



Telehandlers for **Agricultural and Construction** Applications



Dana's Spicer® and Brevini® technologies for telehandlers are engineered to improve performance and efficiency across applications.





Founded in 1904, Dana Incorporated is a world leader in highly engineered solutions for improving the efficiency, performance, and sustainability of powered vehicles and machinery. Dana supports the passenger vehicle, commercial truck, and off-highway markets, as well as industrial and stationary equipment applications.

We maintain a competitive advantage in the marketplace with a commitment to delivering on the five dimensions of our enterprise strategy – leveraging the core, strengthening customer centricity, expanding global markets, commercializing new technology, and accelerating hybridization and electrification.

Employing thousands of people in 33 countries, on six

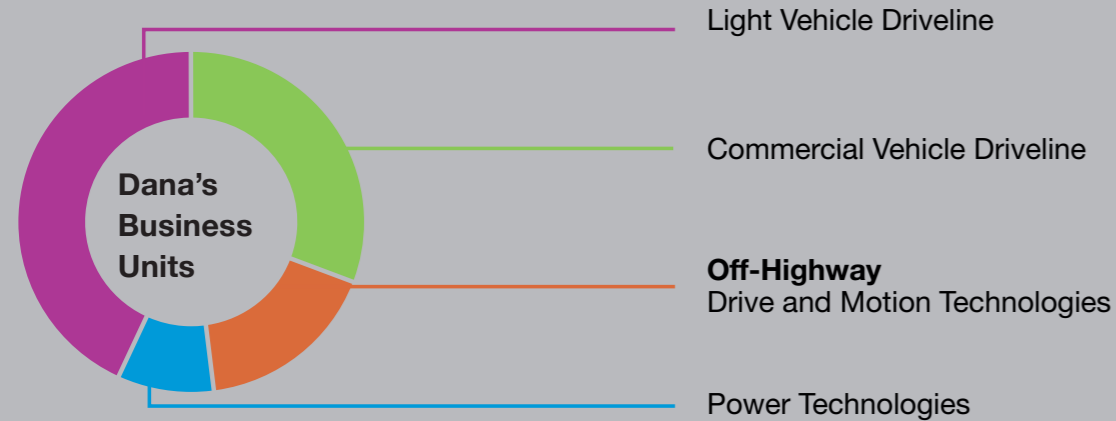
continents, our people work tirelessly to deliver long-term value to customers around the world. We have earned our position as a trusted, top-tier supplier by collaborating with customers to develop, integrate, and support the innovations required to improve vehicle performance and efficiency.

Each day, in both large and small ways,
Dana is defined as People Finding A Better Way®.



Corporate Business Units

Dana serves global light vehicle, medium/heavy vehicle, and off-highway markets through four business units – Light Vehicle Driveline Technologies (Light Vehicle), Commercial Vehicle Driveline Technologies (Commercial Vehicle), Off-Highway Drive and Motion Technologies (Off-Highway), and Power Technologies, which is the center of excellence for sealing and thermal management technologies that span all customers in our on-highway and off-highway markets.



Off-Highway Brands

Off-Highway Sectors

Drivetrain Systems



Motion Systems



Thermal Management



Sealing



MOBILE

Agricultural

Our products are engineered to support increased crop yields, optimized harvesting operations, lower emissions, improved operator safety and comfort, and reduced total cost of ownership, while complying with evolving emissions standards

Construction

Integrated drive and motion systems from Dana enhance construction equipment performance, efficiency, and productivity with a range of solutions for vehicles ranging from 3 to 50 tonnes (4 to 55 tons). Spicer® axles, wheel drives, transmissions, driveshafts, and Brevini® motion products are integrated with the most advanced technologies for improved machine operation on any job site, in any condition.

Mining and Forestry

Dana designs complete drive and motion systems to meet increasing industry demands for automation and productivity, coupled with high safety standards. Our solutions are specially engineered to maximize vehicle performance in extremely harsh environments.

Material Handling

Our custom drive and motion systems enhance material-handling and surface-mining vehicle performance, productivity, and power. Spicer® transmissions, axles, and driveshafts are designed to work seamlessly in any vehicle to allow operators to engage, lift, and transport heavy loads with more precision.

INDUSTRIAL

Dana's portfolio of advanced motion technologies has been engineered to support increased productivity and reliability, lower emissions, improved operator safety and comfort, and reduced total cost of ownership.

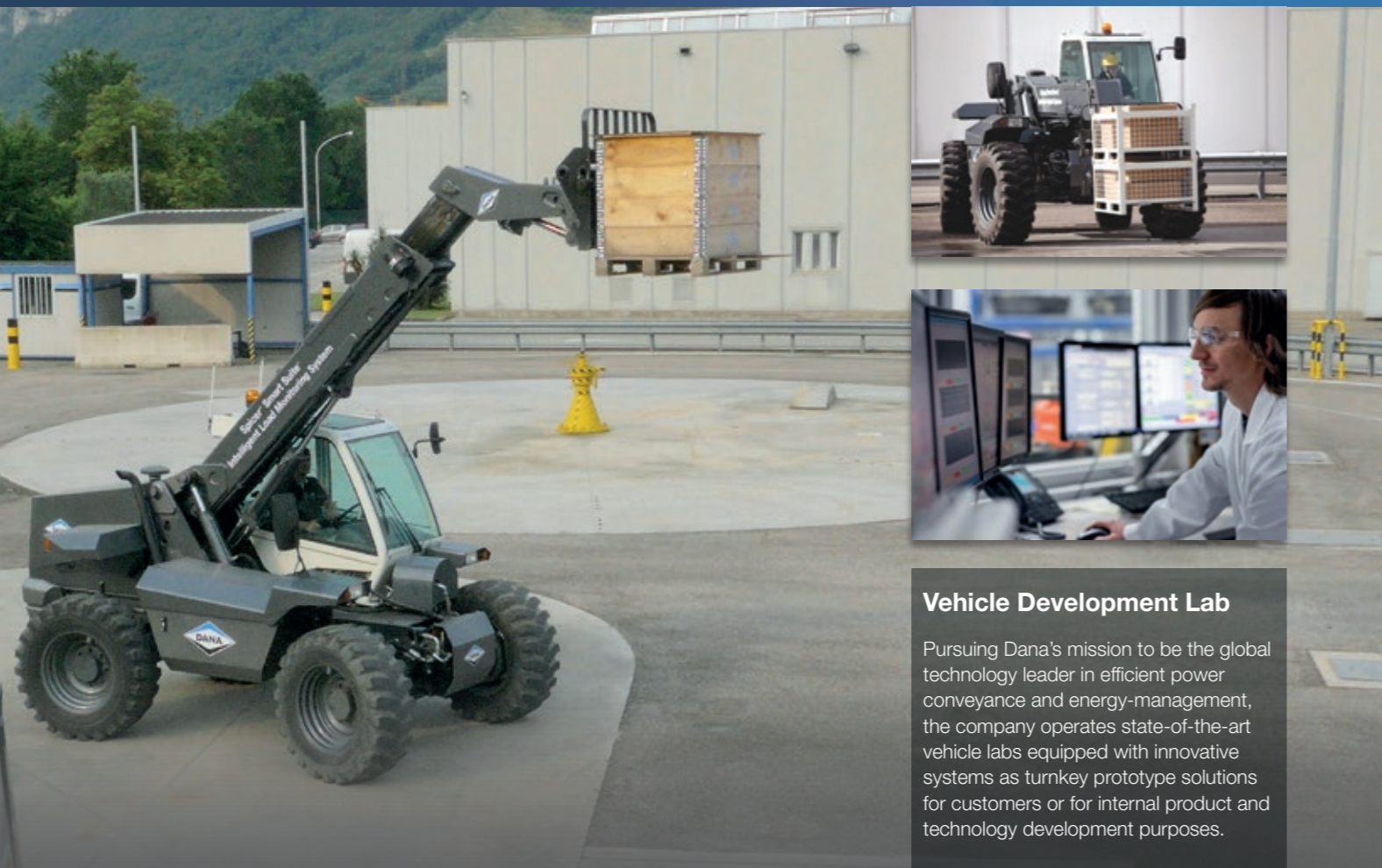


Drive and Motion Systems for Construction and Agricultural Telehandlers

Telehandlers are used globally across many markets for a wide variety of purposes with both individual purchaser and rental fleets. Such diversity in end-use requires the providers of the major vehicle systems to develop a deep understanding of end-user needs and expectations to determine success.

Based on more than 50 years of experience, Dana has emerged as the market and technology leader for telehandler applications. Spicer® drivetrain systems make telehandlers operate more efficiently on the worksite, while maximizing speed and fuel economy on the road between work assignments. Now with Brevini® motion systems – specifically developed

to perform high-efficiency working functions – Dana supplies a comprehensive range of products. Through integrated electronic, mechanical, and hydraulic systems, our technologies improve the maneuverability, efficiency, speed, and safety of work functions performed by both the machine and its attachments.



Vehicle Development Lab

Pursuing Dana's mission to be the global technology leader in efficient power conveyance and energy-management, the company operates state-of-the-art vehicle labs equipped with innovative systems as turnkey prototype solutions for customers or for internal product and technology development purposes.

The Right Partner for Your Telehandler

Spicer® Drivetrain Systems

Enhance performance and productivity by offering a range of products that constantly meet evolving global customer needs

- Spicer axles deliver the high turning angle required for telehandlers.
- Spicer hydrostatic and hydrodynamic transmissions provide the power to enhance productivity while maximizing fuel efficiency.
- Spicer driveshafts are designed to exacting durability standards and ease of maintenance.

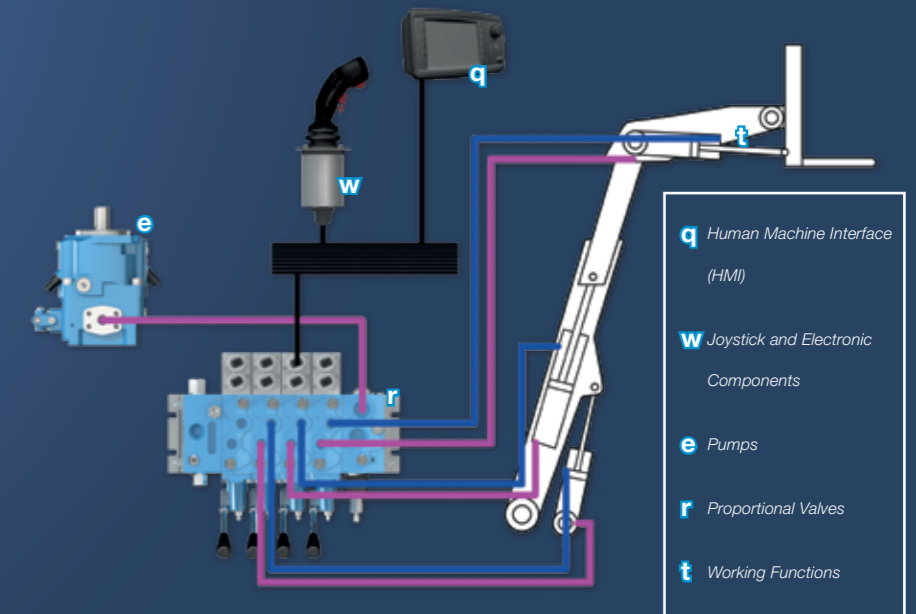
Lift Capacity Lbs (Tonnes)	Spicer® Drivetrain System Solutions			
	Transmission		Axle	Driveshaft*
	Hydrodynamic	Hydrostatic		
4,000-5,000 (1.8-2.3)	–	603, 311	211	1410
6,000-8,000 (2.7-3.6)	T12000, VDT12000	357, 367, 318	212	1480
9,000-12,000 (4.0-5.4)	T12000, VDT12000	357, 367, 318	212	1480
12,000-15,000 (5.4-6.8)	T13000	357, 367, 318	223	1550
15,000-28,000 (6.8-12.7)	T20000	360, 319, 2+3	213	1550
29,000 - 50,000 (13.2-22.7)	–	360, 319, 2+3	214	1550

*Other driveshaft series and end-fitting designs available.

Brevini® Motion Systems

Proven Power Conveyance for Work Functions on Machines and Attachments

- Brevini hydraulics deliver reliable power through a combination of robust and efficient motors and pumps. Designed for both open and closed circuits, operate with smoothness and precision even at high pressure and low flow.
- Brevini valves offer a wide range: from a manually actuated design to a sophisticated, remote-operated, proportional configuration that optimizes the hydraulic fluid flow.
- Brevini advanced valves are supported by a top-of-the-line electronic control system incorporating inclinometers, leveling systems, sensors, and human machine interfaces powered by proprietary software.



Market-Driven Innovations

We deliver innovative technologies to meet worldwide customer demands. By anticipating market trends, Dana uses industry expertise to deliver product solutions to help customers achieve their goals.



Customized Technologies



Full-System Solutions



Low Cost of Ownership



Electrification



Global Support

Full-System Solutions for Agriculture

Our deep understanding of agriculture end-user needs and expectations, together with decades of relevant experience lead to a product portfolio that enhances agricultural telehandlers maneuverability, efficiency and overall performance.

Spicer® Planetary Steering Axles

Modular design to fulfill market demands
Greater customization of features
Proven Technology Expertise
Reliable experience across many applications
Deliver maximum performance and offer easy, low-cost service

Spicer® Hydrostatic Continuously Variable Transmission (CVT)

Unique two-motor design offers CVT functionality without torque interruption
Increased efficiency at high travel speeds
Increased tractive effort at low travel speeds
Accommodates various combinations of hydraulic motors from 80 cc to 115 cc

Spicer® Driveshafts

A century of quality and innovation
Ideal for the rigorous demand of most off-highway applications
Multiple driveshaft and end-fitting combinations
Designed for minimal maintenance, longer life and reduced operating cost

Brevini® Piston Pump and Gear Pumps HD1/OT300+OT200

Wide range of swashplate controls available
Two built-in pressure relief valves protect the system from pressure overloads
Swashplate design
Integrated electro proportional and on-off valves
Embedded additional bearings for external loads

Brevini® Fan Drive Gear Motor

Cast iron body for improved efficiency especially at high oil temperature
High volumetric and mechanical efficiencies
Low noise level
Built-in proportional relief valve for fan speed control
Built-in anti cavitation valves

Brevini® Proportional High Efficiency CFS3 Bankable Valve

Compact design electro-proportional directional flow sharing valve
Energy saving: very low pressure drop
No need for relief valves to avoid zero flow with actuators at end of stroke
Regulated flow up to 60 lpm @ 310 bar



Brevini® Proportional Directional Valve HPV Series

Wide range: regulated flow up to 600 l/m – 370 bar working pressure
Remote, electronic operation
Smooth control to improve work function performance



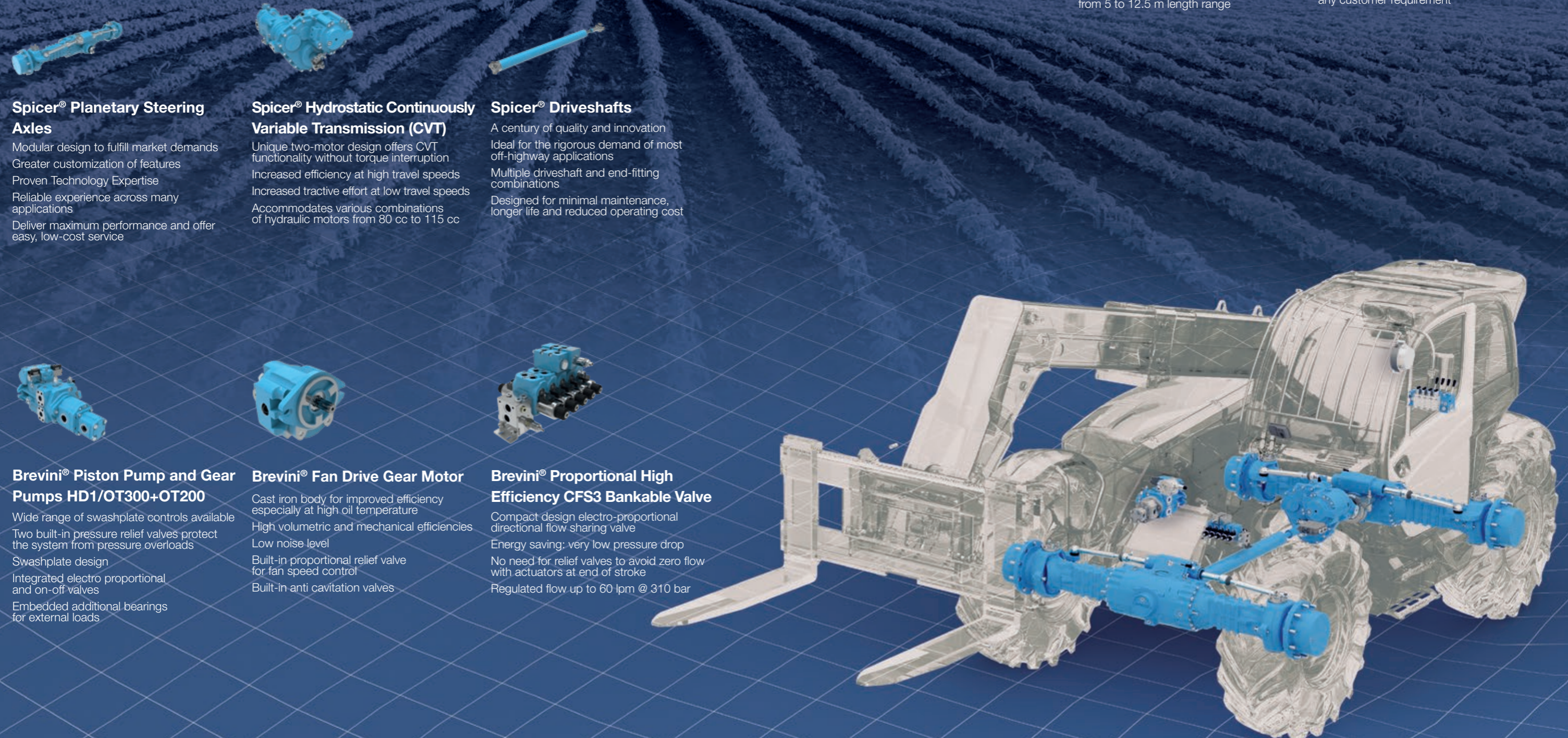
Brevini® Boom Angle/Length Extension Sensor AS Series

Robustly constructed draw-wire length sensor
Available with dual/redundant output for PLd EN13849 compliance
Voltage: 4-20 mA or CANbus output from 5 to 12.5 m length range



Brevini® Electronic Control Management

Complete solution for electric hydraulic control and human machine interface thought innovative ECUs, display and joystick
Enhanced programming flexibility to meet any customer requirement



Full-System Solutions for Construction

Reliability, durability and optimal cost of ownership are the common expectations from both rental fleets and individual machine purchasers in the construction market. Dana has the expertise, global reach and systems know-how to support construction telehandlers manufacturer's needs worldwide.



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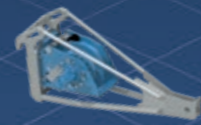
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Remote, electronic operation
Smooth control to improve work function performance



Brevini® Slew Drive

Compact solution with hydraulic motors for a perfect fit in machine frames
Range of motor valves matches various functional demands
Output pinion variations allow customized configurations



Brevini® Hoisting Winch WPL10C

Designed to be embedded in the structure of the attachment
Complete package with hydraulic motor and brake valve
Better control of the winch due to electronic devices
Perfect spooling is ensured by special grooved drum and tension roller design



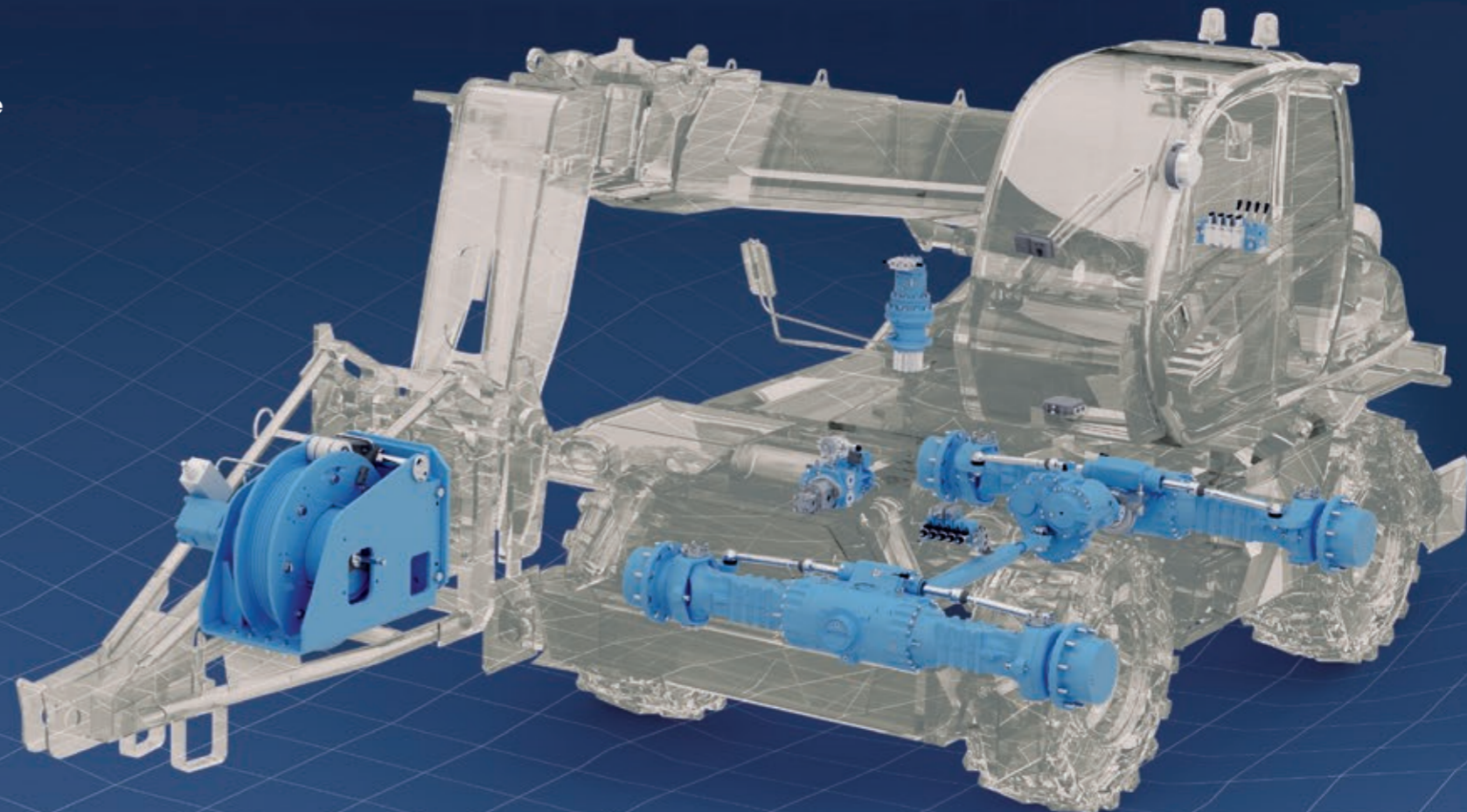
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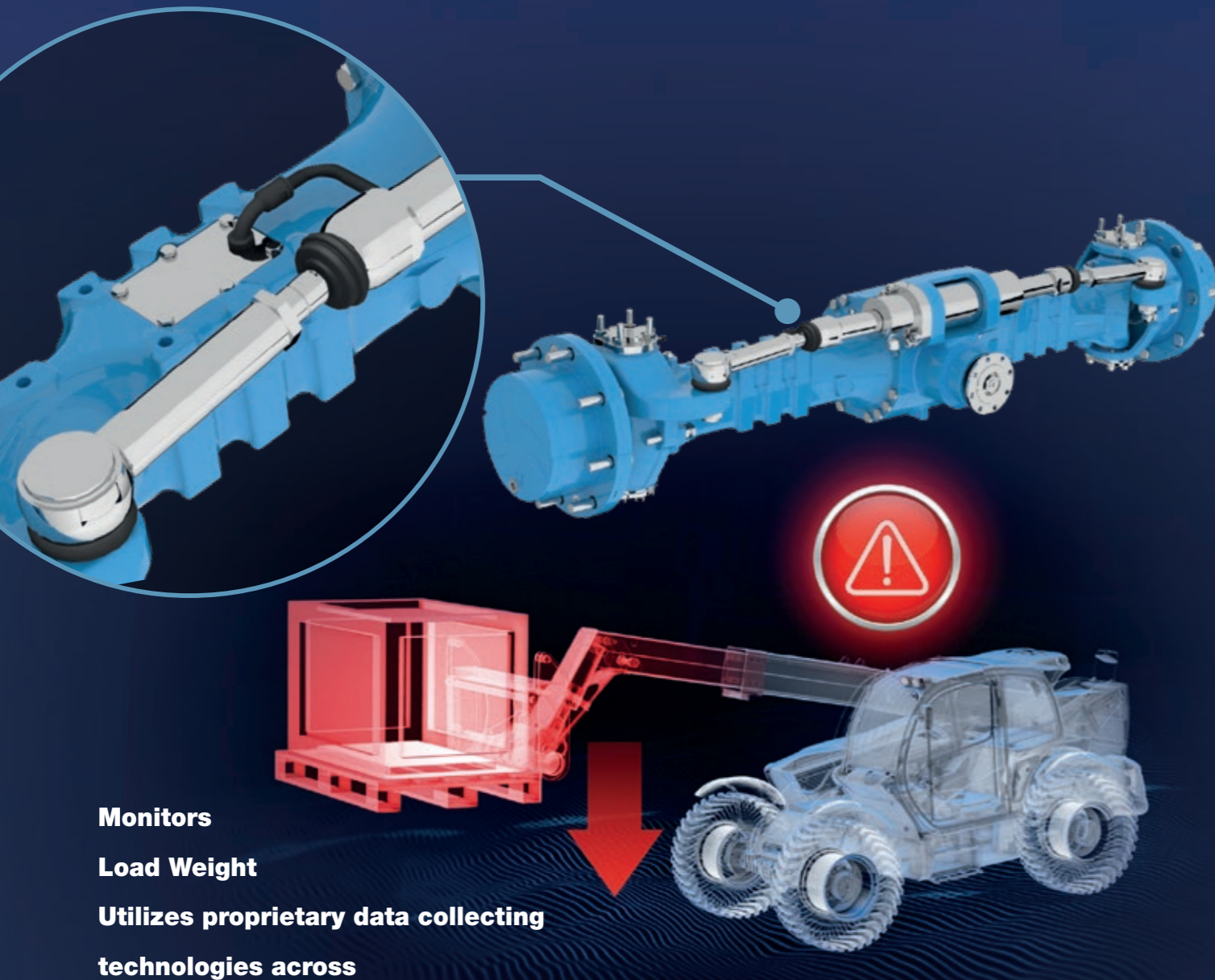
Brevini® Electronic Control Management

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Enhanced programming flexibility to meet any customer requirement



Spicer® Smart Suite™ Intelligent Load Monitoring System (ILMS)

Spicer® Smart Suite™ ILMS is designed to alert the operator of potential tipping situations, reduce the risk of vehicle breakdowns, improve productivity and precision, and enhance the long-term durability of powertrain systems.



**Monitors
Load Weight**
Utilizes proprietary data collecting
technologies across



Monitors Load Weight

Utilizes proprietary data collecting technologies across the vehicle to proactively estimate static loads.



Prevents Boom Overextension

Detects improper operating maneuvers that may lead to tip-over incidents.



Assists with Sloped Surfaces

Autonomously monitors and adapts to various operating conditions and shifts in weight.

Fully integrated e-Drive and e-Motion Systems

A new era of mobility is upon us. Emissions regulations and government policies are manifesting at an ever-increasing pace, and visions of vehicles that reduce operating costs while enhancing productivity and safety are accelerating the need for alternative propulsion solutions. For over 20 years, our group of highly focused engineers has been dedicated to research and development of new technology solutions aimed at electrification. We have built a broad portfolio of award-winning, patented technologies, making us a leader in electrification. Today we can proudly say that we are the ONLY supplier with the capability to help manufacturers bring electric-driven vehicles to market through our collaborative, systems-oriented approach; decades of expertise; and broad selection of proven drive and motion capabilities for electrified vehicles. Dana offers a full product portfolio and multiple technologies for electrification needs. Through our market-proven brands, we can provide motors, inverters and controllers for low-and high-voltage applications ranging from 24 to 800 V.

REDUCES OPERATING COSTS

IMPROVES EQUIPMENT SAFETY

REDUCES EMISSIONS INTO THE ATMOSPHERE

INCREASES PRODUCTIVITY

COMPLIANCE HEALTH AND SAFETY DIRECTIVES





Technologies Customized to **Every Part of the Globe**

With a presence in 33 countries, Dana Incorporated boasts more than 145 engineering, manufacturing, and distribution facilities. Our worldwide network of local service centers provides assurance that each customer will benefit from our proximity and responsiveness.

About Dana Incorporated

Dana is an integral partner for virtually every major vehicle and engine manufacturer worldwide. We are a leading supplier of drivetrain, sealing, and thermal technologies to the global automotive, commercial-vehicle, and off-highway markets. Founded in 1904, we employ thousands of people across six continents.



About Dana Off-Highway Drive and Motion Technologies

Dana delivers fully optimized Spicer® drivetrain and Brevini® motion systems to customers in construction, agriculture, material handling, mining, and industrial markets.

We bring our global expertise to the local level with technologies customized to individual requirements through a network of strategically located technology centers, manufacturing locations, and distribution facilities.

Learn more about Dana's drivetrain and motion systems at dana.com/offhighway.



Application Policy

Capacity ratings, features, and specifications vary depending upon the model and type of service. Application approvals must be obtained from Dana; contact your representative for application approval. We reserve the right to change or modify our product specifications, configurations, or dimensions at any time without notice.