



Electrification Capabilities

Commercial Vehicle Market

The Power Behind
The Power Ahead

The Commercial Vehicle Landscape is Changing.

Emissions regulations and government policies are manifesting at an ever-increasing pace while businesses envision vehicles that reduce operating costs, while enhancing productivity and safety.

The accelerated need for alternative propulsion solutions is imminent. Fortunately, Dana is ahead of the curve, so you can be too.

Solutions that matter...

Meeting local regulation and zero-emission zones

Increasing productivity

Enhancing green corporate initiatives

Improving total cost of ownership

Where There's a Need, Dana Finds a Better Way.

It's been 50 years in the making, and today, Dana is an industry leader in e-powertrain integration. When it comes to complete electrified vehicles, Dana is your single source.

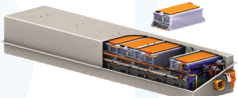
Vehicle Integration Services

e-Powertrain

e-Power Systems



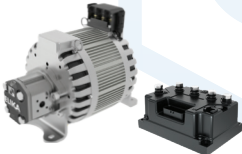
Power Electronics Cradle



Battery Packs with Battery Management Systems

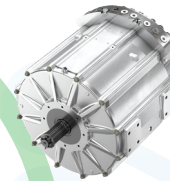


On-Board Chargers

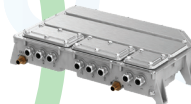


Low-Voltage Auxiliaries

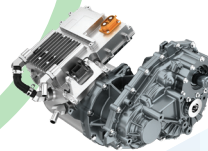
e-Propulsion Systems



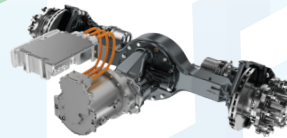
High-Voltage Motor



High-Voltage Inverter



e-Drive Unit



e-Drive Axle

System Software and Controls



Supporting Products



Thermal Management



Controllers

More than Hardware and Software. Complete In-House Integration from A to Z.

The strategic acquisition of Nordresa allows Dana to offer vehicles complete with highly effective, fully electrified powertrains. These vehicles are upfitted with Spicer® Electrified™ e-power and e-propulsion systems and supported by in-house software and vehicle controls, all seamlessly integrated into complete e-powertrains.



Hardware

- Custom battery packs
- Power electronics cradle
- Vehicle control unit
- Spicer driveline
- Spicer axles
- Spicer e-Drive Axles
- TM4® motors
- TM4 inverters
- TM4 on-board charger
- NEURO™ controller
- SME accessory motors
- Brake systems*
- ADAS systems*

Software

- BMS – battery management module and master
- ECU – powertrain control
- CCU – charge control unit
- EBC – electric brake controller
- Motor controls
- EBS – electric braking systems*
- ADAS software*

Driver/Fleet Interface

- Dashboard integration
- Connected software for drivers, fleet managers, and service technicians
- Customizable tools
- Over-the-air software updates available



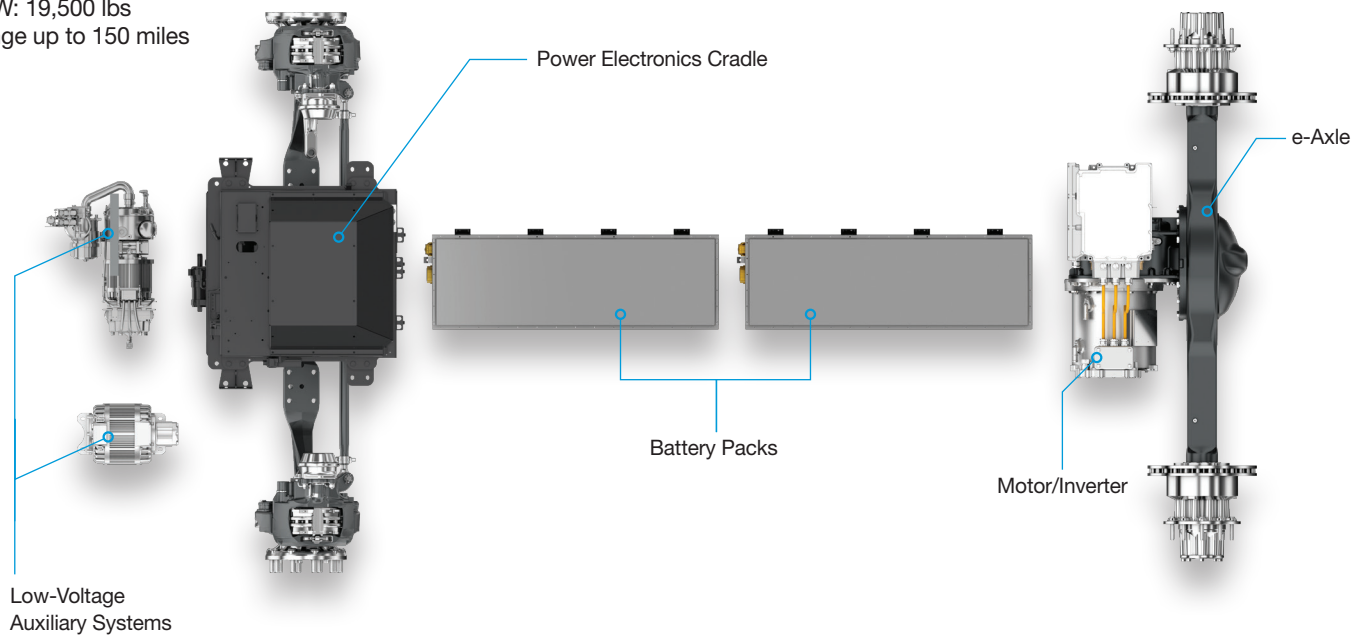
*Via joint venture with Bendix Commercial Vehicle Systems.

Commercial Vehicle e-Powertrain Systems

Supported by a legacy of innovation in conventional drivetrains, Dana has the electrified system solutions to meet any OEM's need wherever they are in their electrification development. While our engineers are working on electrification solutions for all applications, the following configurations are available now for immediate upfitting into your vehicles.

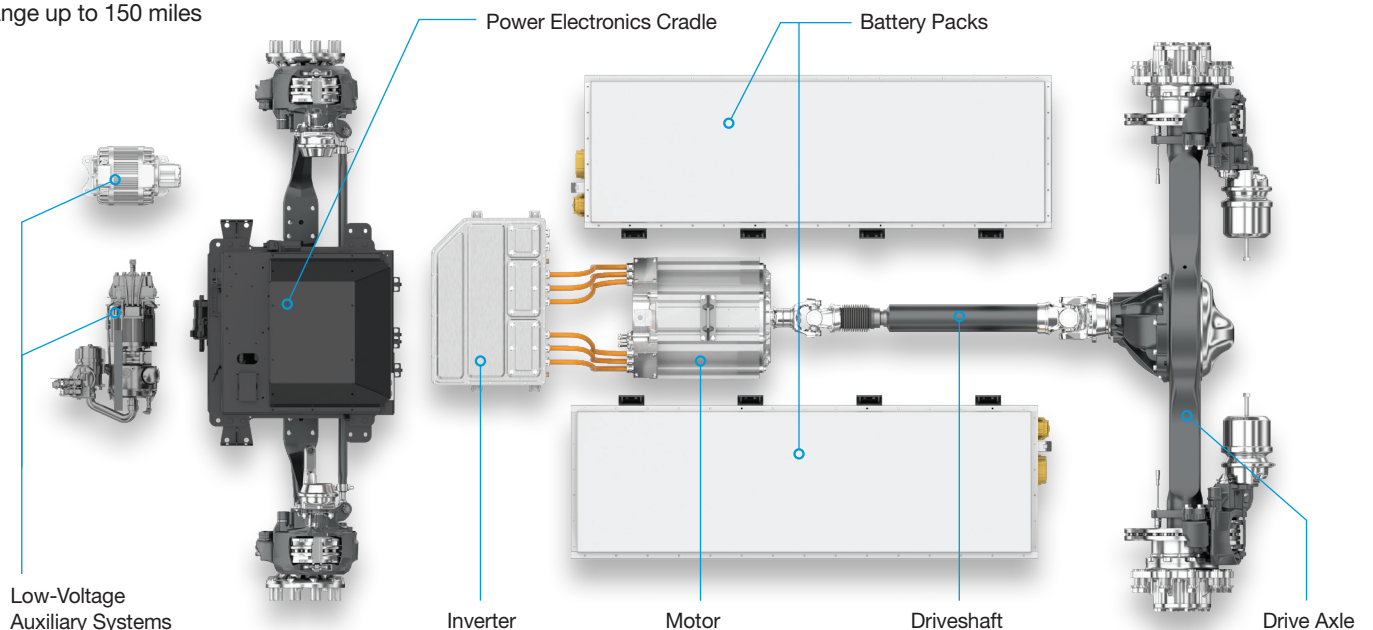
Class 5 e-Axle Systems – Available Now

- eS9000r e-Drive Axle with SUMO™ LD motor and CO150 inverter
- Max Horsepower: 303 hp
- GVW: 19,500 lbs
- Range up to 150 miles



Class 5 and 6 Central Drive Systems – Available Now

- SUMO MD motor and CO200 inverter
- Max Horsepower: 355 hp
- GVW: 33,000
- Range up to 150 miles



From Initial Information...

Dana makes the electrification process easy.

From our first interaction until the driver is behind the wheel, your electrification integration is in great hands. Our hands. Now and for years to come.

1



Call or Click

Start the conversation at DanaElectrified.com, or contact your field service representative.

2



Engineering Analysis

Dana engineers use the information to consider the variables and calculate anticipated performance.

It's all taking place right now...

To Full Vehicle Integration.

3

Installation and Programming

The system is routed, installed, programmed, and tested.

4

Fulfillment

Your vehicle is complete and ready to use.

5

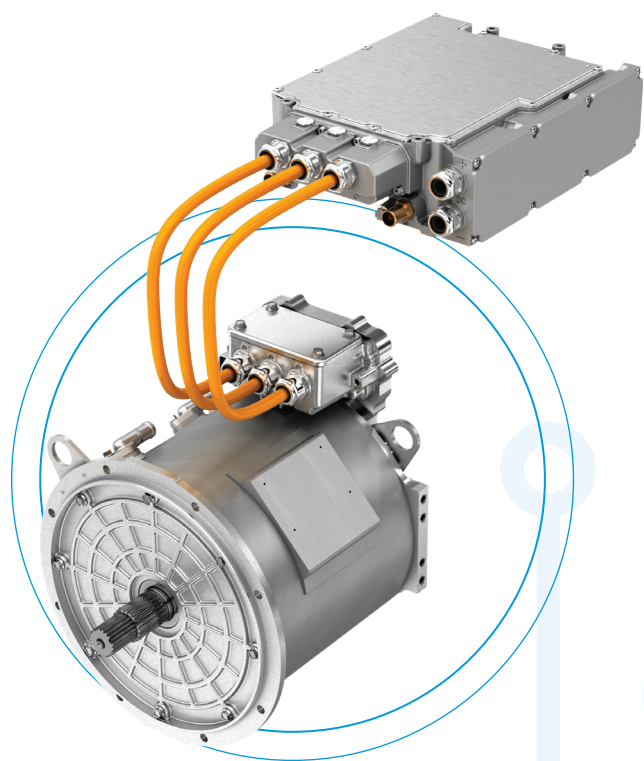
Continued Support

Over-the-air communication allows the unique ability to send software updates and power boosts.

Right here at Dana.

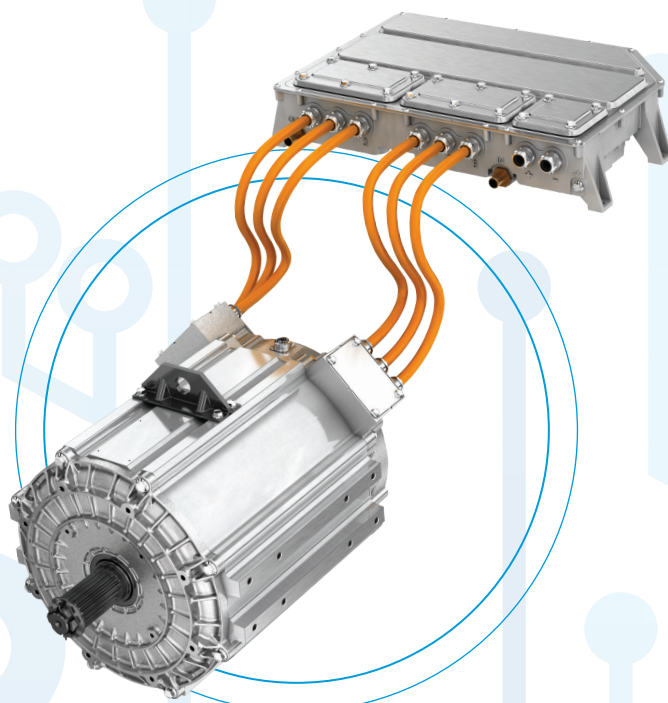
e-Propulsion Motors and Inverters

Dana's e-motor systems interface directly with standard differentials and/or gearboxes, and/or e-Drive Axles, making them perfect for class 2 to 8 commercial vehicles and light- to medium-duty bus platforms. The series features combinations of a high-torque/low-speed reluctance-assisted permanent magnet motor and controller that offer cost-effective solutions for vehicle electrification or hybridization.



SUMO LD Motor
+
CO150 Inverter

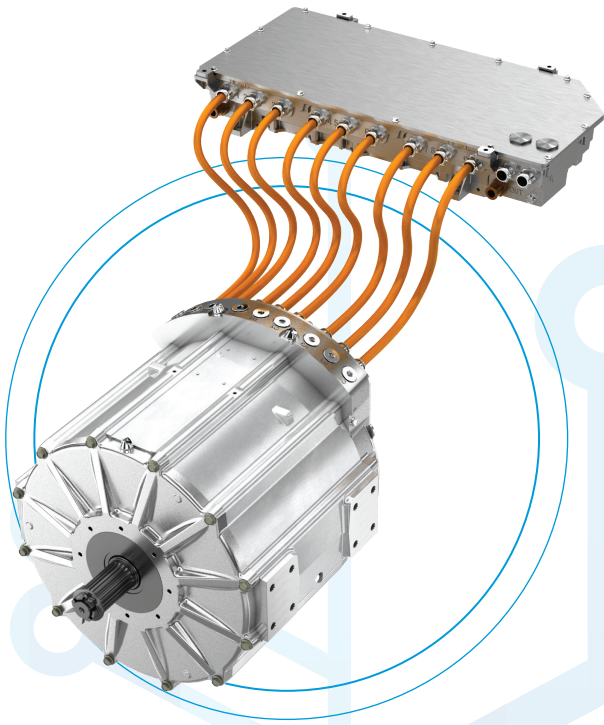
- e-Axle applications
- 3-phase
- Max Voltage: 750 V
- Peak Power: 200-275 kW
- Cont. Power: 100-160 kW



SUMO MD Motor
+
CO200 Inverter

- Central motor direct drive applications
- 6-phase
- Max Voltage: 450-750 V
- Peak Power: 162-265 kW
- Cont. Power: 100-190 kW





SUMO HD Motor + CO300 Inverter

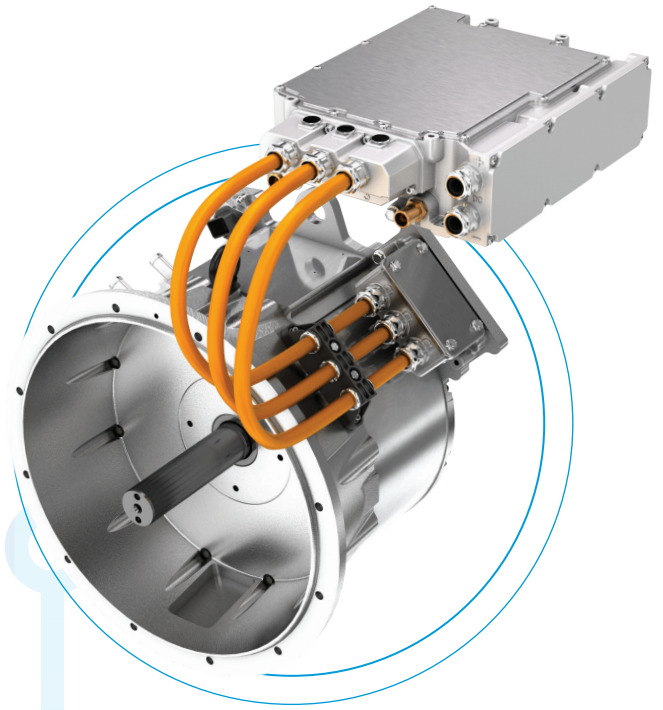
- Central motor direct drive applications
- 9-phase
- Max Voltage: 750 V
- Peak Power: 250-350 kW
- Cont. Power: 195-260 kW



Large Bus



Heavy-Duty Truck



SUMO HP Motor + CO150 Inverter

- Generator, e-Axle, and e-Trans applications
- 3-phase
- Max Voltage: 750 V
- Peak Power: 205-440 kW
- Cont. Power: 150-340 kW



Medium-Duty Truck



Medium Bus



Large Bus



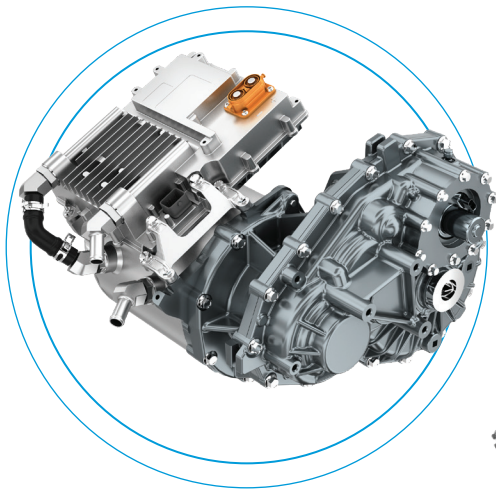
Heavy-Duty Truck



Vocational

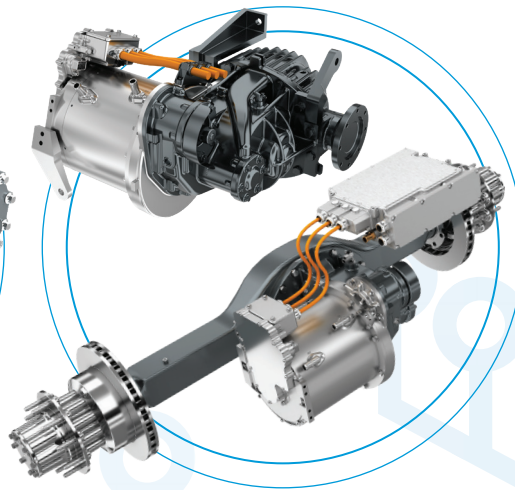
e-Propulsion Commercial Truck and Bus Axles

At Dana, we continue to do what we do best, effectively transfer energy to the wheels. Building on our 115 years of experience, we provide a variety of durable and efficient e-Drive Axle and driveline solutions for all applications.



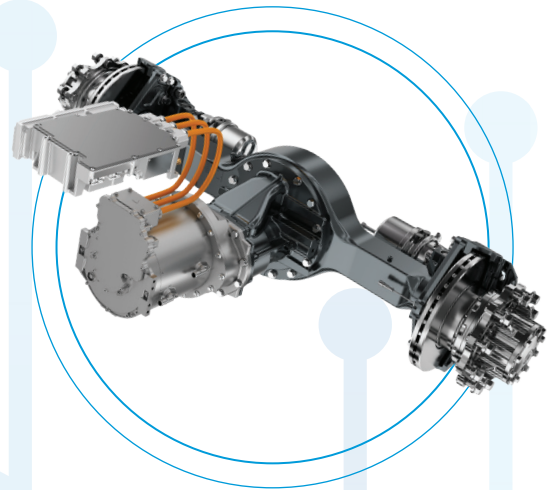
eS4500i

- Max GVW: 1.9T
- Max GAWR: 1.2T
- Max RPM: 14,000
- Peak Power: 180 kW
- Max Output Torque: 4,500 Nm



eS9000r

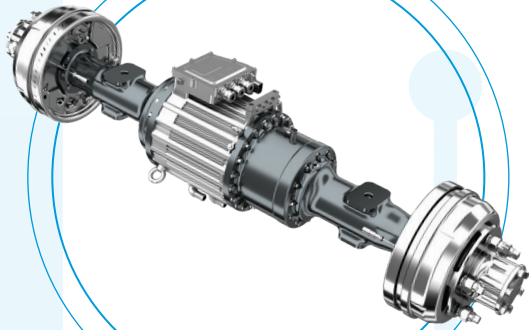
- Max GVW: 10.6T
- Max GAWR: 7T
- Top Speed: 83 mph
- Peak Power: 237 kW
- Max Output Torque: 9,000 Nm



eS6200r

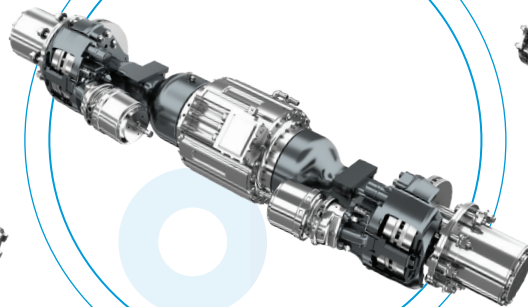
- Max GVW: 39T
- Max GAWR: 11.5T
- Top Speed: 84 mph
- Peak Power: 208 kW
- Max Output Torque: 6,200 Nm





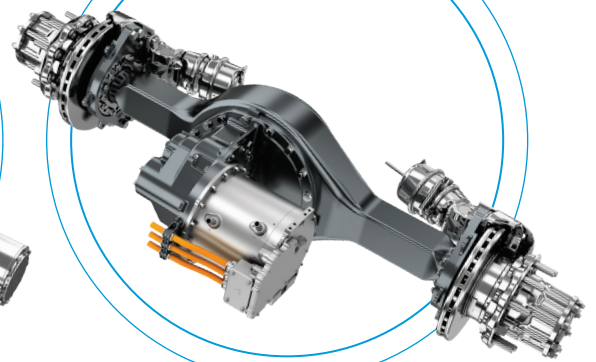
eS5700r

- Max GVW: 6T
- Max GAWR: 3.5T
- Top Speed: 50 mph
- Peak Power: 130 kW
- Max Output Torque: 5,700 Nm



eS13.0xr

- Max GVW: 13.5T
- Max GAWR: 8.5T
- Top Speed: 50 mph
- Peak Power: 150 kW
- Max Output Torque: 13,000 Nm



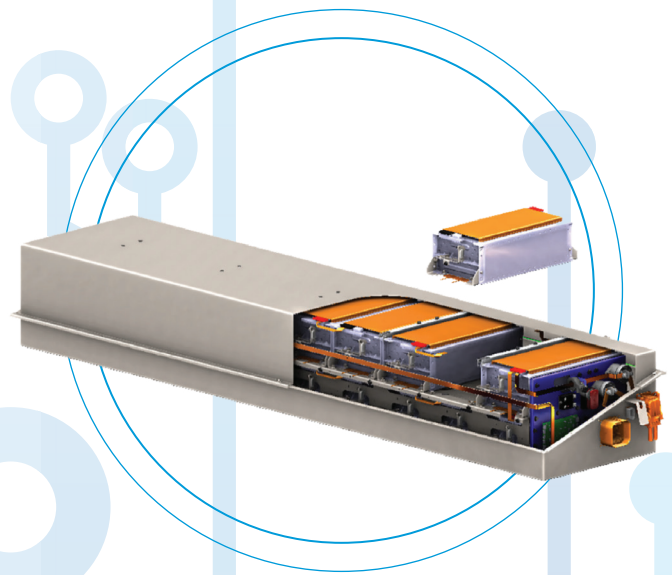
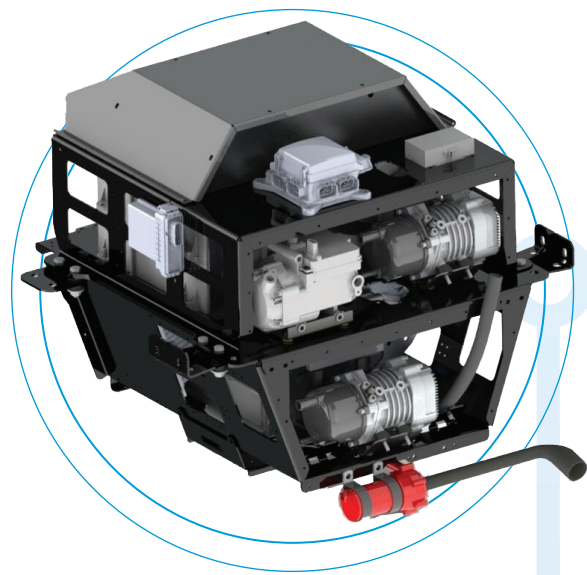
eS19.0xr

- Max GVW: 19T
- Max GAWR: 12.5T
- Top Speed: 55 mph
- Peak Power: 235 kW
- Max Output Torque: 19,000 Nm



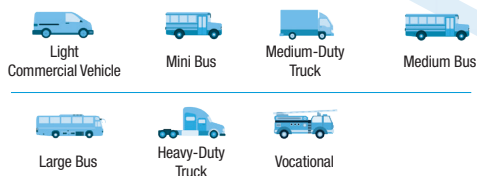
e-Power Systems

The Spicer Electrified e-power system comprises the technologies used to power the vehicle. With solutions available to support battery-electric, hybrid, or even full cell vehicles, we are your single source, no matter the power source!



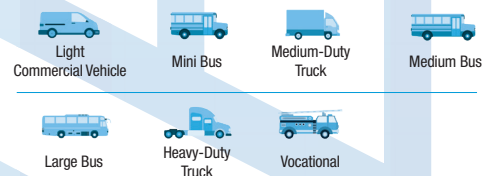
Power Electronics Cradle

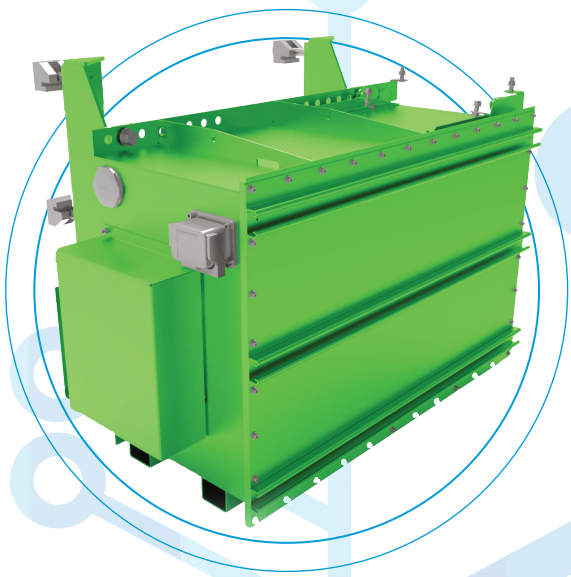
- Integrated controls, EV accessories, inverters, and charger
- Vehicle controls software
- Charge control software
- Designed for easy installation and serviceability
- Powers auxiliary vehicle systems such as EHPS and air compressors



BEV Batteries

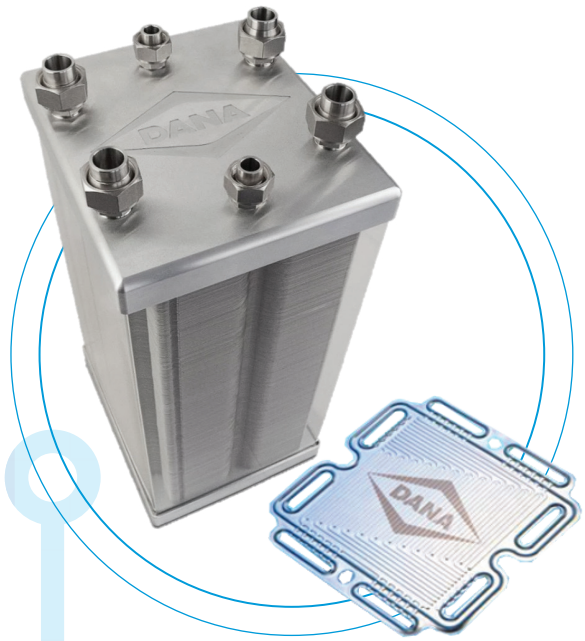
- Lithium Nickel Manganese Cobalt battery chemistry
- Energy Density: 175-215 Wh/kg
- Pack Sizes: 80, 120, 160 kWh
- Cycle Durability: 1,500-3,000
- Battery management system: charging, temperature control, and cell balancing software





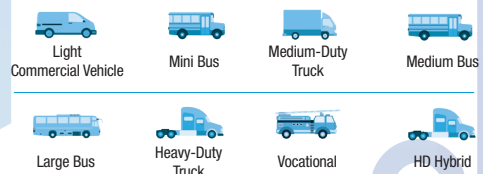
Hybrid Batteries

- LTO Lithium Titanate battery chemistry
- Energy Density: 60-110 Wh/kg
- Pack Sizes: 7 kWh
- Cycle Durability: 10,000-20,000
- Hyliion's proprietary battery technology provides power to the electric axle and climate control system in idle free scenarios



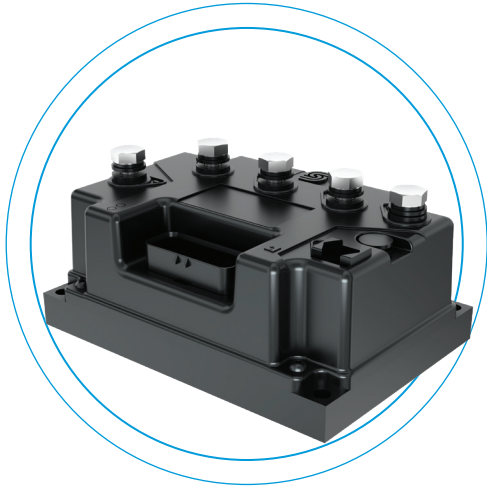
Fuel Cells

- Compressed Hydrogen
- Energy Density: 40,000 Wh/kg
- Pack Sizes: Variable
- Over 15 years of experience in the design and manufacturing of bi-polar plates for stack partners
- Partnering with key OEMs to co-develop future fuel cell technologies



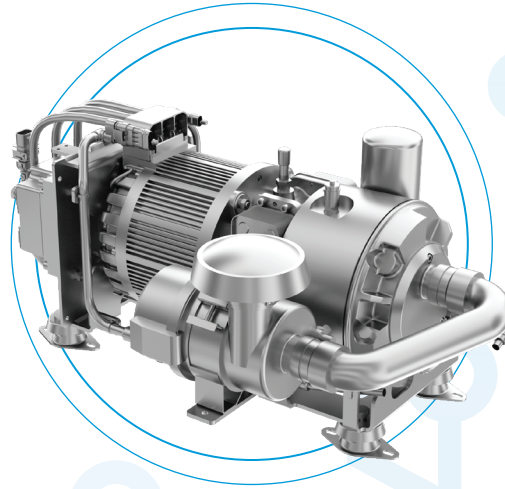
Additional EV Products

Dana offers a variety of low-voltage auxiliary systems, controller and thermal management products to support electric vehicle applications.



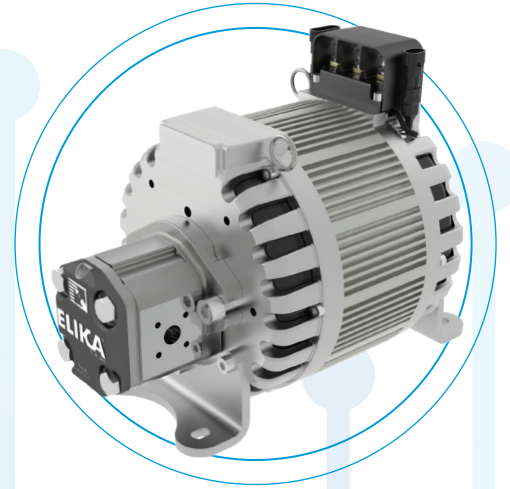
Low-Voltage Auxiliary Inverters

- e-Axle applications
- 3-phase
- Max Voltage: 450 V
- Peak Power: 120-150 kW
- Cont. Power: 70-90 kW



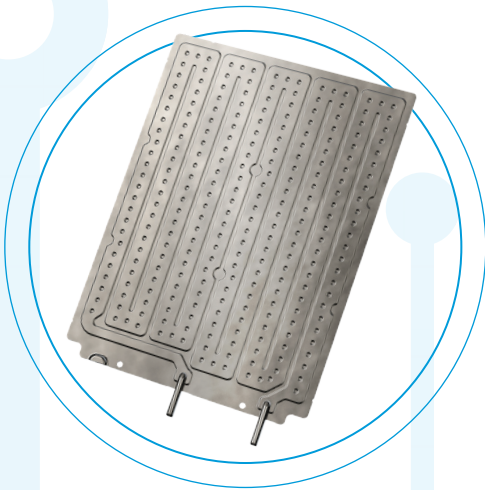
Electrically Powered Air Compressor

- e-Axle applications
- 3-phase
- Max Voltage: 750 V
- Peak Power: 200-275 kW
- Cont. Power: 100-160 kW



Electro-Hydraulic Power Steer

- Central motor direct drive applications
- 6-phase
- Max Voltage: 450-750 V
- Peak Power: 162-265 kW
- Cont. Power: 100-190 kW



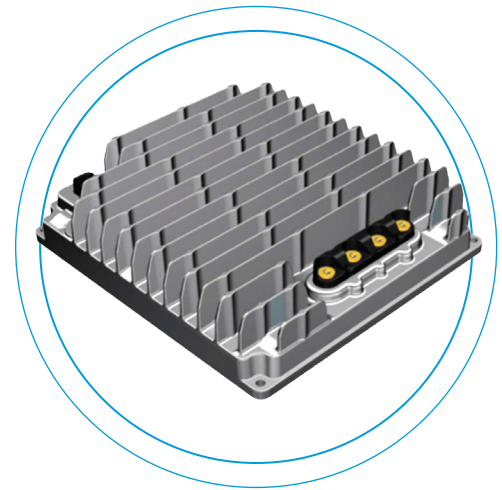
Thermal Management

- Battery and power electronics cooling via inner cooler or chiller plate
- Increasing high-voltage systems requires efficient heat dissipation for power electronics
- Dana's power electronics solution was a PACE Award finalist in 2016



NEURO 200 Vehicle Controller

- Fully programmable controller designed to be used as the main vehicle management unit
- Enables the development of multiple control features by interacting closely with the man-machine interface, traction system, and other components



DC/DC Converters

- Bidirectional 48V:24V
- Cont.: 3kW / Peak: 6kW
- Scalable
- ASIL-B
- 95%+ efficiency at partial load and high temp.
- Wide Temp. Range: -40 to +80 C

Vehicle Integration Portfolio

Rely on Dana for your e-powertrain needs. We already have a portfolio of successful developments in many medium- and heavy-duty applications. These are just a few customers who are already enjoying the Spicer Electrified advantage.

Zenith Van



Workhorse Van



Ford F-550



Isuzu NPR



Peterbilt 220



Hyllion Tractor



Lion 8



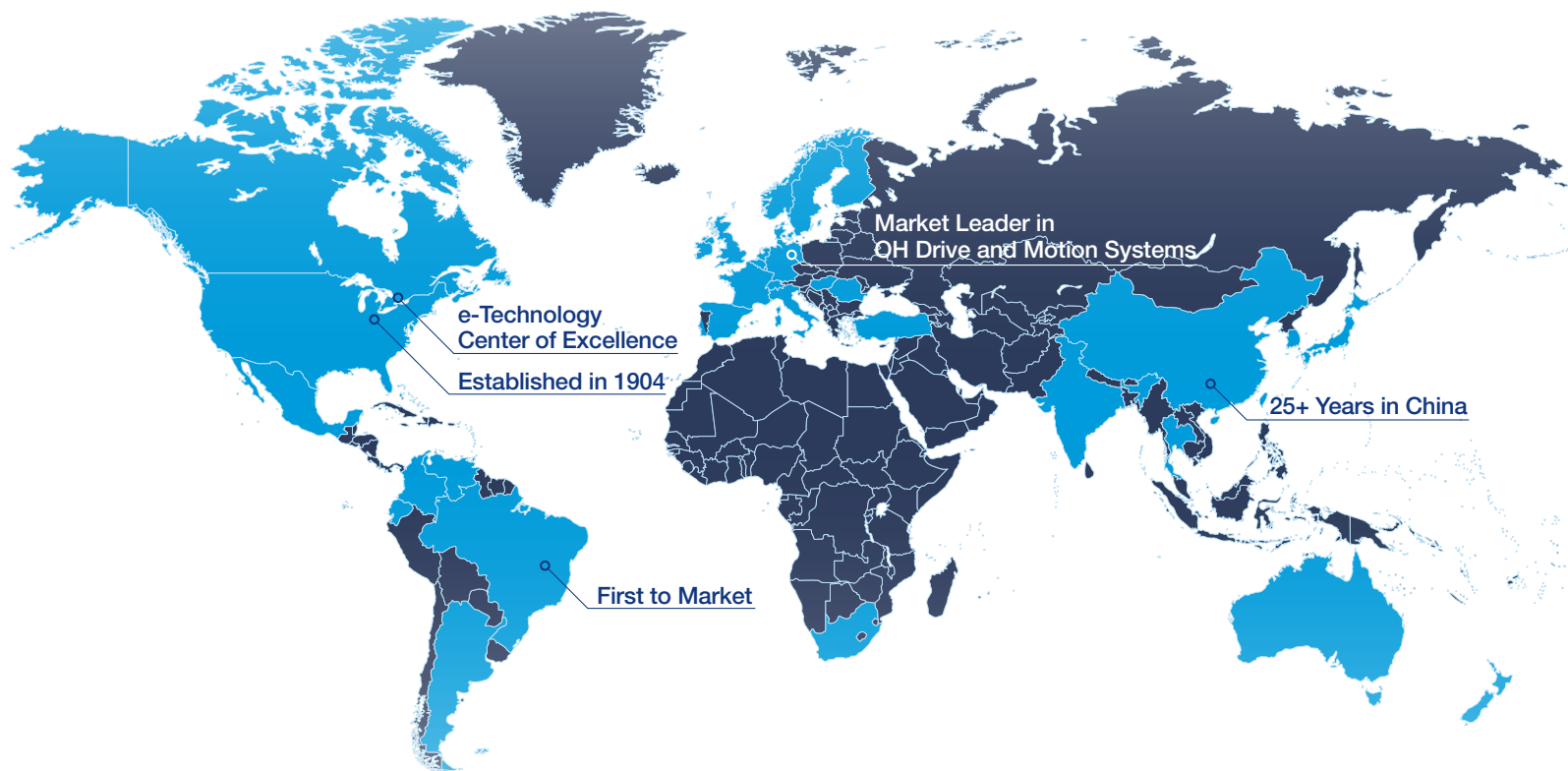
Lonestar Terminal Tractor



No Matter Where You Go. We'll Be There.

To date, Dana is the only supplier who can deliver complete e-driveline systems and fully-integrated e-Axles across all vehicle markets, and to more than 140 countries.

Our global presence, combined with our localized logistics, allows us to meet region-specific electrification and production needs anywhere in the world.



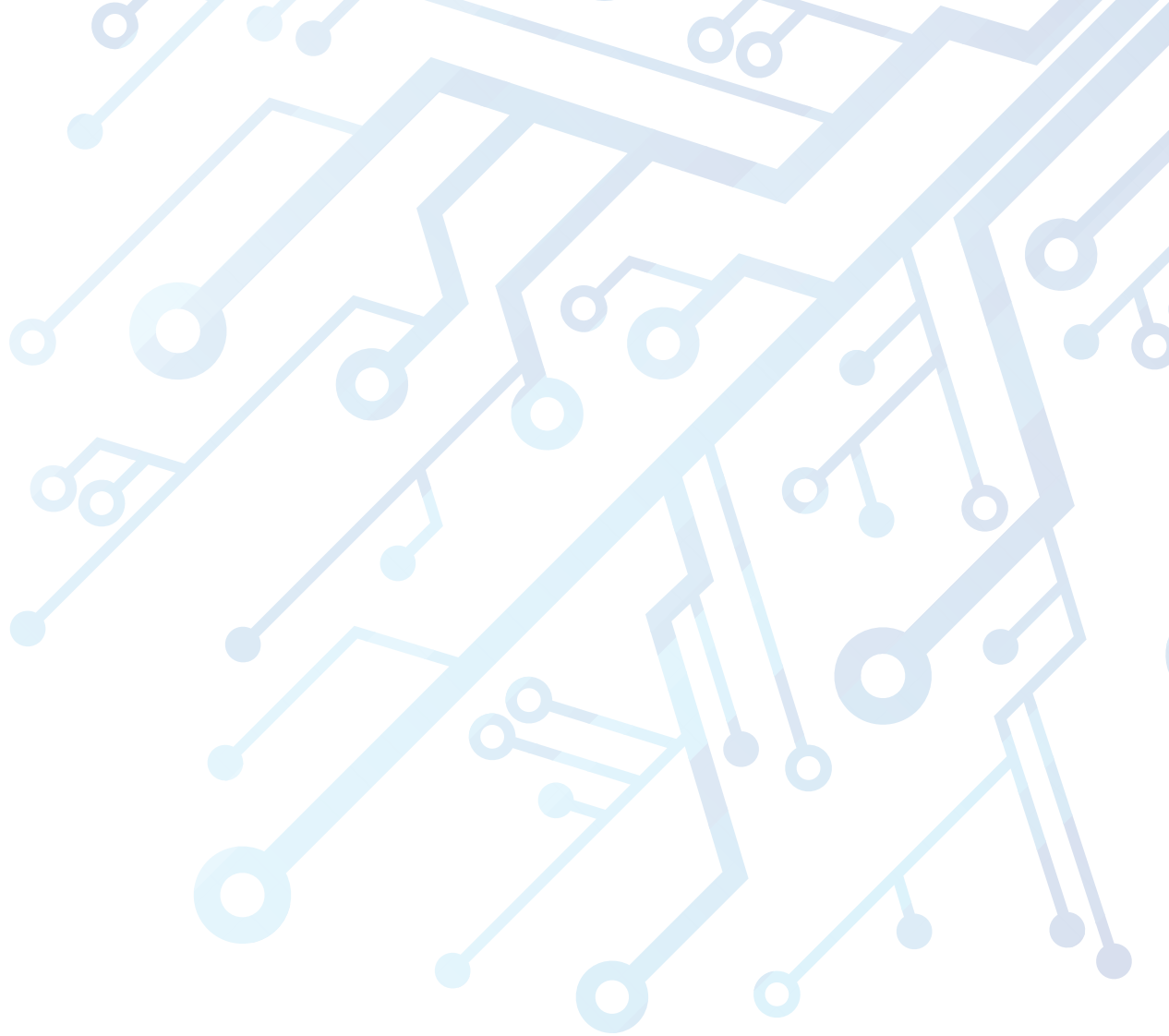
33 
COUNTRIES

36,000+ 
EMPLOYEES

26 
GLOBAL TECHNOLOGY CENTERS

15,000  **141** 
SHIP TO 15,000 CUSTOMERS IN 141 COUNTRIES

146 
MAJOR FACILITIES



Always at the ready.

If you ever have questions or need help, you won't have to look far.

Call:
Your Field Representative

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DanaElectrified.com

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Dana.com/TCO



Visit DanaElectrified.com to learn more about how Dana is leading the charge in electrification.

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