of carbon nanotube additives, low electrical resistance phenolic resin separators, and thinner plate construction.

The addition of carbon nanotube additives to the active material in lead acid batteries has been shown to improve conductivity and reduce internal resistance.

The use of low electrical resistance phenolic resin separators in lead acid batteries has also been shown to significantly reduce internal resistance.

These separators allow for faster charging and discharging, prevent the formation of dendrites, and contribute to low internal resistance. Thinner plate construction is another design improvement that can significantly reduce internal resistance. Thinner plates offer increased surface area and shorter diffusion.

Thinner plates offer increased surface area and shorter diffusion.



Paul Everill — Black Diamond Structures



Rainer Bussar — PENOX



Kalyana Sundaram — Eternity Technologies



Dr Mark Stevenson — Eternity Technologies

1.30 pm-1.55 pm

Battery Water Loss — Counter Measures Outside the Plate Stack

Ingo Koch — Technical Director, Frötek-Kunststofftechnik GmbH, Deutschland

Battery water loss plays a significant role in battery failures under certain applications. Three counter measures that can be applied to a battery or cell without changing the plate stack will be addressed in this presentation:

- improving battery recombination in flooded batteries
- forcing recombination by catalysts
- improving tightness of automotive battery plugs

1.55 pm-2.20 pm

Innovation of Separation Technology to Meet the Need of Future Lead acid Batteries

Ming Zhang — Consultant, Huakang Eco-materials Co., Ltd, China

Based on design innovation, structure improvement, process progress and quality consistency of separators, this presentation from Huakang lists its actions and contributions to the separator industry in stepping up to the challenge. Huakang is promoting progress for a new generation of lead acid batteries with support from its R&D team and following the CBI innovation roadmap.

2.20 pm-2.45 pm

Presentation title to be confirmed

2.45 pm-3.30 pm

Presentation title to be confirmed

Doug Lambert — Vice President of Sales and Technology, Wirtz Manufacturing Company, Inc.

Full details of the abstracts can be found on www.asianbatteryconference.com



Ingo Koch — Frötek-Kunststofftechnik GmbH



Ming Zhang — Huakang Eco-materials

House advert

A decade of turmoil but also of progress



To the outsider the lead battery business seems to be a tranquil landscape where nothing seems to change very rapidly. The truth is vastly different. One moment all is calm, the next it has lurched in yet another direction.

2013

- **Exide Technologies** files for bankruptcy protection a second time. As with first Chapter 11, it will take two years before it is able to trade again.
- After 22 years of struggling, bipolar start-up **Atraverda** goes into receivership.
- Charlesbank Capital Partners makes initial investment in **Trojan Battery**. The firm had been in the Godber family since its foundation in 1925.
- **Ador Digatron** joint venture goes ahead between German headquartered Digatron and Ador, a well respected Indian firm and a further move by Digatron to expand its presence in Asia.
- **Hammond** releases K2 range of expanders, offering a step change in lead acid battery performance,

particularly in terms of cyclability in partial state of charge and offering performance benefits that can be adjusted to varying temperature ranges and demands. Initially most suited for stop-start and micro-hybrid applications.

- **Atomized Products Group** sets up new \$4.3 million operation in Chesapeake in US state of Virginia.
- South Africa's **Metair** buys 100% of Turkey's **Mutlu Holding** and a 75% stake in **Mutlu Akü**, the lead battery maker.
It was already lining up taking a stake in German battery manufacturer Moll (2015), which gives it a part stake in Chaowei, a Chinese battery firm.
- At the end of the year Seven Mile Capital Partners buys **Microporous** from **Polypore/Daramic** for \$120 million. A new management team is set up early in 2014.

2014

- **Aqua Metals** demonstrates a novel way of recycling lead acid batteries without the use of smelting. Commercialization of the technology stalls thereafter. After the initial public offering peak of \$21 a share, the price now trades under \$1.

2015

- **Zesar** invests in new factory in Manisa, near Turkey's port city of Izmir. Later expanded to another factory. Plans are to double the firm's manufacturing area to 10,000m².
- **GS Yuasa** acquires Turkish battery firm, boosts stake in Malaysia, expands further in Indonesia.
- **C&D Technologies'** CEO plans revamp aimed to restore lead battery reputation the firm had in the 1990s and 2000s.
- **ALABC** restructuring approved by its members and ILA.
- Bipolar batteries make a spectacular return to the limelight with two firms, in particular **Advanced Battery Concepts** and **Gridtential**, providing viable alternatives to regular lead batteries.
ABC develops GreenSeal technology, a full suite of patented technologies and simplified production processes, to enable the construction of reduced lead content, high performance, lower cost lead batteries in existing formats for today's and newly enabled future markets. Commercial adoption follows.
Gridtential introduces its Silicon Joule technology. This is a substrate that replaces the grid in a battery, resulting in a large reduction in the amount of lead required and better performance. Like ABC's bipolar batteries most of the regular production of the battery can be built on existing plate-making lines,

modified assembly lines and existing formation/finishing lines.

- **Asahi Kasei** acquires Polypore International, the parent company to Daramic and affiliates.

- **Death of DeLight Breidegam**, charismatic founder of East Penn Manufacturing and creator of the largest family owned battery business in the US.

2016

- **BCI** launches innovation award. **Hammond** wins award for further development of its K2 range of expanders and opening up its E=MC² laboratory to serve the battery industry.

- Tactical tax reasons are involved in the creation of **Johnson Controls International** based in Ireland and formed through a merger of Johnson Controls and Tyco International.

- End of a legend. **Ann Noll**, one of the great institutions of Battery Council International, retires after 37 years with the council. Greatly missed by North American battery firms as well as worldwide.

- Four lead association bodies **BCI, ILA, EUROBAT** and **ABR** agree to kickstart a global pro-lead battery campaign. This is the first attempt at full coordination between the organizations.

- **Cellusuede** moves into new base and 125,000sq ft factory at Rockford in US state of Illinois.

- **Ecoult**, the East Penn subsidiary, installs UltraBattery in smart grid test bed in Dublin.

- Founder of ALABC **Michael Mayer** dies.

- A watershed moment for lead battery research when **Argonne National Laboratory, RSR Technologies** and **East Penn Manufacturing** agree to work together under a standard US government cooperative research and development agreement.

RSR and East Penn to use Argonne's state-of-the-art analytic technologies to accelerate lead battery research. These same technologies have already been used by lithium

battery researchers in previous years.

Tests undertaken will investigate the fundamental transport processes in lead batteries, using a variety of characterization techniques available at Argonne.

Scientists at Argonne who will be assigned to the project have extensive experience in synchrotron X-ray techniques, in particular for characterizing materials under controlled electrochemical conditions.

2017

- **ENTEK International**, battery separator designer and producer, signs an agreement with Separindo, the Indonesia-based polyethylene battery separator producer and Japanese glass company NSG Group, to make and sell PE separators across Asia. Breaks ground on new plant for this in 2019.

- **BCI** leads the way with pushing for lower blood lead levels for workers in battery plant.

- **Death of Detchko Pavlov**, Bulgarian academician and probably the greatest expert on the lead battery that has ever lived. Over his lifetime his research contributed to much of our present understanding of how lead batteries work. He is particularly remembered for the generosity of spirit in sharing this knowledge around the world.

- **Doe Run** expands lead mining on back of higher lead prices.

- **Monbat** buys Italian recycling firm Piombifera Italiana.

- **Penox** opens new product development centre in Germany.

- Chinese e-bike lead battery maker **Danneng Power International** expands output with \$870m sales.

- **BM Rosendahl** opens development centre.

- **EC** fines lead cartel Recyclex, Campine, Ecobat Technologies for fixing lead prices.

- **Exide Industries** opens \$100m plant in Bengal.

- **Belectric**, a UK lead acid/lithium battery firm, is bought by German utility Innogy SE (previously RWE).

- **Black Diamond Structures** opens battery testing for nanomaterials technology facility in Texas.

- **Exide Technologies** waives the right to use Exide brand name in perpetuity to Indian battery giant Exide Industries. This follows a 20-year dispute over the issue.

- **Daramic** greenfield plant in Gujarat, India finished and operational.

- **NorthStar** wins BCI award for its remote monitoring technology. This allows battery users to review the battery's health and status at any time from anywhere. The embedded battery sensor communicates with both site technicians and power systems to ensure correct installation and settings. The device was launched for the telecom sector, but will be expanded to new segments.

2018

- **Batek Makina** opens 43,000 sq ft plant in Dilovasi in Turkey.

- **Furuksa Battery** partners Vietnam's **Pinaco** in UltraBattery manufacturing deal. Furuksa already had operations in China, India, Indonesia and Thailand.

- **C&D Technologies**, a portfolio company of KPS Capital Partners, acquires **Trojan Battery Company**.

- **Proposal for new body to replace ALABC** mooted at Vienna ELBC. The **Consortium for Battery Innovation** emerged the following year.

- **SY Innovations** formed, designed to support SY Group and explore new markets, products and sales/marketing techniques.

- **Gridential** wins BCI award for its bipolar battery solution but automation problems on the production line dog adoption despite backing from well-known battery manufacturers.

- Chinese battery firm **Leoch** makes undisclosed investment in UK firm **DBS Energy**.

- **Hollingsworth & Vose** invested in capacity expansion in raw material and global separator production to support the AGM market.

- **Duracell** unveils new lead battery, citing cost benefits against lithium.

- Solar power company **Mobisol** partners African lead battery firms for storage component to its offering.
- Canada's **Discover Energy** buys Korean lead manufacturing business **iQ Power Asia**.

- India's **Exide Industries** moves into lithium with **Leclanché** in joint venture.
- Innovative New Zealand lead battery pioneer **ArcActive** partners **East Penn**.

- **Amara Raja, Gravita** sign recycling deal. **JCI**, which has worked with Amara Raja for 20 years, formalized an agreement between the two this year.

- **Narada** inaugurates first of five grid-scale lead carbon ESS in Germany.

- **EnerSys** buys Canada's Alpha Technologies for \$750m in push into energy storage markets.

- Korean lead battery maker **AtlasBX** gets go-ahead to build lead battery plant in US.

- **Trojan Battery** sold to **C&D Technologies** as last remaining link with Godber family cut.

2019

- **RSR Technologies** wins BCI award with possibly the most important advance in lead research this side of the century.

RSR, working with East Penn Manufacturing and the US Argonne National Laboratory, used Argonne's Advanced Photon Source synchrotron to look at, in real time, the crystallization of lead plates at the atomic level during the charging and discharging process.

The results of the research enable the firm to develop its alloy, known as Supersoft-Hycycle, which enhances lead battery performance.

Tim Ellis, president of RSR Technologies, said: "With this we can compete and win against lithium in many applications with higher performance."

"The work at Argonne has helped us understand the physical processes taking place in real time inside batteries to develop higher performance advanced lead batteries. Our Supersoft-Hycycle lead really improves cycle life as validated by

many of our customers, especially in higher temperature and extreme operating conditions."

The alloy is already being used by South African battery firm Auto-X, the maker of the Willard brand of batteries.

- **Microporous** forms joint partnership with Chinese firm **Zisun**, the largest fully integrated producer of glass micro-fibres and media in Asia, allowing Microporous to add AGM separators to its product range.

- Specialist battery machine maker **Wirtz Manufacturing** invests in nickel-zinc battery maker **ZAF Energy Systems**.

- **Johnson Controls Power Solutions** — the former battery division of JCI bought by Brookfield Business Partners for \$13 billion — launched itself with the name **Clarios**.

- Lead batteries in India lose subsidies under new **FAME-II** regulations.

- **East Penn** takes stake in lithium battery maker **Navitas**.
- **Exide Industries** moves into e-rickshaw battery manufacturing.

- **Water Gremlin** moves back to full production after agency shut-down.

- **Upside Group** switches on 25MWh lead carbon system in Germany.

- **John Devitt**, VRLA pioneer and developer dies aged 96.

2020

- **Hammond Group** completes the first step to employee ownership.

- **Covid-19** claims first lead battery insolvency victim, **Moll**, but outlook for the firm brightens later.

- **Exide Technologies** (and four subsidiaries) files for Chapter 11 bankruptcy protection to facilitate the sale of its North American assets. In July Exide sells its North American assets to Atlas Holdings.

- German formation firm using acid recirculation technology **Inbatec** and **Kustan** become equal and independent subsidiary of new firm **RedDotPlastics**.

- **ArcActive** wins BCI innovation award with technology to replace negative battery electrode with non-woven carbon fabric that achieves high DCA with minimal loss. Later in the year ArcActive is very close to full commercialization of the product.

- **Neutron diffraction** is used for the first time to improve lead battery performance, says **Consortium for Battery Innovation**. The project, launched in Spain under the CBI's technical programme, uses hi-tech neutron diffraction techniques to explore what happens as lead batteries charge and discharge. Exide Technologies and the Institute of Materials Science of Aragon work with the CBI on the project.

- **Exide Technologies** officially separates from its North American business and in October becomes a new European, Asia-Pacific firm under new ownership but retaining Stefan Stubing as president, CEO and director. The European business, now free from the US parent, is free to focus on its automotive and industrial energy storage technologies. It has two R&D facilities as well as 11 production plants across Europe.

- **Don Gribble**, inspirational founder of *Batteries International*, passes away in November.

- **California DTSC** issues writ to former Exide Technologies — now called Stryten Energy — to recover Vernon clean-up costs. Saga continues.

- **End of the year round-up.** Lithium ion battery prices drop to lowest ever. Meanwhile, the numbers of lithium battery recalls explode for safety reasons. Chronologically, first for LG Chem home systems (December), Polestar 2 models recalled (November), GM recalls 68,667 Chevrolet Bolts (November), BMW recalls 40,000 cars in various ranges (October), Hyundai recalls 77,000 Kona Electric models (October), Ford recalls 20,000 Kuga plug in hybrids (August).

2021

- **Batek Makina**, the Turkish battery equipment manufacturer, takes over Italian formation firm Bertola and its subsidiary Moran.

- **India's second largest lead battery maker Amara Raja** announces plans in February to begin working on lithium battery cells.

- **Hammond, East Penn, Consortium for Battery Innovation** launch joint research program in March. CBI meanwhile announced it had launched a new European research project using neutron diffraction.
- **China moves to ban lead batteries in low-speed electric vehicles.**

- **Chris Pruitt, East Penn CEO** takes over as new BCI president.

- **Kathryn Bullock**, one of the greats in the electrochemical history of the lead battery, passes away in May.

- **Hammond Group wins BCI innovation award** for development of using lead silicate as a way to counter the destructive effects of acid stratification in lead batteries. This is subsequently called GravityGuard.

- **Oxis**, the lithium sulfur battery developer, is acquired by Johnson Matthey.

- **Victory for Battery Council International** in May as lead batteries removed from California's DTSC danger list. This is a huge vindication of the value of BCI's tireless campaigning on the subject.

- **Lead/lithium hybrid trial starts in Poland in July.** GS Yuasa, next month, wins another installation of lead/lithium hybrid capitalizing on the energy strength of lithium batteries with the price advantages and stability of lead ones.

- **Clarios** pulls \$1.7 billion capital raising via an IPO at last minute citing market volatility.

- **Ecobat** buys German lithium battery recycler Promesa in July in clear sign of future plans. It follows this up in October with acquisition of Emrol.

- **ENTEK** closes acquisition of NSG separator division in September can offer AGM, P/E and lithium separators.

- **Women in The Global Battery Industry group** launched at BCI meeting held in San Diego, California.

- **Sunlight Systems**, the Greek battery manufacturing firm, announces in September it will spend €50 million (\$59.2 million) to create the world's largest motive lead battery unit.

- **Long Duration Energy Storage Council** formed in November by 24 tech companies.

- **Monbat** announces plans to open a bipolar lead battery facility by 2024. In following June agreement reached with ABC when Monbat managers secure near 21% stake in the group.

- **Stryten** buys vehicle power division of Galvion a military equipment maker. In December it buys Tulip Richardson Manufacturing which makes injection moulding products and in January acquires Storion Energy, a vanadium flow battery technology firm.

2022

- **Disturbing signs of imminent lithium battery shortages** according to reports circulating well before the Russian invasion of Ukraine and the ensuing chaos.

- **Shake up of maritime transportation** rules becomes likely after cargo vessel *Felicity Ace* sinks off Azores with talk of possible cause being lithium fire in EVs being transported.

- **Shareholder** reveals in February ahead of Metair's results announcement that the South Africa holding group is to sell off its batteries business.

- **Surprises at Ecobat** as Marcus Randolph is appointed in March as its president and CEO taking over from incumbent Jimmy Herring.

- **Clarios** acquires Spanish recycler Metalúrgica de Medina.

- **India's Exide Industries** announces plan in March to invest \$800m in lithium manufacturing.

- **Bipolar batteries** to the fore as Gridtential signs development agreement with Camel Energy. Meanwhile Advanced Battery Concepts pushes ahead with sales contracts for its GreenSeal batteries.

- **Ahlstrom-Munksjö** launches AGM line in June in Italy. European battery

production is still a very mainstream market.

- **EU warns** in June 'hazard' classification could endanger battery investments

- **Campine** acquires Recyclex in €3.5m agreement in July after court process in May.

- **Double honour for Mark Stevenson**, who wins International Lead Medal at ELBC Lyon in September and becomes 29th member of Alpha/Beta club. Eckhard Karden also wins ILM.

- **Senior management buy-out of Monbat**, now one of the five largest battery manufacturers in Europe

- **Advanced Battery Concepts** wins BCI innovation award

- **Gridtential** announces plans to develop bipolar pilot line with Hammond and Wirtz,

- **Ace Green Recycling** plans to produce US lead in 2023.

- **Clean-up sage of Exide's former plant** at Vernon, California enters 'next phase'

- **Industry first** as batteries insurance warranty scheme launched.

2023

- **UK and US legislators** consider further laws to tighten up lithium safety.

- **ABC** agrees bipolar lead BESS projects deal

- **Prices and supply chain** disruptions hit all battery supplier firms.

- **International Energy Agency** warns further substantial hikes in all battery packs.

- **New direction** for lead with 'battolyser' project launched

- **Clarios** challenges Mexico claims on soil contamination

- **Fire on container ship** blamed on battery from EV cargo in the hold

- **Gopher Resource** wins BCI innovation award with better slag processing. ■





AUTOMATION

YOUR SOLUTION FOR INCREASED PRODUCTION AND PRODUCTIVITY FROM LABOR SHORTAGES

Wirtz is a Fanuc-approved robotic integrator and has supplied multiple automation systems for lead-calcium and pure lead plate-making. Our solutions have aided clients in motorcycle, automotive, and UPS markets with lead handling to additive additions for paste-mixing and palletizing. From high-speed spider robots with vision recognition that identify, sort, and stack plates at warp speed to conventional off-loading of automotive pasting lines, no matter the application Wirtz has the automation.

CUSTOM AND CONVENTIONAL AUTOMATED SOLUTIONS FOR:

LEAD HANDLING

LOADING, INGOT CASTING

PASTE MIXING

AUTOMATED ADDITIVES, FIBER EXPANDERS

MONITORING

RFID, SERVOS, EQUIPMENT SETTINGS

SORTING - STACKING

VISION RECOGNITION SCANNING, HIGH-SPEED SPIDER ROBOTS

OFF LOADING - PALLETIZING

PALLETIZING ROBOTS, CUSTOM GANTRY SYSTEMS



Discover the benefits of robotic and automated solutions for increased production and productivity by calling +1.810.987.7600 or emailing sales@wirtzusa.com

The Wirtz Group of Companies



INNOVATIVE | RELIABLE | PERFORMANCE

MACTM

ENGINEERING & EQUIPMENT



For over 55 years, MAC Engineering & Equipment Company, Inc. has sold more than 4500 machines, to over 300 customers, in 81 different countries, bringing the MAC Advantage worldwide.

MAC ENGINEERING & EQUIPMENT COMPANY, INC.



Women in the
Global Battery Industry
SUSTAINING SPONSOR

Visit www.mac-eng.com to see how we can bring the MAC Advantage to you!