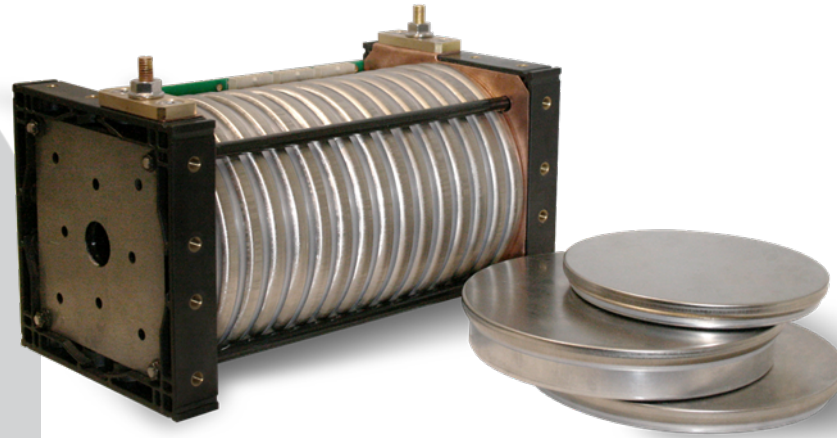


The New Standard for High-Power High-Capacity Lithium-ion Batteries



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www.rolled-ribbon.com

NAATBatt Meeting & Conference, Pasadena, CA
February 10-13, 2020

Who are we? What do we do?

- Manufacturer of Li-ion batteries
 - High-performance
 - High-power
 - High-capacity
 - Patented Rolled-Ribbon® technology – the new standard for high-power high-capacity Li-ion batteries
- Based in Austin, TX, USA



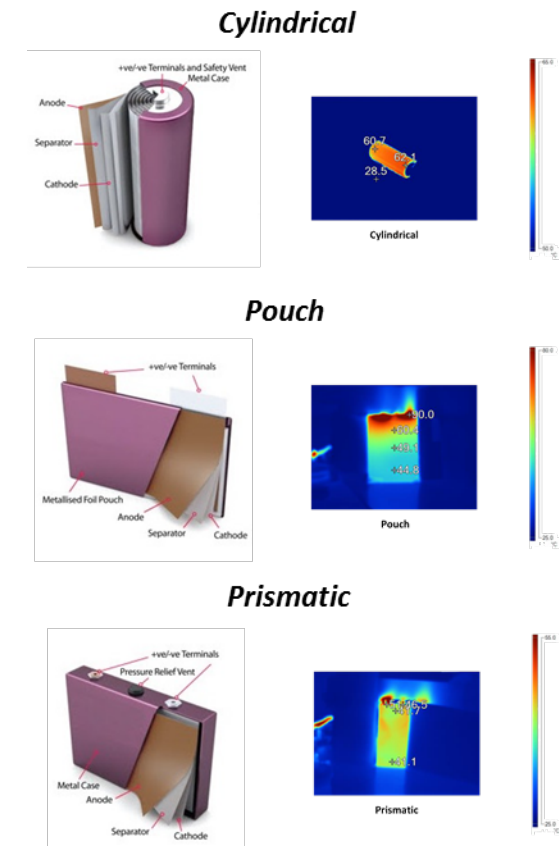
Rolled-Ribbon Cells



Rolled-Ribbon Battery Modules

Why a new standard?

- Current cell packages were designed for low-power low-capacity batteries – they don't scale up well for high-power high-capacity batteries
- Scaling issues:
 - Increased electrical resistance
 - Decreased power delivery
 - Increased heat generation
 - Increased thermal resistance
 - Poor thermal properties .. leads to thermal issues that are difficult or impossible to solve
 - Degraded battery performance and life

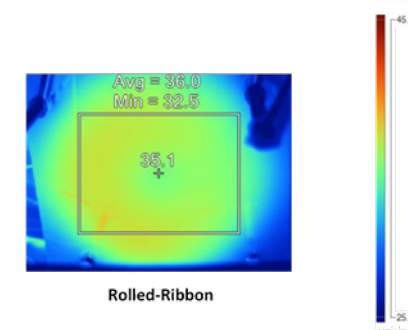
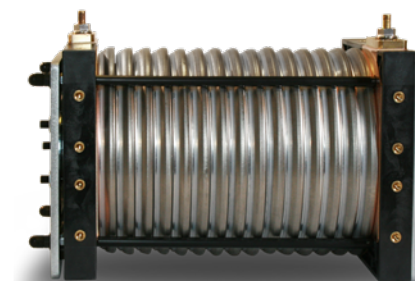


Note: **High** internal-external temperature differential.

What does Rolled-Ribbon do?

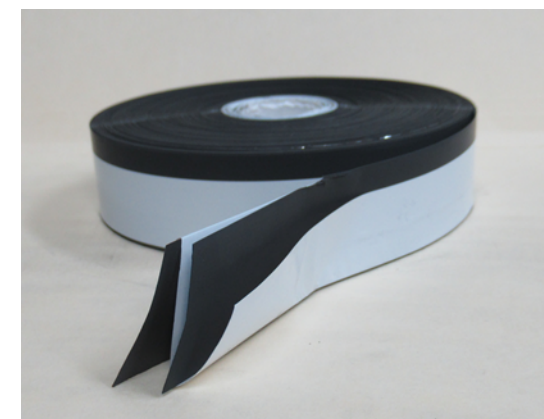
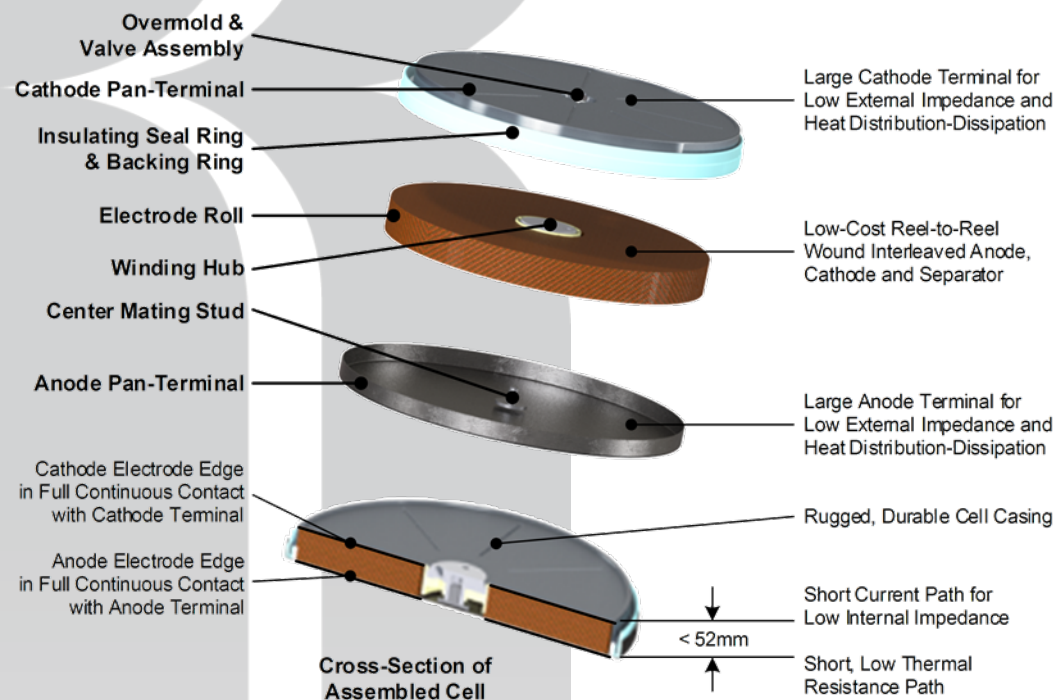
- Decreases electrical resistance
- Increases power delivery
- Decreases heat generation
- Decreases thermal resistance
- Provides **unparalleled** thermal performance
- Improves ruggedness, durability
- Enhances battery performance and life
- Enables stacked-cell batteries (no welding)
- Enables servicing/repurposing of cells (no welding)

Rolled-Ribbon (RR)



Note: Low internal-external temperature differential.

How does Rolled-Ribbon do this?



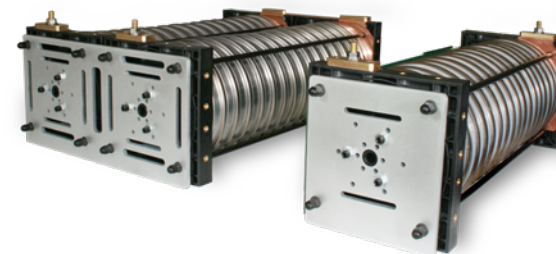
Rolled-Ribbon Electrode Rolls

Rolled-Ribbon Characteristics

- Independent of electrochemistry and formulation
- Compatible with most existing electrode designs, manufacturing processes and manufacturing equipment
- Only backend cell manufacturing specific to RR (electrode roll winding, electrolyte filling, cell crimping)
- Can customize RR cells (diameter, height)
- Only cell design that can provide low thermal resistance from electrode through cell to battery module



Rolled-Ribbon Cells



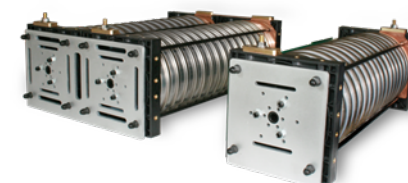
Rolled-Ribbon Battery Modules

Rolled-Ribbon Portfolio

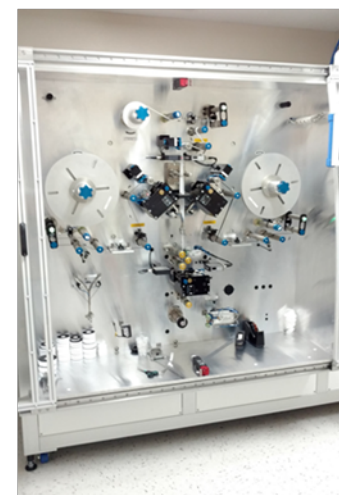
- Present
 - RR Cells
 - LFP, Mild-Power Formulation
 - 136x15mm, 3.2V@15Ah
 - 165x15mm, 3.2V@22Ah
 - 165x28mm, 3.2V@45Ah
 - RR Battery Modules, 1-2 Columns, 8-200 Cells
 - RR Battery Systems
 - RR Licensing
 - RR Manufacturing Equipment
 - RR Design and Manufacturing Services
- Future
 - IP67 Enclosures
 - Liquid-Cooling
 - Other Electrochemical Formulations



Rolled-Ribbon Cells



Rolled-Ribbon Battery Modules



*Rolled-Ribbon
Manufacturing Equipment*

We are exhibiting here at the conference.

*Drop by our booth to learn more about
Rolled-Ribbon.*

Thanks!