Telehandlers for **Agricultural and Construction Applications**

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

Market-Driven Innovations

We deliver innovative technologies that meet customer demands worldwide. By anticipating market trends, Dana uses its industry expertise to deliver product solutions that achieve customer goals.
The Right Partner for Your Telehandler

Spicer® Drivetrain Systems

Our goal is to enhance performance and productivity by offering a range of products to 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.

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<th>Lift Capacity</th>
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<td>Lbs (Tonnes)</td>
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<table>
<thead>
<tr>
<th>Spicer® Drivetrain System Solutions</th>
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<tbody>
<tr>
<td>Transmission</td>
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<tr>
<td>Axle</td>
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<td>Driveshaft*</td>
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<tr>
<td>4,000-5,000 (1.8-2.3)</td>
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<td>6,000-8,000 (2.7-3.6)</td>
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<tr>
<td>9,000-12,000 (4.0-5.4)</td>
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<td>12,000-15,000 (5.4-6.8)</td>
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<td>15,000-28,000 (6.8-12.7)</td>
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<td>29,000-50,000 (13.2-22.7)</td>
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*Other driveshaft series and end-fitting designs available.

Brevini® Motion Systems

Proven Power Conveyance for Work Functions on Machines and Attachments

- Brevini hydraulic systems deliver reliable power through a combination of robust and efficient motors and pumps designed for both open and closed circuits. These products operate with smoothness and precision even at high pressure and low flow.
- Brevini mobile valves range from a simple, manually actuated design to a sophisticated, remote-operated, proportional configuration that optimizes the flow of hydraulic fluid.
- Brevini advanced mobile 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.

Human Machine Interface (HMI)
Joystick and Electronic Components
Pumps
Proportional Valves
Working Functions

Cost of Ownership
Hybridization
Mobility and Performance
Emerging Markets
Complete System Solutions for Construction and Agricultural Telehandlers

**Drivetrain System**

**Spicer® 318 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® 223 Planetary Rigid Steering Axles**
Modular design to fulfill market demands
- Greater customization of features
- Reliable experience across many applications
- Static Load Capacity daN 24000 and Maximum Output Torque daNm 5300
- Optimum maneuverability and traction on all ground conditions

**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 and reduced operating cost

**Electronic Controllers and Displays**

**Brevini® Master Programmable Electronic Control Unit (ECU) BM55 Series**
- Available dual microprocessor for PLd EN13849 compliance
- Fully programmable through specific SW and with 2 CANbus lines
- Waterproof aluminum compact body and available from 15 to 77 I/Os per item

**Brevini® Graphic Display Opus Series**
- Indoor/outdoor usage: waterproof, robust plastic body, bright TFT screen
- Available with touchscreen or standard keyboard
- Different panel sizes available, 32-bit @632 MHz processor
Motion Systems

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 lpm – 370 bar working pressure
High flexibility with valve and block combinations
Precise operations: load sensing and pressure compensated functions

Brevini® Hydraulics High-Pressure Pump HD1/S6CV Series
Wide range of controls covering different working needs
Through drive for mounting of further pumps
Smooth changes in flow direction ensure steady operation when swashplate moves from neutral position
Circuit protection with standard cut-off valve

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

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
Spicer® Smart Suite™ for telehandlers uses patented and proprietary data-collecting technologies across the vehicle.

**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 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.

What is your driveline communicating to you?
Since every vehicle is different, Dana works closely with OEMs to deliver custom-made driveshafts that live up to the Spicer® reputation for performance.

Durable Driveshaft Technology, Built for Extreme Angles.

More than 100 years ago, Clarence Spicer developed the first practical application of the cardan universal joint. Since then, Dana has continuously developed new designs, materials, and processes for Spicer® driveshafts that provide more power, greater efficiency, and better overall performance.

Dana’s Spicer driveshafts with cardan universal joints cover a wide variety of off-highway vehicles. Our double cardan technology is ideal for off-road applications. Typically used with independent and beam axles, it can accommodate high angles and high temperatures. Designed with advanced sealed center bearings and snap ring retention, double cardan joints allow easier maintenance and reduced drivetrain weight. Aluminum, steel, and additional yoke options are available for further customization.

Today, Dana can meet any need through the Spicer 10™ Series, Spicer Wing® Series, Spicer Life® Series, Spicer Compact™ Series, and Spicer centered double joint lines of driveshafts. Dana also offers multiple end-fittings, including wing-style end yokes and full round or Quick Disconnect™ options for round-style bearings. SAE, DIN, and cross-serrated flanges are also available.
With a global presence in 33 countries, Dana Incorporated boasts more than 100 engineering, manufacturing, and distribution facilities. With a worldwide network of local service centers, each customer is assured of the local proximity and responsiveness they need.

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 systems and individual product solutions to customers in construction, agriculture, material-handling, underground-mining, and forestry markets, plus Brevini® motion systems for machine working functions. 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 for telehandlers at dana.com/offhighway.