



Lunch & Learn

Custom or Standard – Which Battery is Best for You?

Recorded Friday, 27 April 2020

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<https://attendee.gotowebinar.com/recording/5839954162658416897>

Custom or Standard – Which Battery is Best for You?



Agenda:

If you are “cutting the cord” for the first time, learn what battery options are available and how to decide which is most suitable for your needs.

- ▶ Evaluation criteria for Battery systems
- ▶ Technical advantages of Custom vs. Standard
- ▶ Commercial considerations
- ▶ How to choose a Battery partner

Next Webinar: **Custom Battery Designs**
Friday, May 15, 2020 at
12:00 PM EDT

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HOUSEHOLD BATTERIES



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Custom or Standard – Which Battery is Best for You?



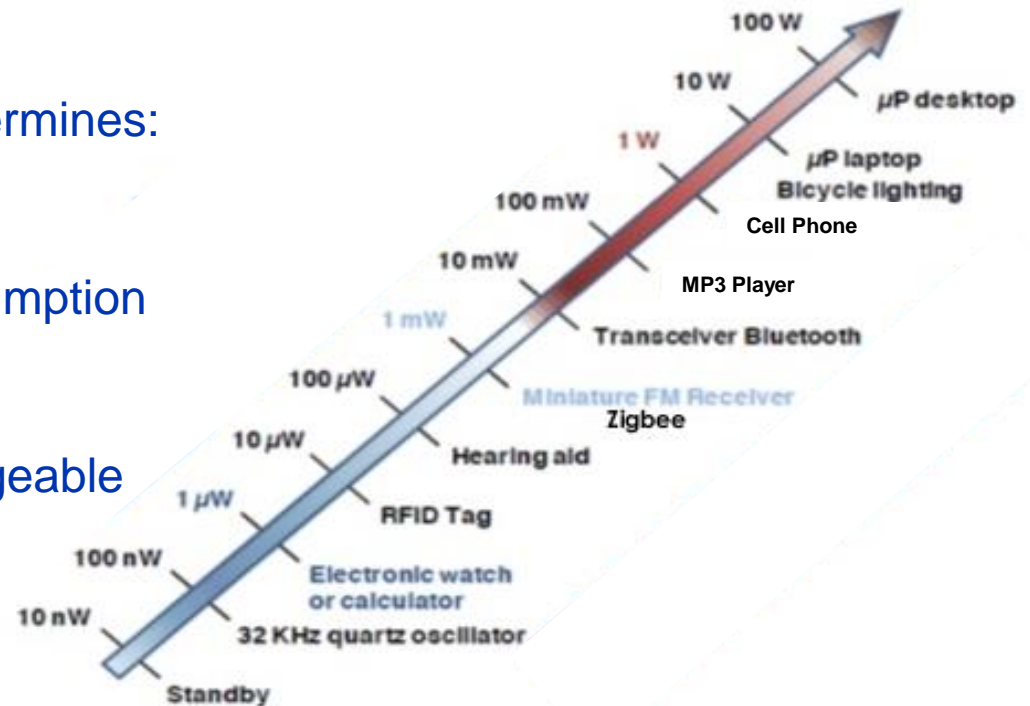
Agenda:

- ▶ Evaluation Criteria for Battery Systems
- ▶ Technical aspects of Custom vs. Standard
- ▶ Commercial Considerations
- ▶ How to choose a Battery partner

Criteria	Technical	Commercial
Definition of Custom	Power vs. Energy	Design Costs
Definition of Standard	Size, Shape, & Interface	Production Volumes
Semi-Custom / Semi-Standard	Charging	Timing

What type of Battery System?

- ▶ Power Consumption of the Device determines:
How much Battery is needed
- ▶ Battery needs change as Power Consumption increases...
 - ▶ Hearing Aid can use a non-rechargeable cell replaced once a week
 - ▶ Bluetooth ear-bud prefers a small rechargeable battery cell
 - ▶ Cell Phones, Laptops require larger rechargeable Battery Systems



What type of Battery System?

- ▶ Battery: Collection of Cells configured with wires/connector, housing, circuitry
 - ▶ Simple: Shrink-wrap housing, protection circuit, few wires
 - ▶ Complex: Plastic molded housing, fuel-gauge circuit, embedded connector



Definitions	Description	Details
Custom	Built for one customer only	One-time Design Fees Unique: Performance, Environment
Standard	“Off-the-shelf” – available to everyone	“Typical” usage environment Supply may fluctuate

Questions to consider regarding a Custom Design or Standard Battery systems...

- ▶ Is this a one-time design or will the Battery be the first in a line of products?
- ▶ How critical is the Battery to the operation of the device: Main Power or Backup?
- ▶ What is the operating Environment – typical or extreme?
- ▶ Expected Product Life-Cycle: Few years to 10+ years?
- ▶ Special Regulatory Certifications: FDA, IS, etc.
- ▶ Other “unique” requirements?



Obviously anything unique is a better candidate for a Custom Battery solution, but there are exceptions...

Critical Technical Metrics: What does your Device require?

▶ Power vs. Energy

- ▶ Power: High Discharge or Charge currents for short “bursts” of time
- ▶ Energy: Long Run-time with Low/Medium Discharge
- ▶ Mixed Use: High Discharge Continuously

Custom Battery could meet any of these

Standard Battery is often designed for Energy applications.

▶ Capacity

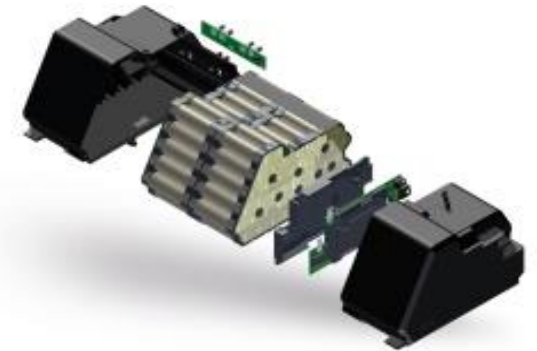
- ▶ Fixed or Expandable - Is one Battery enough?

Standard Batteries are more difficult to expand in parallel for increased capacity.

Critical Technical Metrics: What does your Device require?

▶ Size & Shape

- ▶ Custom options can meet tight requirements.
- ▶ Standard options may require more space.
- ▶ Battery embedded in Device or User Removable?



▶ Interface: Physical & Communications

- ▶ Industry standard pin-out and communications: SMBus, I2C, CAN Bus, etc.
- ▶ Device proprietary (custom to product line)

(NOTE: Industry Standard Communications can still use Authentication protocols to prevent unauthorized replacement Battery usage.)

Evaluating Custom vs. Standard



Custom	Product Requirements	Standard
Product Family	Product Line	One Time Design
Main Power	Criticality of Battery	Backup Only
Extreme	Environment	Typical
5+ Years	Product Life Cycle	Few Years
FDA, IS, other	Regulatory Certifications	UN, UL, IEC only
Power or Energy	Power or Energy Device	Energy
Expandable	Capacity	Fixed
Unique Shape and/or Non-Embedded	Size & Shape	Rectangle or Square, Embedded Battery

Critical Technical Metrics: What does your Device require?

▶ Charging: When & How?

- ▶ During operation? During the usage day? = Quick opportunistic & fast.
 - ▶ Will Battery be replaced with a full one or charged briefly?
- ▶ Overnight only? End of shift / usage day = Slow
- ▶ Regenerative Option: Ability to accept charge from Device in operation

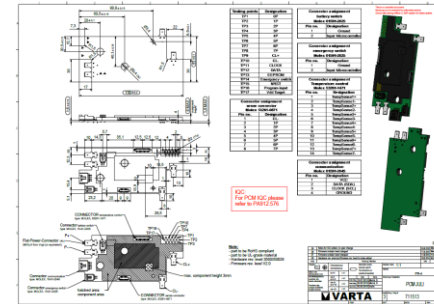
▶ Other Charging Methods (best for Custom)

- ▶ In-Battery Charging
- ▶ Wireless Charging



Design Costs: Custom

- ▶ NRE: Non-Recurring Engineering
 - ▶ Mechanical & Electrical Design
 - ▶ Tooling Design & Manufacture (plastic parts, metal parts)
 - ▶ Manufacturing Design (fixtures needed to assemble the Battery)
 - ▶ Regulatory Certifications (UN38.3, IEC, UL, etc.)



Design Costs: Standard

- ▶ Low (*Optional: Additional Regulatory Certifications can often be added for a set fee depending on the requirement.)

Production Volumes & Price:

▶ Standard

- ▶ Unit Price x Annual Volume < \$1M
- ▶ Lead-time variable based on stock – limited forecasts needed
- ▶ Pricing variable based on supply & demand

▶ Custom

- ▶ Unit Price x Annual Volume > \$3M
- ▶ Lead-time fixed with supply agreements
- ▶ High volumes help keep pricing low



Timing:

- ▶ Custom Development
 - ▶ Can be as short as eight (8) weeks or as long as 6 months
 - ▶ Allows changes in Design (at a cost, and if early enough)

- ▶ Standard Availability
 - ▶ Product is stocked
 - ▶ Multiple customers
 - ▶ Widely Available through multi-national Distribution channels



Evaluating Custom vs. Standard

Final Tally



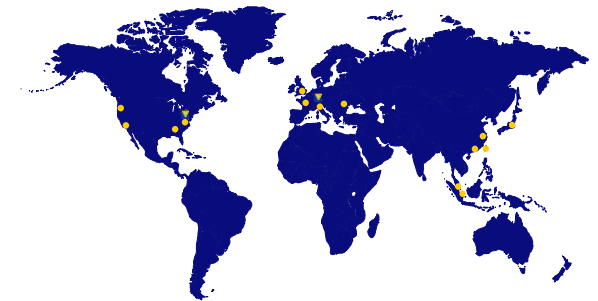
Custom	Product Requirements	Standard
Product Family	Product Line	One Time Design
Main Power	Criticality of Battery	Backup Only
Extreme	Environment	Typical
5+ Years	Product Life Cycle	Few Years
FDA, IS, other	Regulatory Certifications	UN, UL, IEC only
Power or Energy	Power or Energy Device	Energy
Expandable	Capacity	Fixed
Unique Shape and/or Non-Embedded	Size & Shape	Rectangle or Square, Embedded Battery
Proprietary	Interface	Industry Protocols
Fast, Regen	Charging	Slow, After Usage
On-board or Wireless	Charging Methods	Traditional
NRE	Design Costs	Low
Unit \$ x EAU > \$3M	Production Volumes	Unit \$ x EAU < \$1M
2 to 6 months	Timing	Immediate

Selecting a Battery Partner Standard or Custom



Considerations:

- ▶ Technology Leader
- ▶ Well known in the Industry
- ▶ Standard line of products in a variety of sizes
- ▶ Previous Custom designs with well known customers
- ▶ History and Industry Experience in Battery systems
- ▶ High-volume Manufacturing Expertise (not just a Design House)
- ▶ Worldwide Reach & Support
 - ▶ Multiple Manufacturing & Design locations
- ▶ Reputable firm – ideally a public company
- ▶ Financially Stable & Reliable



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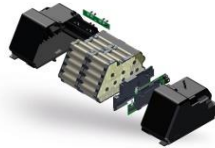
More than 130 years of innovation



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Primary Lithium
Cell assembly**
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+
Mechanical and
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Residential Energy
Solutions**
+
Cell and charge balancing,
Power interface



**VARTA Storage
Commercial Storage
Solution**
+
Adressing multiple
energy management
functionalites



Production
+
Massive Investments in
production in lithium ion
cells in Ellwangen and
Noerdlingen

VARTA has a long history in research, development, and mass production of a variety of electro-chemistry and battery systems.

**VARTA
Lithium Cells**



**VARTA
Customized Lithium-
Polymer Pouch**
+
Safety Electronic



**VW VARTA
Joint Venture**
+
New material
technologies



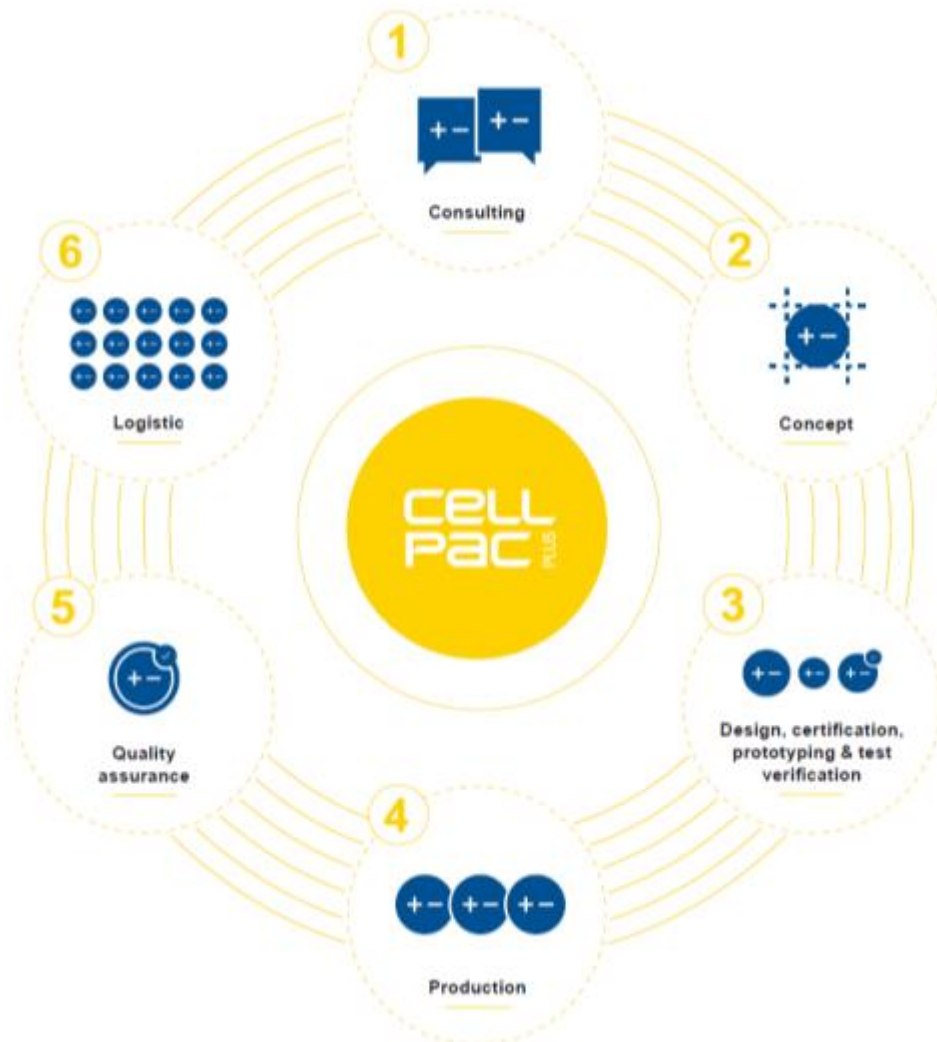
**VARTA
CoinPower Series**
+
Innovative
Cell-Design for highest
Performance & Safety



**New VARTA
CoinPower types**
+
form factors



VARTA Methodology Custom Designs



Complete Customer Focus:

To Your Schedule, Not Ours

- ▶ VARTA provides comprehensive service and consultation through the whole development process.
- ▶ Success-determining factors for the development of individual battery pack solutions:
 - ▶ Selection of the right Cells
 - ▶ Mechanical and Electrical design
 - ▶ Certification and Tests



Standard Battery Products



Wide Array of Standard Batteries:

- ▶ Voltages 3.6V to 48V
- ▶ Capacities 660mAh to >1.5kWh
- ▶ Individual & Expandable
- ▶ Cylindrical Sizes
- ▶ Pouch/Prismatic Sizes
- ▶ Embedded Battery Packs
- ▶ Consumer Removable Packs
- ▶ Industrial, Mobile Robotics units

www.varta-storage.com/en/products/power/asb

www.varta-storage.com/en/products/power/cellpac-lite

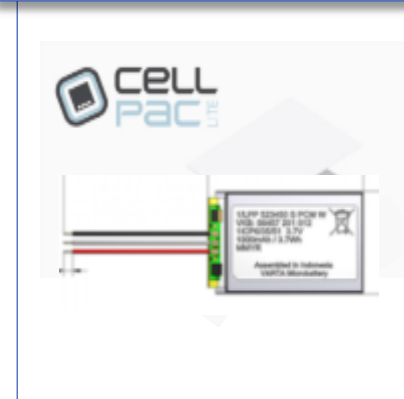
CellPac LITE Cylindrical



Easy Block/Blade ASB



CellPac LITE Pouch



EasyPack





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Next Webinar: “Custom Battery Design Tips”

Friday, May 15, 2020 at 12:00 PM EDT

Register at: <https://attendee.gotowebinar.com/register/5911531270115967504>

Previous: “Application Specific Standard Battery Workshop”

View video at: <https://attendee.gotowebinar.com/recording/5416910467111528461>