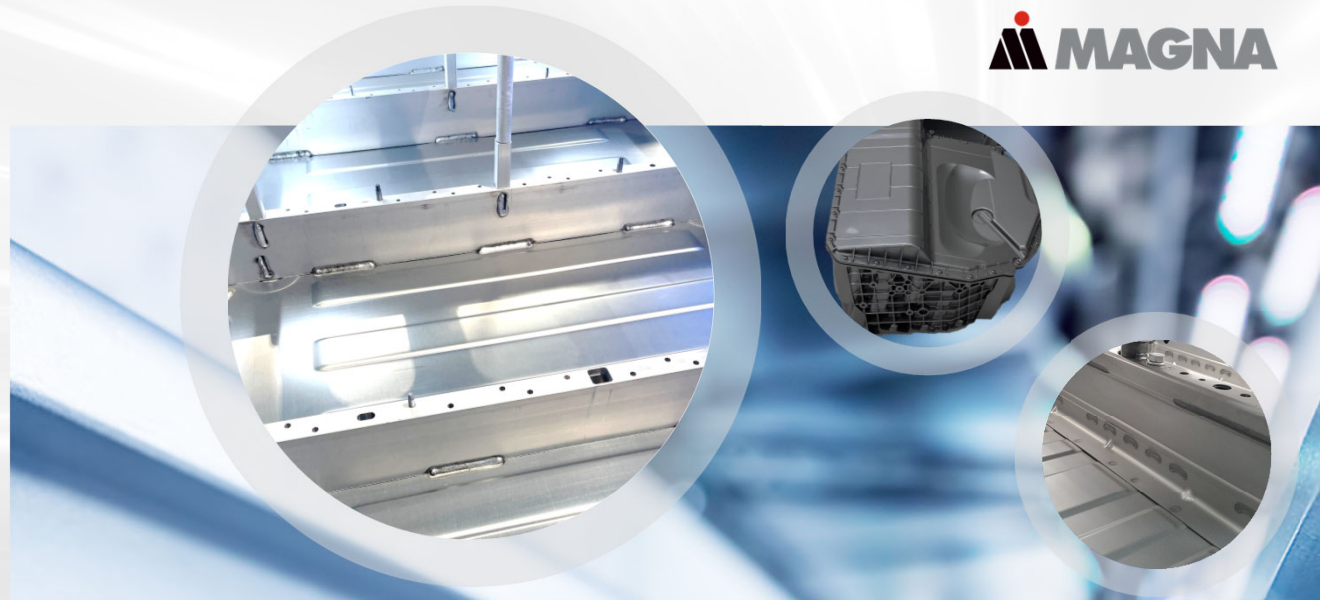


# Body & Chassis Battery Enclosures

## Battery Enclosures

# Battery Enclosure Efficiencies

Magna offers the complete array of battery enclosure production and engineering solutions. Advanced forming and integration projects are underway within Magna, focusing on steep walls and tight corners as well as functional integrations of the complete battery system, eliminating redundancies to allow for greater space optimization.



Cleaner



Safer



Lighter



Co-Development Opportunity



Design



Electrification

### Competitive advantage/differentiators

- Two complete battery enclosure systems for fully-electric vehicles begin production in 2021, following our track record of supplying mid and full-hybrid battery enclosures
- R&D, advanced engineering, and simulation expertise optimize design, and address technical challenges
- Global engineering production footprint

### Applications

- Hybrid & EV platforms
- Complex and modular designs
- Multi-material requirements
- Scalable design to fit different vehicle segments or energy densities

SOP

Ideation

Discovery

Concept

Development

Series Preparation

in Production

## Steel Capabilities

# Steel Battery Enclosure

With Magna's broad expertise in engineering and various steel forming and joining capabilities, we offer the complete development and production of steel battery enclosure solutions. This includes all required safety and quality checks on a global scale.



Cleaner



Design



Electrification



Co-Development Opportunity

### Competitive advantage/differentiators

- Steel battery enclosures combine the structural advantage of higher-grade steel and the lower material cost compared to aluminum or fiber reinforced plastic
- Large one-piece stampings offer improved leak tightness, are safety-critical, and reduce production costs
- Optimized battery space utilization due to formability properties of steel

### Applications

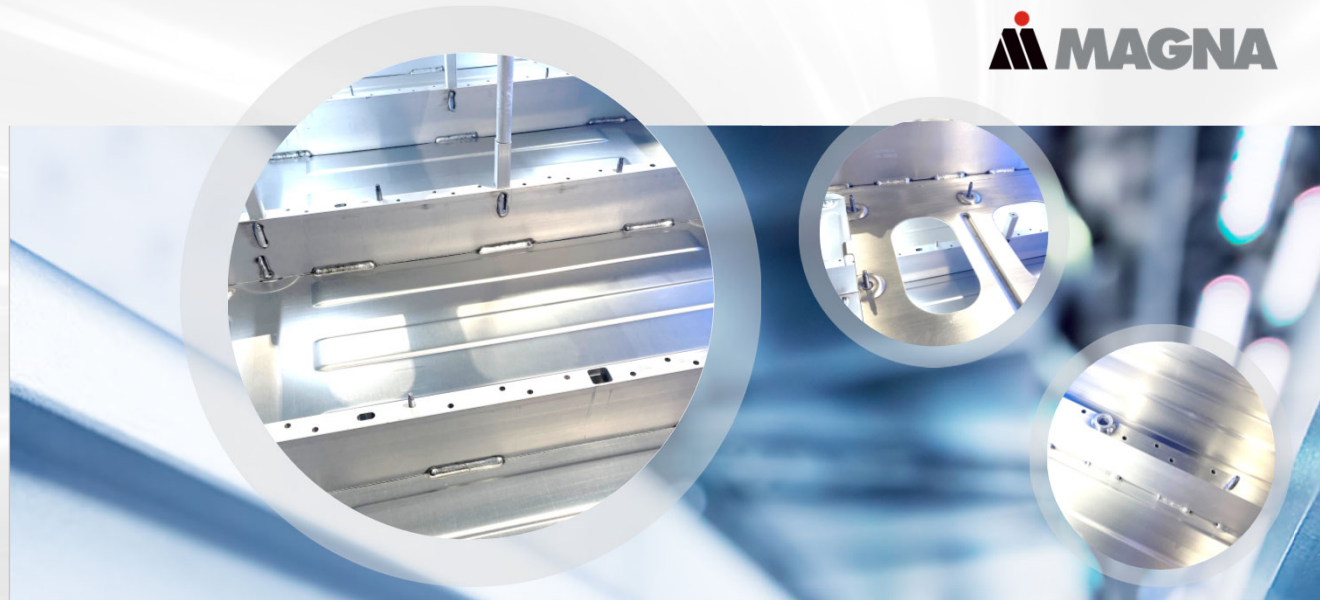
- Complex and modular designs
- Cost reduction initiatives
- Hybrid & EV platforms



## Aluminum Capabilities

# Aluminum Battery Enclosure

With Magna's engineering and manufacturing capabilities for complex aluminum assemblies, we can support all customer needs regarding aluminum battery enclosures on a global scale. We offer solutions with the best possible quality from the first concept development to high volume mass production.



Cleaner



Design



Lighter



Electrification



Co-Development Opportunity

### Competitive advantage/differentiators

- 20% lighter than comparable steel designs
- Aluminum designs offer light weighting and high-scalability to produce different enclosure sizes for different vehicles on one production line
- Designed as an assembly of extrusions, castings, and stampings

### Applications

- Lightweight designs
- Complex and modular designs
- Hybrid & EV platforms



## Seamless Design

# One-Piece Tub Battery Enclosure

Magna's innovative One-Piece Tub Battery Enclosure utilizes steel stamping and laser welding techniques to offer improved structural efficiency and load paths. The One-Piece Tub reduces manufacturing costs and increases battery volume.

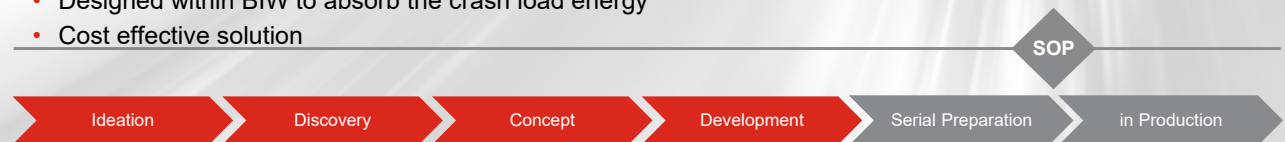


### Competitive advantage/differentiators

- Eliminate complex joining solutions that drive manufacturing costs and high risks to meet sealing performance
- Increases volume for battery cells by 8%
- Non-structural steel battery enclosure is 18kg lighter vs baseline aluminum structural battery enclosure
- Designed within BIW to absorb the crash load energy
- Cost effective solution

### Applications

- Can be applied into multiple BIW solutions
- Uniform single seal surface to remove leak tight joint in multiple piece construction solutions
- Eliminates redundant crash structure



Innovation

# Electric Vehicle Battery Cover

Composite EV Battery Enclosure offers the ability to create large parts with complex geometry in affordable one-piece solutions.



Cleaner



Lighter

## Competitive Advantage/Differentiators

- 30% reduction in tooling investment
- A range of materials that will achieve equal to or lighter than aluminum solutions
- High performing flame-retardant materials to meet thermal runaway requirements
- EMI shielding capable
- Complex geometry enables packaging for higher energy density.

## Applications

- Battery Covers
- In production on Ford Mach-e

SOP

Ideation

Discovery

Concept

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in Production



**ii MAGNA**

Forward. For all.