AGENDA

• Introduction of Cleveland-Cliffs Corporation
• BEV growth outlook
• Life cycle assessment – Steel vs. Aluminum
• Challenges in BEV architecture design for safety
• Is lightweighting still relevant?
• Battery enclosure material – Steel
• AHSS battery pack design
• Summary
CLEVELAND-CLIFFS

- Largest flat-rolled steel producer in North America following 2020 acquisitions of AK Steel and ArcelorMittal USA
- Fully integrated from raw materials to primary steelmaking to downstream stamping, tooling, and tubing
- Steel market leader in automotive industry sales and quality
- Track record of cost synergy achievement, commercial excellence, and disciplined approach to supply
- Full commitment to ESG policies including aggressive GHG emissions reduction and inclusive capitalism
COMPANY OFFICES AND OPERATIONS

Offices
1. Cleveland-Cliffs Headquarters
2. Regional Office – West Chester
3. Regional Office – Chicago
4. Regional Office – Richfield
5. Research & Innovation Center

Mines and Pellet Plants
6. Hibbing Taconite (JV)
7. United Taconite
8. Northshore Mining
9. Minorca Mine
10. Tilden Mine
11. Empire Mine (idled)

Steelemaking
12. Mansfield Works
13. Butler Works
14. Dearborn Works
15. Middletown Works
16. Ashland Works (idled)
17. Burns Harbor
18. Cleveland
19. Coatesville
20. Indiana Harbor
21. Riverdale
22. Steelton

Value-Added Products
32. Toledo – HBI
33. Windsor/Ontario – Component Stamping
34. Sylacauga – Component Stamping
35. Bowling Green – Component Stamping
36. Walbridge – ERW Tubing
37. Columbus – ERW Tubing

Cokemaking and Coal Mining
38. Mountain State Carbon
39. Monessen (idled)
40. Princeton
41. Warren

Finishing Facilities
23. Rockport Works
24. Coshocton Works
25. Zanesville Works
26. Burns Harbor Plate and Gary Plate
27. Columbus (idled)
28. Conshohocken
29. Piedmont
30. Weirton
31. I/N Tek and I/N Kote
A DIFFERENTIATED, FULLY-INTEGRATED BUSINESS MODEL

- Vertically integrated in ferrous raw materials
- Annual shipments of 16-17 million tons
- Industry leading automotive market share
- Innovative and diverse downstream capabilities
DIVERSIFIED END MARKETS WITH FOCUS ON VALUE ADDED PRODUCTS

Product Mix

- Coated: 30%
- Slab, Rail, Other: 10%
- Plate: 6%
- Hot-Rolled: 33%
- Cold-Rolled: 17%
- Stainless & Electrical: 4%

End Market Mix

- Auto: 23%
- Infrastructure & Manufacturing: 40%
- Distributors & Converters: 27%
- Other: 10%

Extensive Product Offering

- Advanced High-strength Steels
- Aluminized
- Automotive Exposed
- Cold-rolled Coil
- Electrogalvanized
- Galvalume
- Galvanneal
- Grain Oriented Electrical
- Hot-dipped Galvanized
- Hot-rolled Coil
- Non-oriented Electrical Steels
- Plate
- Rail
- Stainless Steels
- Stamped Components
- Trimplate
- Tool & Die
- Tubing
CLIFFS NOW HAS INFLUENCE OVER THE ENTIRE STEEL LIFE CYCLE

- Cliffs' flat-rolled
  The largest original source of prime scrap in the US

- Cliffs' scrap processing

- Equipment Manufacturing

- Cliffs receives OEM scrap offtake

- FPT has existing infrastructure inside OEM facilities

- Third party sales

- Agreement with OEM covers both steel sale and scrap offtake

Cliffs' position as the most prominent automotive steel supplier in the US provides the most compelling scrap offtake proposition for the OEM.
CLIFFS’ COMMITMENT TO GHG REDUCTION

Cliffs’ 25% GHG Reduction by 2030

How we will accomplish

- Use of natural gas via direct reduction and blast furnaces
- Clean energy and energy efficiency projects
- Carbon capture

Cleveland-Cliffs’ eight operating blast furnaces are among the lower GHG-intensive integrated operations in the world

Pro forma GHG emissions profile of Cleveland-Cliffs’ new operating footprint.

GHG Emissions (CO2e MMT per Year)

2015 2016 2017 2018 2019 2030

44.5 44.2 44.1 42.0 39.8 33.0

25% GHG Reduction by 2030
ICE PHASE OUT - USAOEM PERSPECTIVE - BEV OUTLOOK

Source: McKinsey & Company

- Denmark
- Scotland
- France
- Iceland
- Singapore
- Cabo Verde
- Canada
- Ireland
- Slovenia
- China
- Portugal
- Israel
- Sweden
- Japan
- Spain
- Norway
- Netherlands
- United Kingdom
- Sri Lanka
- Costa Rica
- Germany

2025
2030
2035
2040
2045
2050

- 100% electrified sales
- 100% ZEV sales
- 100% ZEV stock
- Net-zero pledge

Net-zero emissions pledges

Source: IEA
This means that, with the energy it would take to produce aluminum-intensive vehicles, you could manufacture, power and recycle AHSS BEVs plus have enough leftover energy to power an additional 170,000 BEVs for their entire useful lives, or supply the total energy demand to 77,000 U.S. households for 12 years (based on publicly available 2015 data).
CHALLENGES IN BEV ARCHITECTURE DESIGN FOR SAFETY

- Unique safety performance like electric safety and cabin deformation
- Mass increase about 50% for the propulsion and 25% of the curb mass compared to ICE
- New layout and structure of the front end to meet the frontal crash requirements
- IIHS SORB adds additional safety requirements
  - Increased role of bumper in high speed impact
- New IIHS side impact protocol introduces 82% more energy
  - Mass increase from 1500 kg to 1900 kg speed increase (50 to 60 kmph)
    - Rocker structures are becoming more complex
DO WE NEED LIGHT WEIGHTING?

BEV price parity with gas-powered cars by 2024

Mass saving cost premium for EV Structures
$1.75 - $2.75 per kg saved

Source: BloombergNEF

https://lar.org/report-electric-vehicles
# Battery Weight Comparison

<table>
<thead>
<tr>
<th>Car Segments</th>
<th>BEV Models (SOP)</th>
<th>Energy Content / Battery Size (kWh)</th>
<th>Battery Range (mi)</th>
<th>Battery Weight (lbs.)</th>
<th>Battery Housing Net Weight (lbs.)</th>
<th>Housing Share of Total Battery Weight (%)</th>
<th>Energy Content per Pound of Battery</th>
<th>Energy Efficiency (declared)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Volkswagen Up! (2011) (only one A-segment model in NA: JAC Refine S4)</td>
<td>32</td>
<td>160</td>
<td>547</td>
<td>ST: 97 Composite: 21</td>
<td>22%</td>
<td>58.5 Wh/Lbs.</td>
<td>20.3 kWh per 100 mi</td>
</tr>
<tr>
<td>B</td>
<td>Chevrolet Bolt (2016)</td>
<td>66</td>
<td>259</td>
<td>960</td>
<td>ST: 190</td>
<td>20%</td>
<td>68.8 Wh/Lbs.</td>
<td>25.5 kWh per 100 mi</td>
</tr>
<tr>
<td>C</td>
<td>Nissan LEAF (2017)</td>
<td>52</td>
<td>226</td>
<td>904</td>
<td>ST: 180</td>
<td>20%</td>
<td>68.5 Wh/Lbs</td>
<td>27.4 kWh per 100 mi</td>
</tr>
<tr>
<td>D</td>
<td>Ford Mach-E (2020)</td>
<td>75.7 (70 usable)</td>
<td>230</td>
<td>1069</td>
<td>AL Extrusion: 168 AL Sheet: 45 Composite: 42</td>
<td>25%</td>
<td>70.8 Wh/Lbs.</td>
<td>30.4 kWh per 100 mi</td>
</tr>
<tr>
<td>E</td>
<td>Tesla Model S (2012)</td>
<td>85</td>
<td>265</td>
<td>1200</td>
<td>AL: 240 ST: 35</td>
<td>23%</td>
<td>70.8 Wh/Lbs.</td>
<td>32.1 kWh per 100 mi</td>
</tr>
</tbody>
</table>

Source: Ducker
BATTERY ENCLOSURE - STEEL SOLUTION

Advantages
- Manufacturing
- Impact Resistance
- Space Saving
- Fire resistance/Preconditioning
- Lower cost
- Sustainability

Disadvantages
- Corrosion
- Thermal Management
- Limited ability to consolidate parts
# LOAD CASES

<table>
<thead>
<tr>
<th>Modal Constraint on BIW attachments</th>
<th>Crush test</th>
<th>Underfloor Intrusion</th>
<th>Drop Test</th>
<th>Shock Test</th>
<th>Vibrational Fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency constraint depending on OEM</td>
<td>EU ECE R100 China-GBT31467.3</td>
<td>Quasi Static Load Rigid Pole Impactor 150 mm -Dia.</td>
<td>Quasi Static Load Round Shape 20 mm rigid impactor</td>
<td>SAE J2464 China-GBT31467</td>
<td>Proof Shock 2g (x,y)&amp; 4g in Z Abuse Shock (25g)</td>
</tr>
<tr>
<td></td>
<td>No contact with Modules before reaching 100 kN</td>
<td>No contact with modules before reaching 35 kN</td>
<td>Drop from 4.9m (Hitting velocity 9.8m/s), Angle with ground 15 degrees. No failures</td>
<td>Stresses below Yield/Tensile</td>
<td>Stresses below tensile/6</td>
</tr>
</tbody>
</table>
CRUSH & UNDER FLOOR TEST
DIFFERENT BATTERY ENCLOSURE DESIGNS

Top and Bottom Cover

Top Cover
Mild Steel
EDDS/EDDS+

Bottom Cover
DP980/DP1180/NEXMET1200
CP780/CP980/MP780
ULTRALUME® PHS
Stamping
DIFFERENT BATTERY ENCLOSURE DESIGNS

Longitudinal Members

Martensitic M1100/M1300/M1500/M1700 Roll Form
DIFFERENT BATTERY ENCLOSURE DESIGNS

Cross Members

Martensitic M1100/M1300/M1500/M1700 Roll Form
DIFFERENT BATTERY ENCLOSURE DESIGNS

Longitudinal & Cross Members

Martensitic M1100/M1300/M1500/M1700 Roll Form
BEV - INTEGRATED BATTERY/BODY DESIGN

- Industry is heading in this direction
- Integrating battery enclosure to the chassis structure
- Skateboard design
- Steel offers the same advantages as before
SUMMARY

• Steel is clearly the material of choice for the battery enclosure
• Cleveland Cliffs provide a wide portfolio of steel grades for this application

- Martensitic
  - 1100/1300, 1500, 1700
- DP980/DP1180
  - CP780/CP980/MP780
- NEXMET® 1200
- ULTRALUME® PHS
- Mild Steel
  - (EDDS/EDDS+)

• In addition to the research and innovation center at Middletown, Ohio, Cleveland Cliffs offers a most comprehensive support with our advanced, applications, and customer technical services departments
FOR MORE INFORMATION

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