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®.

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.

**Corporate Business Units**

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**Off-Highway Brands**

- Drivetrain Systems
- Motion Systems
- Thermal Management
- Sealing

**Off-Highway Sectors**

- **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. Our range of solutions for vehicles ranging from 3 to 55 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 specifically 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.

Sprayers
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.

Tractors
A wide range of Spicer® axle options and Graziano® custom gears, powershift units and synchronizers enables OEM to build next generation equipment.

Combines and Harvesters
Offering enhanced productivity, maneuverability, stability, and traction on any terrain while maintaining operator comfort.

Telehandlers
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.
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.

### 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 tip service

### Brevini® Programmable Control Unit
- Dual / redundant microprocessors
- Optimized for off-highway equipment performance and safety enhancement
- Waterproof, aluminum compact body
- PWM outputs with closed loop current control

### Brevini® Cetop valves
- Fixed and variable displacement options
- On/off or proportional directional flow
- Bankable cetop valves for harsh environments

### Brevini® Pintop Pump and Gear
- Wide range of swashplate controls available
- Two built-in pressure relief valves protect the system from pressure overloads
- Swashplate design
- Integral 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 Pressure Compensated Bankable Valve
- LSA and LSB valves available
- GAS and SAE ports available
- Same interface of all Dana bankable valves ranging to mix slices with post compensated or hot compensated valves
- Modular valves (check and pressure relief) available

### Brevini® Tilt sensor SP Series
- Constantly measures vehicle tilt
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**
- 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 internal loads

**Brevini® Fan Drive Gear Motor**
- Cast iron body for improved efficiency especially at high oil temperatures
- High volumetric and mechanical efficiencies
- Low noise level
- Built-in proportional relief valve for fan speed control
- Built-in anti-cavitation valves

**Brevini® Proportional Directional Valve HPV Series**
- Wide range, regulated flow up to 600l/m
- 370 bar working pressure
- Rugged, electronic operation
- Smooth control to improve work function performance

**Brevini® Boom Angle/Length Extension Sensor AS Series**
- Ruggedly constructed draw-wire length sensor
- Available with dual/redundant output for Plc EN13849 compliance
- Voltage: 4-20mA or CANbus output from 5 to 12.5m length range

**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 50lpm at 310bar

**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 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 applications requiring different flange to flange
- Compact full retract dimension for shipping purpose
- Disconnect option improves traction at low speed and maximizes 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
- Improved controllability in transit

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Spicer® Front Axle
- Designed for combines up to 35 tons gross weight
- Modular concept, two or three speeds Shift on Fly
- Stand-still shifting option available
- Integrated Spicer and SAF-Holland Brake "Self-Adjust"
- Transit speed up to 45 kph

Brevini® Proportional Directional Valve HPV Series
- Wide range: Regulated flow up to 600 l/min – 370 bar working pressure
- High flexibility with valve and block combinations
- Remote, electronic operation
- Smooth control to improve function performance

Brevini® Orbital motor Series
- Support from 1.3 to 600 cc displacement
- Fixed and variable displacement available
- Suitable for open and closed circuit
- Loader 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/min @ 315 bar

Brevini® Electronic Control Management
- Complete solution for electric hydraulic control and human machine interface thought innovative joystick, display and joystick
- Enhanced programming flexibility to meet any customer requirement
Trelleborg CTIS+. The right pressure, at the right time in the right place.
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.

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.

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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.

EASY TO USE
Compatible with fixed and mobile flanges

FULL MACHINE INTEGRATION

REDUCED WORKING TIME
No external pipes

LESS FUEL CONSUMPTION

FAST PRESSURE REGULATION speed up to 0.33 bar/min

Low soil compaction, high yield from your crops

NOMINAL PRESSURE

LOWER SOIL COMPACTION
HIGHER CROP YIELD

CTIS+ RECOMMENDED PRESSURE

COMPACTED SOIL RESTRICTS THE ROOT GROWTH

MEDIUM COMPACTION
HIGH COMPACTION
LOW COMPACTION

INCREASED TRACTION
LONGER TIRE LIFE
CROPS PROTECTION
COST REDUCTION
CARE FOR THE ENVIRONMENT

INCREASED TRACTION
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COST REDUCTION
CARE FOR THE ENVIRONMENT

MEDIUM COMPACTION
HIGH COMPACTION
LOW COMPACTION
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.
Low soil compaction, high yield from your crops

Soil compaction is one of the major enemies 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 a healthy and profitable crop. This is why the inflation pressure of your tires can make the difference. Trelleborg’s main goal is to help farmers to reduce soil compaction, providing them the right tools to monitor tire pressure and adjust it where and when needed.

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.