



SPICER® | **BREVINI®**

Agricultural **Drive and Motion Systems**

Dana's market-leading Spicer®, Brevini® and Graziano® drive and motion system products maximize agricultural vehicle performance.





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

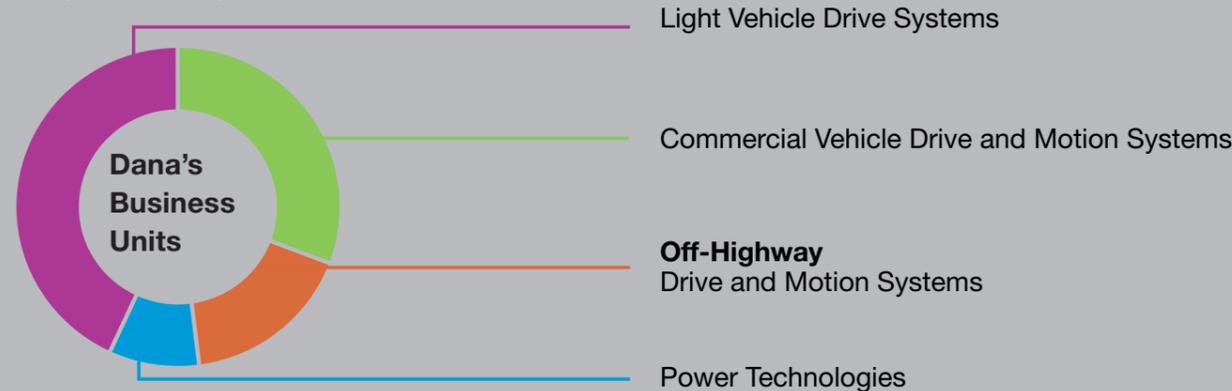
continents, our people work tirelessly to deliver long-term value to customers around the world. We have earned our position as a trusted, top-tier supplier by collaborating with customers to develop, integrate, and support the innovations required to improve vehicle performance and efficiency.

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 to meet your agricultural needs

Dana's innovative products improve the performance and efficiency of agriculture applications including tractors, sprayers, telehandlers, combines, and harvesters. Dana's advanced technologies have been engineered to support increased crop yields, optimized harvesting operations, lowered emissions, improved operator safety and comfort, and reduced total cost of ownership.



SPICER®

BREVINI™

GRAZIANO™



Sprayers	Tractors	Combines and Harvesters	Telehandlers
Spicer® Torque-Hub® wheel drive technologies provide durable, efficient, and safe operation in agricultural applications, while our Brevini® products enable a range of sprayer working functions.	A wide range of Spicer® axle options and Graziano® custom gears, powershift units and synchronizers enables OEM to build next generation equipment.	Offering enhanced productivity, maneuverability, stability, and traction on any terrain while maintaining operator comfort.	Telehandler safety is enhanced with Spicer® Smart Suite™ Intelligent Load Monitoring System (ILMS) technology, using data from across the vehicle to prevent tip-over incidents.

Full-System Solutions for Tractors

With more than a century of knowledge in agricultural tractors, Dana offers proven products and unmatched capabilities. Our Spicer® front axles and Graziano® components and synchronizers are designed for the unique demands of agricultural tractors. Each drivetrain component is tested and manufactured to meet our customers' specific needs.



Spicer® Independent Front Suspension Axle

Designed for open field tractor with increased torque limits up to 295 to 370 kW (396 to 500 hp)
 Deliver Improved traction and increased speed
 Decreased body vibration and enhanced maneuverability
 Transit speed up to 60 Km/h



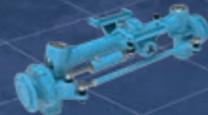
Spicer® Standard Suspension Axle

Designed for tractors from 96 to 296 kW (129 to 397 hp)
 Active suspension system
 Improved vehicle control, traction and handling
 Transit speed up to 60 km/h
 Easy of assembly



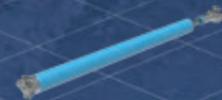
Spicer® Modular Axle

Designed for tractors from 33 to 301 kW (45 to 410 hp)
 Flexible platform assembled from three interchangeable modules
 Cost-effective technology reduces product development lead times
 Geared to meet specific regional and global needs



Spicer® Portal Axle

Designed for compact utility tractors from 19 to 41 kW (25 to 55 hp)
 Increased ground clearance, enhanced traction and performance
 Smooth turning capability
 Suitable for all terrain application



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



Graziano Synchronizer® DC 95/100

Double cone solution for up to 40% faster synchronization time
 Up to 30% higher engagement torque in the same size
 Reduced axial package up to 10% with overall transmission weight saving
 Improved shifting quality



Graziano Synchronizer® SC 184

Three sizes with single or double cone modular design
 Reduced axial package up to 16% with overall transmission weight saving
 High torque capacity –up to 27,000 Nm
 New integrated activation system improves robustness and ease of assembly



Graziano Synchronizer® TC 102/110/118

First triple cone design for agricultural market
 High power density in compact radial package
 Integrated activation system for long life – up to 1 million shifts
 Special friction material developed for high stress capacity



Graziano Synchronizer® CSS

Roller working ramp obtained on the tooth flank of the sliding sleeve
 25% wider friction surfaces in same envelope
 Simpler and stronger hub geometry minimizes heat treatment deformations
 Optimized synchro ring geometry reduces stress and knocking effect



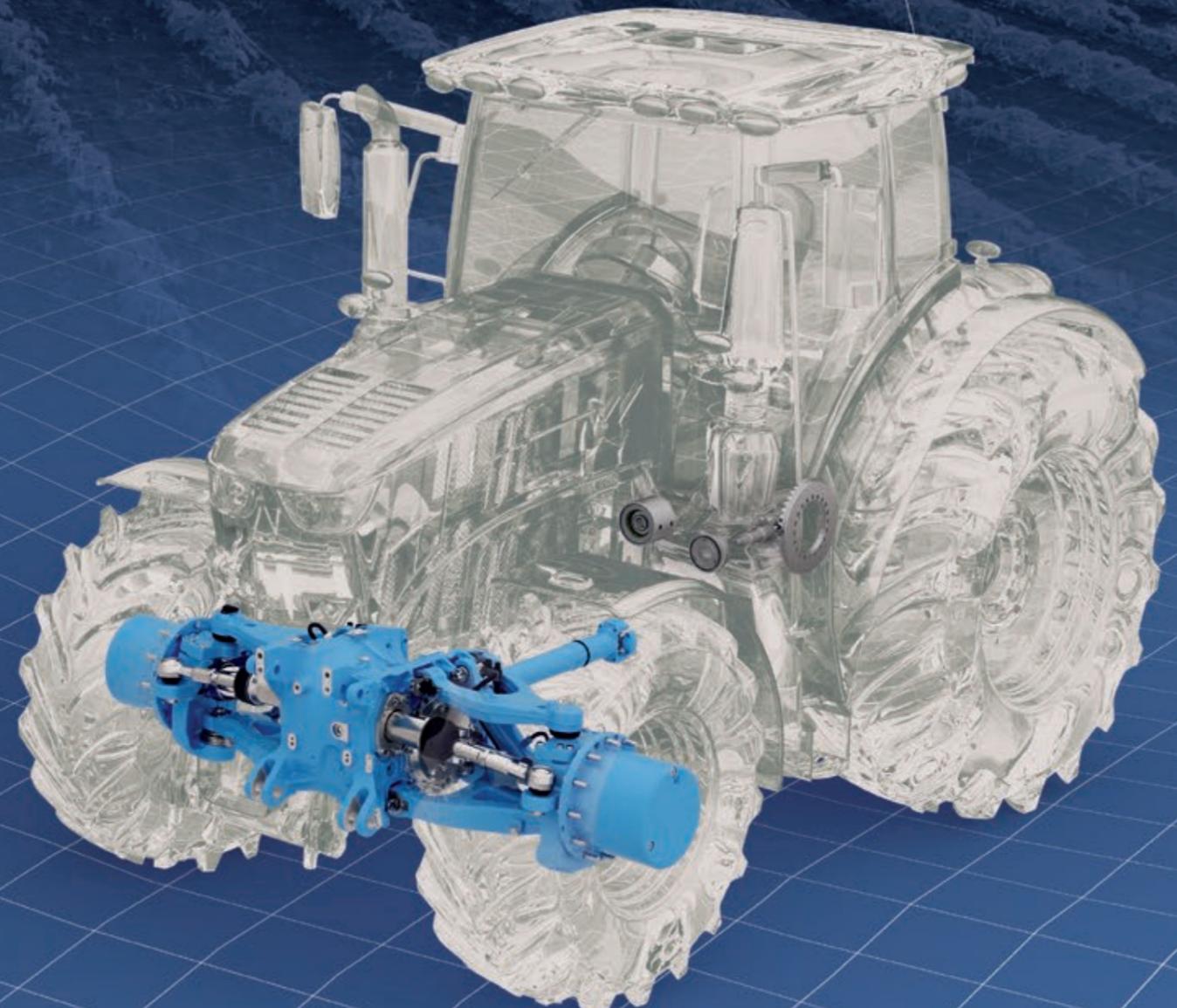
Graziano® Bevel gear sets

State-of-the art gear technologies – Gleason and Klingelberg
 Fine-tuned microgeometry to minimize noise and optimize durability
 Rigorous quality standards deliver high-performance results



Graziano® Powershift units

Designed for high efficiency, enhanced shifting performance, and driver comfort
 Gear shifting without torque interruption
 Electron Beam Welding Technology minimizes distortions



Full-System Solutions for Sprayers

Dana's portfolio of advanced technologies have been engineered to meet the needs of farmers. Our modern equipment supports higher crop yields and lower operating costs. Dana's full-system solutions for self-propelled sprayers include proven Spicer® Torque-Hub® wheel drives and Brevini® hydraulic and electronic components specifically designed to improve speed, maneuverability, efficiency, and safety.



Brevini® Programmable Control Unit

Dual / redundant microprocessor
Optimized for off-highway equipment performance and safety enhancement
Waterproof, aluminum compact body
PWM outputs with closed loop current control



Brevini® Tilt sensor SP Series

Constantly measures vehicle tilt



Spicer® Torque-Hub® New C0 Series

Designed for sprayers capacities carrying from 2000 to 8000 liters
Patented service brake to meet on-road stopping requirements
Heavy duty main bearings and retention for high wheel offsets and side loads
High speed thermal stability for operating machines up to 60 km/h
Low maintenance requirements and easy to service



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



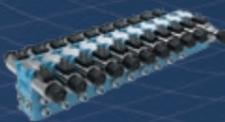
Brevini® Fan Drive Gear Motor

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



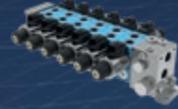
Brevini® HIC Series – Customized Hydraulic Integrated Circuit

Best In Class valve technology taken from Cartridge and Cetop valves range
Less leakage risk. No check valves need on the cylinders
Compact overall dimension
Easier Piping /Hosting



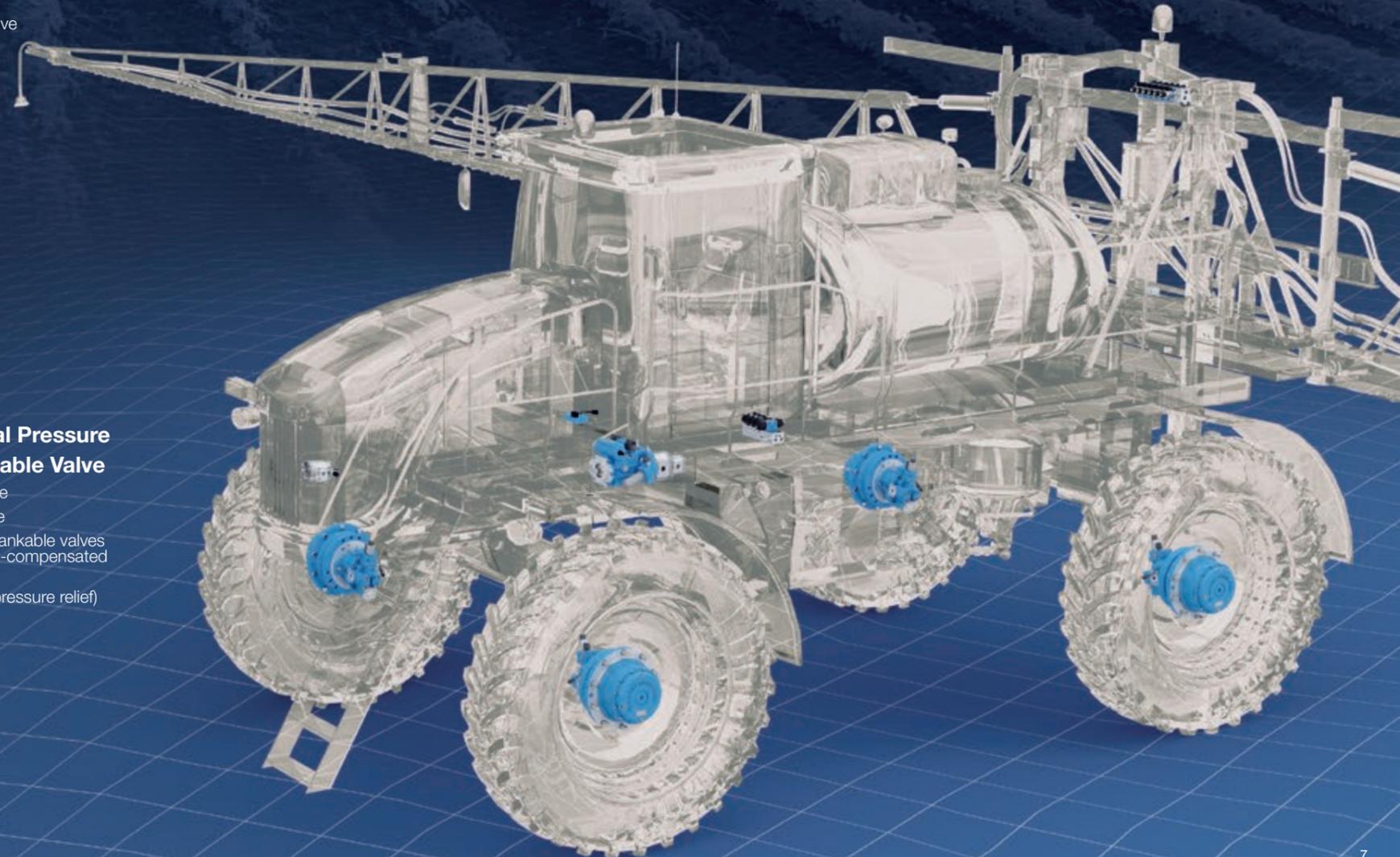
Brevini® Cetop valves

Fixed and variable displacement options
On/off or proportional directional flow
Bankable cetop valves for harsh environments



Brevini® Proportional Pressure Compensated Bankable Valve

LSA and LSB valves available
GAS and SAE ports available
Same interface of all Dana bankable valves range to mix slices with post-compensated or not compensated valves
Modular valves (check and pressure relief) available



Full-System Solutions for Telehandlers

With 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 assignments. Brevini® motion systems, specifically developed to perform high efficiency working functions, improve the maneuverability, efficiency, speed, and safety of work functions performed by both the machine and its attachments.

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 80cc to 115cc

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

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Swashplate design
Integrated electro proportional and on-off valves
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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

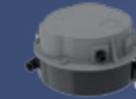
Brevini® Proportional High Efficiency CFS3 Bankable Valve

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 60lpm @ 310bar



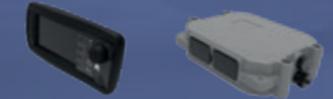
Brevini® Proportional Directional Valve HPV Series

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



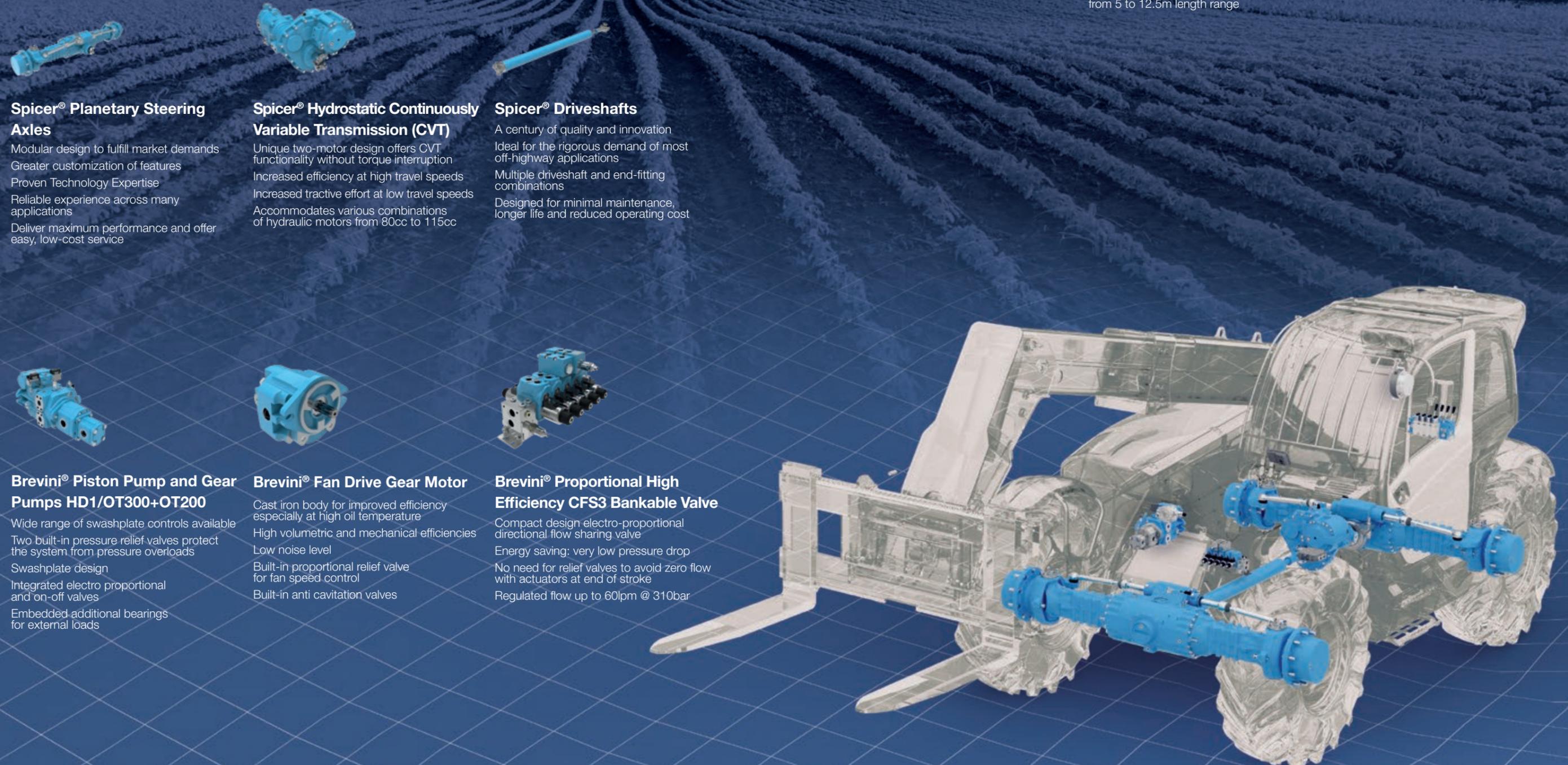
Brevini® Boom Angle/Length Extension Sensor AS Series

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



Brevini® Electronic Control Management

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



Full-System Solutions for Combines and Harvesters

Operators today are spending longer hours working in the field or moving from site to site. The keys to maximizing their productivity are technologies that handle the full range of conditions they face in the field and on the road. Dana offers a wide range of Spicer® drivetrain and Brevini® motion solution for combines and forage harvesters, demonstrating how we can leverage our innovations to deliver real value to equipment buyers.



Spicer® Rear Adjustable Axle

Designed for combine from 360 to 440 kW (490 to 600 HP)
Ideal for application requiring different flange to flange
Compact full retract dimension for shipping purpose
Disconnect option improves traction at low speed and maximize efficiency at high speed
Optimize lubrication oil quantity, limited to center section and final hub



Spicer® Rear Standard Suspension Axle

Designed for combine and harvester from 175 to 460 kW (235 to 625 HP)
Four-wheel drive configuration offers improved maneuverability and traction
Active suspension system enhances driving quality and comfort
Improved controllability in transit



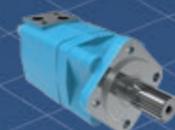
Spicer® Rear Standard Axle

Designed for combine and harvester from 175 to 460 kW (235 to 625 HP)
Four-wheel drive configuration offers improved maneuverability and traction
Improved controllability in transit



Spicer® Front Axle

Designed for combine up to 35 tons gross weight
Modular concept, two or three speeds
Shift on Fly
Stand-still shifting option available
Integrated Service and SAHR
Wet Brake "self-adjust"
Transit speed up to 45 kph



Brevini® Orbital motor Series

Support from 13 to 500 cc displacement
Fixed and variable displacement available
Suitable for open and closed circuit
Roller and gearmotor type available



Brevini® Proportional High Efficiency Bankable Valve

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



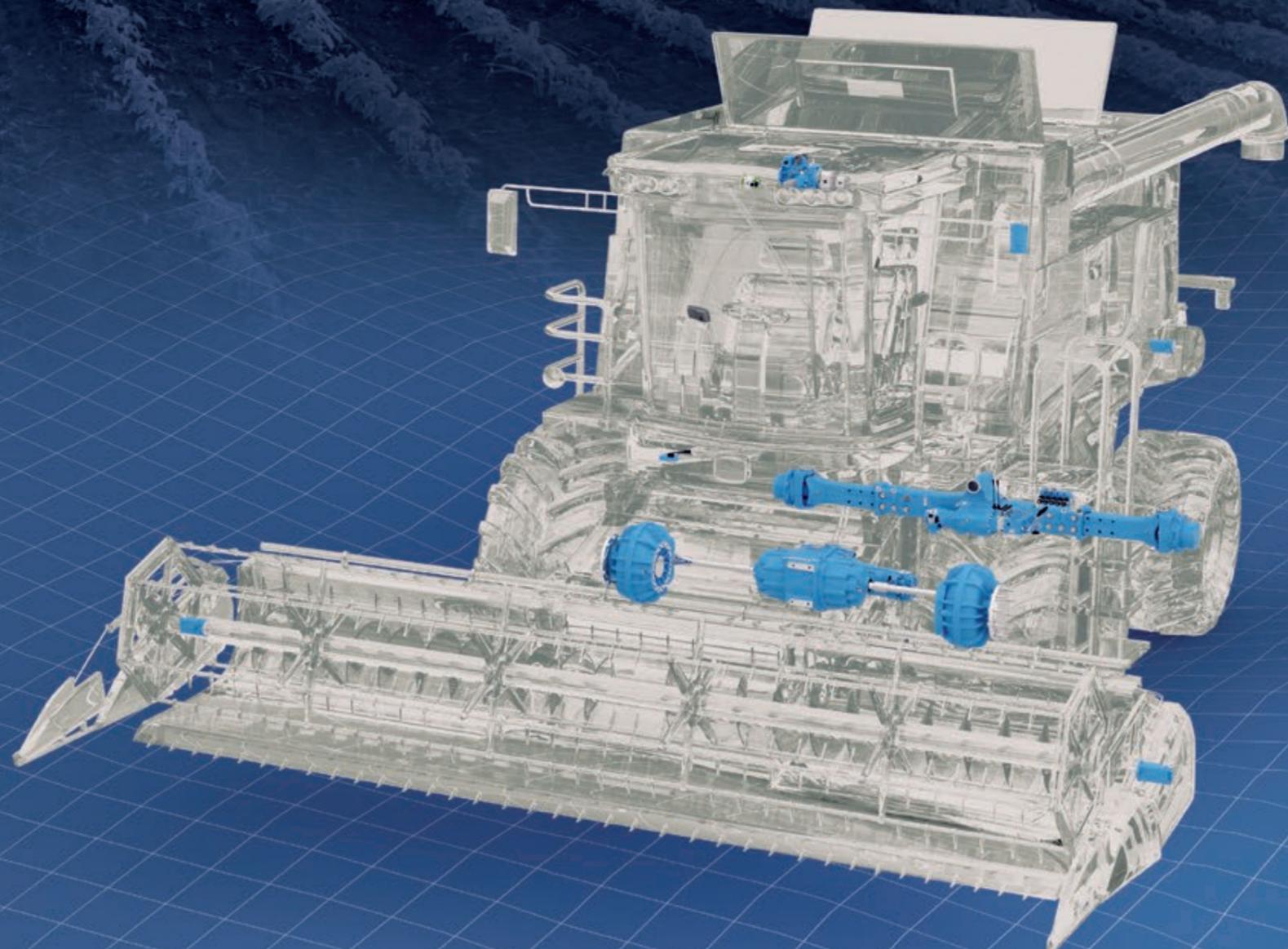
Brevini® Proportional Directional Valve HPV Series

Wide range: regulated flow up to 600l/m – 370 bar working pressure
High flexibility with valve and block combinations
Remote, electronic operation
Smooth control to improve work function performance



Brevini® Electronic Control Management

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





jointly developed between



Trelleborg CTIS+.

The right pressure, at the right time
in the right place.



INNOVATION

The benefits for your farming with the Trelleborg CTIS+



Low soil compaction, high yield from your crops

Soil compaction is one of the major enemy for your farm's productivity. A compacted soil restricts the roots growth, increases the density and reduces soil porosity. Your soil is the most important resource when growing an healthy and profitable crop.

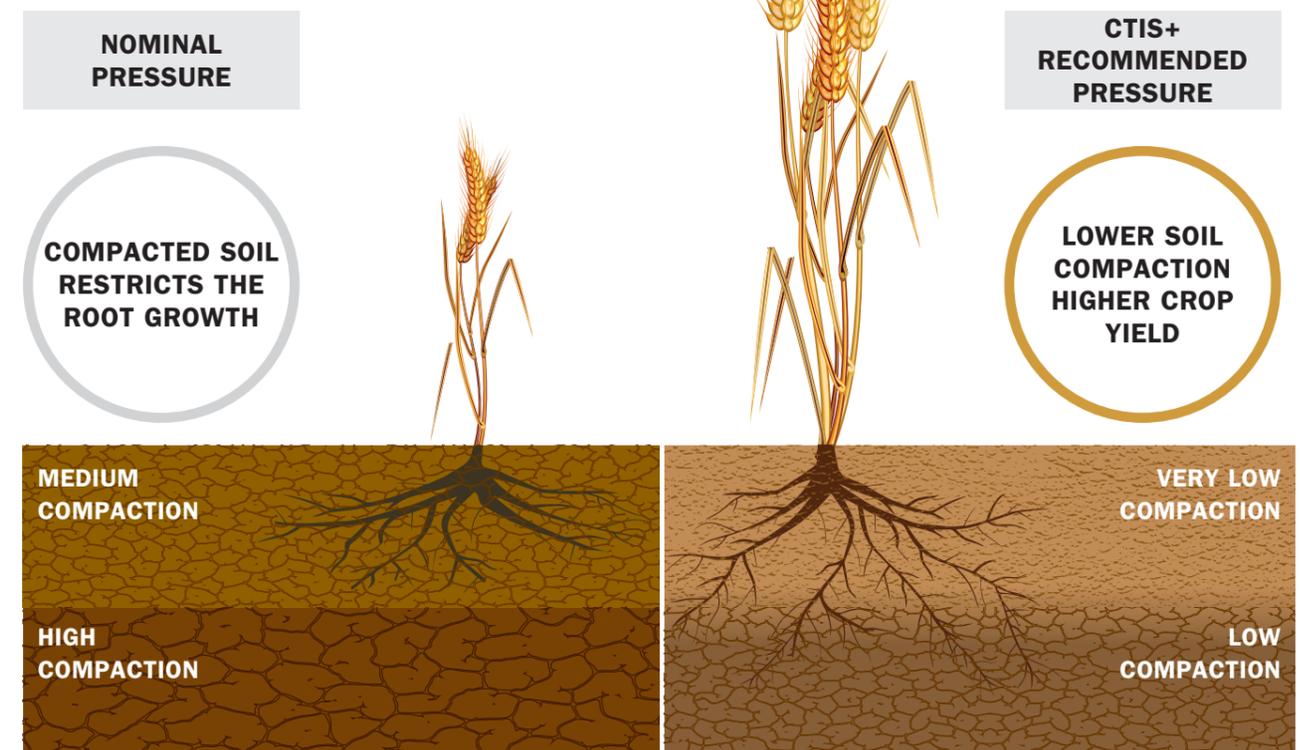
This is why the inflation pressure of your tires can make the difference. Trelleborg's main goal is to help you to reduce soil compaction, providing the right tool to monitor tire pressure and adjust it where and when needed.



The right pressure reduces your costs by over 20%

Incorrect tire pressure has a significant negative impact on soil fertility as well as on tractor efficiency. The right pressure, according to machine configuration and application, boosts the performance

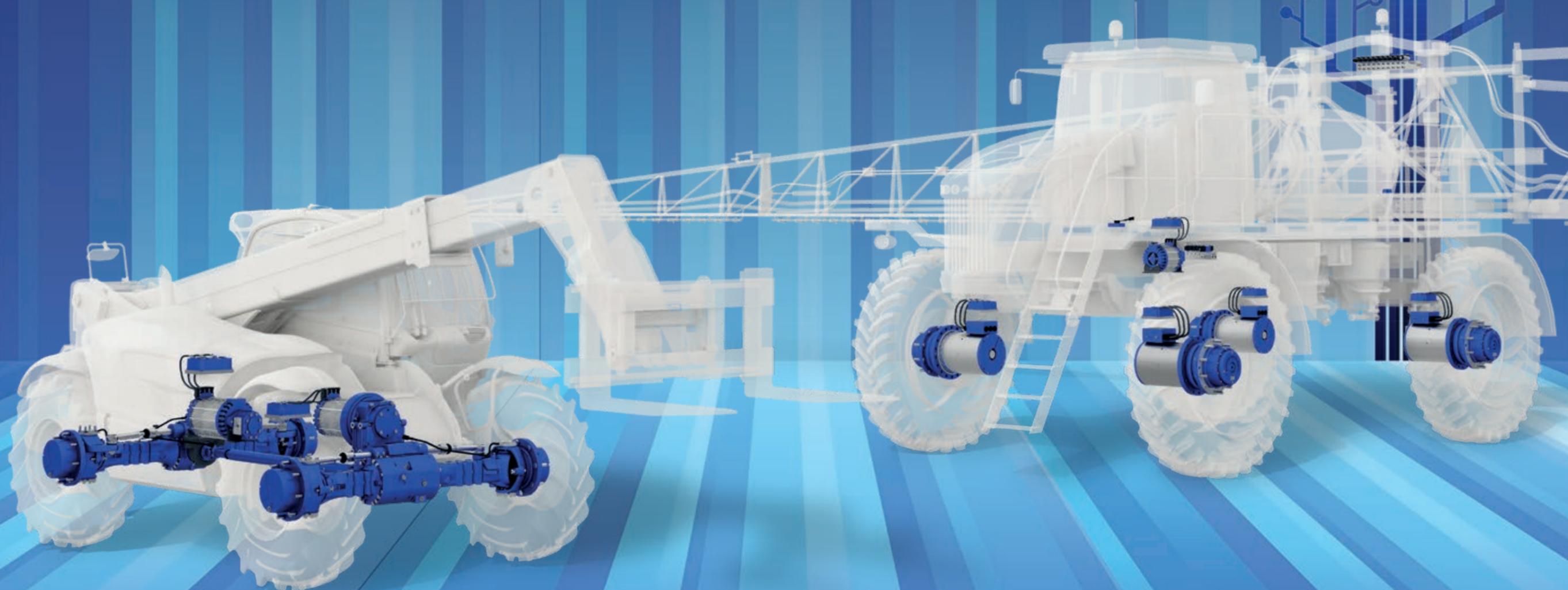
of your tires' increasing traction, reducing slippage and rolling resistance, with consequent higher productivity during daily operation, both in the field and on the road.



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.





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.

Dana.com/oh/contact

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.

