Light Vehicle Driveline Technologies

Delivering innovative solutions for all driveline configurations

Dana continuously provides greater value to customers by engineering the most state-of-the-art technologies to enhance the fuel economy and durability of today’s light vehicles.
Integrated Driveline Solutions

Dana’s best-in-class technologies offer customers solutions that fit their drivetrain configuration. We are committed to innovation. Our differentiating products accommodate new industry trends to enable the most efficient, high-performance vehicles on the market today.

Versatile Spicer® Axles
We engineer Spicer® axles to meet exact customer requirements with various features, materials, and options, including Spicer® AdvanTEK® gearing, to do significantly more with less.

Customizable Spicer® Propshafts
To meet any vehicle packaging requirement, Dana offers the broadest range of Spicer® propshafts on the market today. This offering includes constant velocity and flexible coupling joints with lightweight tube options.
Systems for Passenger Cars, Crossovers, SUVs, and Pickup Trucks

AWD

All-Wheel Drive

- Disconnecting and full-time AWD systems for transverse and longitudinal drivelines

4WD

Four-Wheel Drive

- Lightweight front and rear axles for fully independent suspension systems
- Durable front and rear beam axles for rugged applications

RWD

Rear-Wheel Drive

- Lightweight rear axles for fully independent suspension systems
- Durable rear beam axles for rugged applications

Put to the Test

Dana delivers heavy-duty solutions that provide light-vehicle original equipment manufacturers (OEMs) with the fuel economy, mobility, and durability they seek. Achieving this requires an ongoing commitment to rigorous testing. Every Dana breakthrough is challenged, measured, affirmed – and then tested again. These extensive efforts ultimately benefit customers. Our innovations aren’t just concepts. They’re proven to work.
**Spicer® AdvanTEK® Axles**

Spicer® AdvanTEK® axles deliver more miles per gallon, enhanced vehicle performance, and maximum durability for the complete spectrum of light vehicles. Even with a compact design, these axles provide greater power density than similar offerings while reducing driveline weight with lighter, higher strength materials and advanced gearing.

**Axle Application Range**

<table>
<thead>
<tr>
<th>Mini Car, Truck, Van</th>
<th>Small Car, Crossover, Minivan</th>
<th>Mid-size Car, Crossover</th>
<th>Small SUV</th>
<th>Mid-size Pickup, Crossover</th>
<th>Full-size, Pickup, SUV, Commercial Light Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>M135</td>
<td>M140</td>
<td>M150</td>
<td>M160</td>
<td>M170</td>
<td>M180</td>
</tr>
<tr>
<td>M190</td>
<td>M200</td>
<td>M210</td>
<td>M220</td>
<td>M235</td>
<td>M250</td>
</tr>
<tr>
<td>M275</td>
<td>M300</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Note: Model numbers indicate axle's ring gear diameter in millimeters.

**Torque Management with High-Performance Differentials**

Dana offers unique differentials for Spicer® AdvanTEK® axles, which help customers enhance mobility and improve vehicle performance.

- **Spicer® Trac-Lok®**
  This torque-sensing, clutch-style limited slip differential improves both traction and performance. It complements brake-based traction control systems to increase torque transfer and improve brake durability.

- **Spicer® Powr-Lok™**
  This differential maintains the same benefits of a Trac-Lok, but adds independent adjustability for bias in drive and coast. The tunable design enables enhanced performance and control on the track or off-road.

- **Spicer® PerformaTraK™**
  Pneumatic or electric differentials can transfer full driveline torque to one wheel by preventing wheel differentiation. Both wheels are required to turn at the same speed in all conditions for increased mobility.
All-Wheel Drive (AWD) Systems

AWD is the fastest growing light-vehicle segment today. Right now, Dana is developing cost-effective product solutions for the AWD segment that are helping to meet the increasing need for more efficient powertrains.

With decades of expertise as a full systems solution provider, Dana is bringing next-generation AWD performance to OEMs of passenger cars, crossovers, and vans. Delivering best-in-class fuel economy and safety, our SmartConnect™ disconnecting AWD system automatically connects and disconnects the secondary driveline – rapidly, and only as required. It is available on both transverse and longitudinal drivelines, with transverse drivelines having the option of either a value-optimizing single disconnect coupling, or a performance-enhancing twin-coupling system that is capable of torque-vectoring, limited-slip, and disconnecting.

Electronic Limited Slip Differential

With Electronic Limited Slip Differential (ELSD) technology, Dana is building on its driveline expertise. ELSD bridges the gap between a full AWD system and a two-wheel drive open differential system, delivering maximum tractive effort.

Our ELSD technology improves stability while cornering, and delivers higher torque capacity and greater controllability. Utilizing proprietary software to determine optimum torque corrections, this innovation corrects unwanted driving behaviors such as oversteer or loss of traction in seconds.

Similar to Dana’s disconnecting AWD technology, it disconnects when not in use to maximize efficiency. In addition, ELSD is available as a bolt-on solution for any FWD transaxle or as a bolt-on or fully integrated solution for any front or rear axle.
Spicer® Propshafts

Spicer propshafts offer significant benefits for passenger cars, crossovers, SUVs, and light commercial vehicles all around the world. Our propshafts, from U-joints and tubes to the materials and manufacturing processes used, are customized to meet customer specifications and challenging space requirements. Delivering more torque in smaller packages, Spicer propshafts are precision engineered to reduce driveline weight and are expertly balanced for a smoother, quieter ride.

Vehicle Packaging Flexibility in Every Configuration

Our expert engineering/sales team can help you optimize your drivetrain with various packaging options to accommodate specific requirements while improving vehicle performance and efficiency.

Wide Range of Torque Capacities
Customized propshaft options to meet customer design requirements

<table>
<thead>
<tr>
<th></th>
<th>Rubber Coupling</th>
<th>Cardan</th>
<th>Staked Cardan</th>
<th>Double Cardan</th>
<th>Rzeppa</th>
<th>Double Offset</th>
<th>Plunging Cross Groove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>Medium</td>
<td>Low – Med.</td>
<td>Low – Med.</td>
<td>Highest</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Fixed or Plunging</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Plunging</td>
<td>Plunging</td>
</tr>
<tr>
<td>Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Speed</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Maximum Operating Angle</td>
<td>1°</td>
<td>~3°</td>
<td>~3°</td>
<td>8°</td>
<td>12°</td>
<td>6°</td>
<td>8°</td>
</tr>
<tr>
<td>NVH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant Velocity</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Plunge Force</td>
<td>N/A</td>
<td>High (Slip Spline)</td>
<td>High (Slip Spline)</td>
<td>High (Slip Spline)</td>
<td>N/A</td>
<td>Low – Med.</td>
<td>Low</td>
</tr>
<tr>
<td>Plunge Stroke Capability</td>
<td>N/A</td>
<td>Long</td>
<td>Long</td>
<td>Long</td>
<td>Long</td>
<td>Long</td>
<td>Medium</td>
</tr>
<tr>
<td>Residual Unbalance</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Med. – Low</td>
</tr>
</tbody>
</table>

Versatility Through Premium Spicer® U-Joints

Our large portfolio of U-joints is engineered to offer long-lasting, reliable performance and reduced noise, vibration, and harshness (NVH) for various driveline configurations.

**Constant Velocity Joints**

Constant velocity joints deliver uniform motion at high joint angles and plunge for reduced driveline NVH. Our fixed Rzeppa joints offer high power density and can operate continually at angles up to 10 degrees and ambient temperatures between -40° to +130° Celsius. Plunging cross groove and double offset joints can continuously operate at angles up to 6 degrees, plunging up to 50 mm at ambient temperatures between -40° to +130° Celsius.

**Cardan Joints**

To fit both steel and aluminum propshafts, a large portfolio of centered and staked and industry standard serviceable snap ring single and double cardan joints are available. These long-lasting cardan joints are engineered for reliability with low maintenance and maintenance-free operation using bearings with advanced grease and sealing for ambient temperatures between -40° to +130° Celsius. Joint articulation torque is precisely controlled for reduced driveline NVH.

**Flexible Coupling Joints**

Flexible couplings are engineered to absorb torsional peaks and lower driveline NVH. End fittings are engineered for long reliable life to fit both steel and aluminum propshafts. Joint operating angle is usually limited to less than 2 degrees and ambient temperatures between -40° to +130° Celsius.

Providing longer life, increased bearing capacity, and lower maintenance costs, Spicer Life® Series U-joints consistently outperform competing products.
Electrified Powertrain Solutions
For Today and Tomorrow

Supported by a legacy of innovation in conventional drivetrains, Dana is at the forefront of integrating mechanical and electrical components for alternative propulsion applications. With the acquisition of a majority share in TM4 Inc., a manufacturer of high-voltage, permanent magnet motors, inverters, power electronics, and control systems, Dana is the only supplier with complete in-house gearbox, motor, inverter, and thermal management capability for fully integrated e-Drive systems.

We have the right products to meet any OEM’s need wherever they are in their electrification development. And with multiple electrified products already in production, we’re a step ahead – ready to serve electrification needs now. From fully integrated systems to electrified modules, our comprehensive offering supports the most efficient transfer of energy for both hybrid and electric vehicles.

Below are just a few highlights of the electrified solutions we have available today. To view our entire portfolio of electrified solutions, visit Dana.com/electrified.
Transmission Solutions

For High-Performance Cars

High-performance vehicles demand the best in all components. Graziano™ manual, automated manual, and dual clutch transmission systems are engineered specifically for the highest performance sports cars.

Dana is a world leader in the development and supply of manual and automated manual transmission systems for small/medium series high performance cars and key player in applying innovative technologies such as dual clutch and automated manual transmissions. Graziano™ six- and seven-speed units are designed for either front engine rear transaxle or mid-engine configurations, and are specifically tailored to the particular requirements of the individual car.
We’re where our customers are, and where they’re going.

One of the ways we create value is by positioning our technical and manufacturing resources where customers need us globally. Dana now operates in 33 countries.

### North America
- Albion, IN (M)
- Apizaco, Mexico (M)
- Auburn Hills, MI (M)
- Columbia, MO (M)
- Dry Ridge, KY (M)
- Fort Wayne, IN (M)
- Gordonville, TN (M)
- Louisville, KY (M)
- Maumee, OH (T)
- Mexico City, Mexico (M-2)
- Navi, MI (S)
- Pottstown, PA (M)
- Queretaro, Mexico (M-3)
- Suffolk, VA (M)
- Toledo, OH (M)
- Warren, MI (M)
- Boucherville, Quebec (T)

### South America
- Grand Bourg, Argentina (M)
- Naschel, Argentina (M)
- Gravatá, Brazil (T)
- Gravatá, Brazil (M)
- Bogotá, Colombia (M)
- Bucaramanga, Colombia (M)
- Quito, Ecuador (M)

### Europe
- Bruges, Belgium (T)
- Gyor, Hungary (M)
- Moscow, Russia (S)
- Ibiia-Deba, Spain (M)
- Birmingham, UK (M)
- Nuneaton, UK (T)
- Essen, Germany (S)
- Rivoli, Italy (T)
- Luserna, Italy (M)

### Africa
- Uitenhage, South Africa (M)

### Asia-Pacific
- Weifang, China (M)
- Chongqing, China (M)
- Changshu, China (M)
- Fuzhou, China (M)
- Shenyang, China (M)
- Shanghai, China (S)
- WuXi, China (T)
- Chakan, India (M-2)
- Jodali, India (M)
- Pantnagar, India (M)
- Pune, India (T)
- Tokyo, Japan (S)
- Toyohashi, Japan (T)
- Seoul, S. Korea (S)
- Pa Teh City, Taiwan (M)
- Rayong, Thailand (M-2)
- Bangkok, Thailand (M)

**Key:**
- M – Manufacturing Plant
- T – Technology Center
- S – Sales Office

9 Technology Centers
6 Sales Offices
42 Manufacturing Plants
The Genuine **Difference**

Dana’s global aftermarket network

Our global aftermarket network provides performance-oriented products for passionate car enthusiasts. With Dana craftsmanship, customers can count on longer life and less downtime. And because we are constantly innovating our manufacturing processes, our Spicer® replacement parts will meet or exceed the OE parts that are being replaced. Additionally, complete interchangeability with existing parts provides total product compatibility with no change in part numbers.

A key industry driver

Year after year, Dana puts its technologies to the test by taking part in a number of popular off-roading events. In the past year, Spicer products played an active role in more than two dozen off-roading competitions in three countries. We appreciate that the off-road community values Dana drivetrains. We do our part through promotions and sponsorships to leverage our brand credibility in the category and build additional excitement among consumers.

Tools that make it easier

Beyond engineering industry-leading performance parts, Dana offers extensive support resources to ensure customers are getting the most out of their vehicles. Brochures, catalogs, software, and apps are all available at spicerparts.com.
About Dana Incorporated

Dana 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. Founded in 1904, Dana employs thousands of people in 33 countries on six continents who are committed to delivering long-term value to customers.

About Dana’s Light Vehicle Driveline Group

Dana is a leading supplier of traditional and electrified driveline components and systems for passenger cars, crossovers, SUVs, vans, and light trucks. Working collaboratively with original-equipment manufacturers and the aftermarket, our Light Vehicle business unit is focused on delivering best-in-class efficiency, maximum durability, and superior ride and handling.

Dana.com/lv-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.

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