

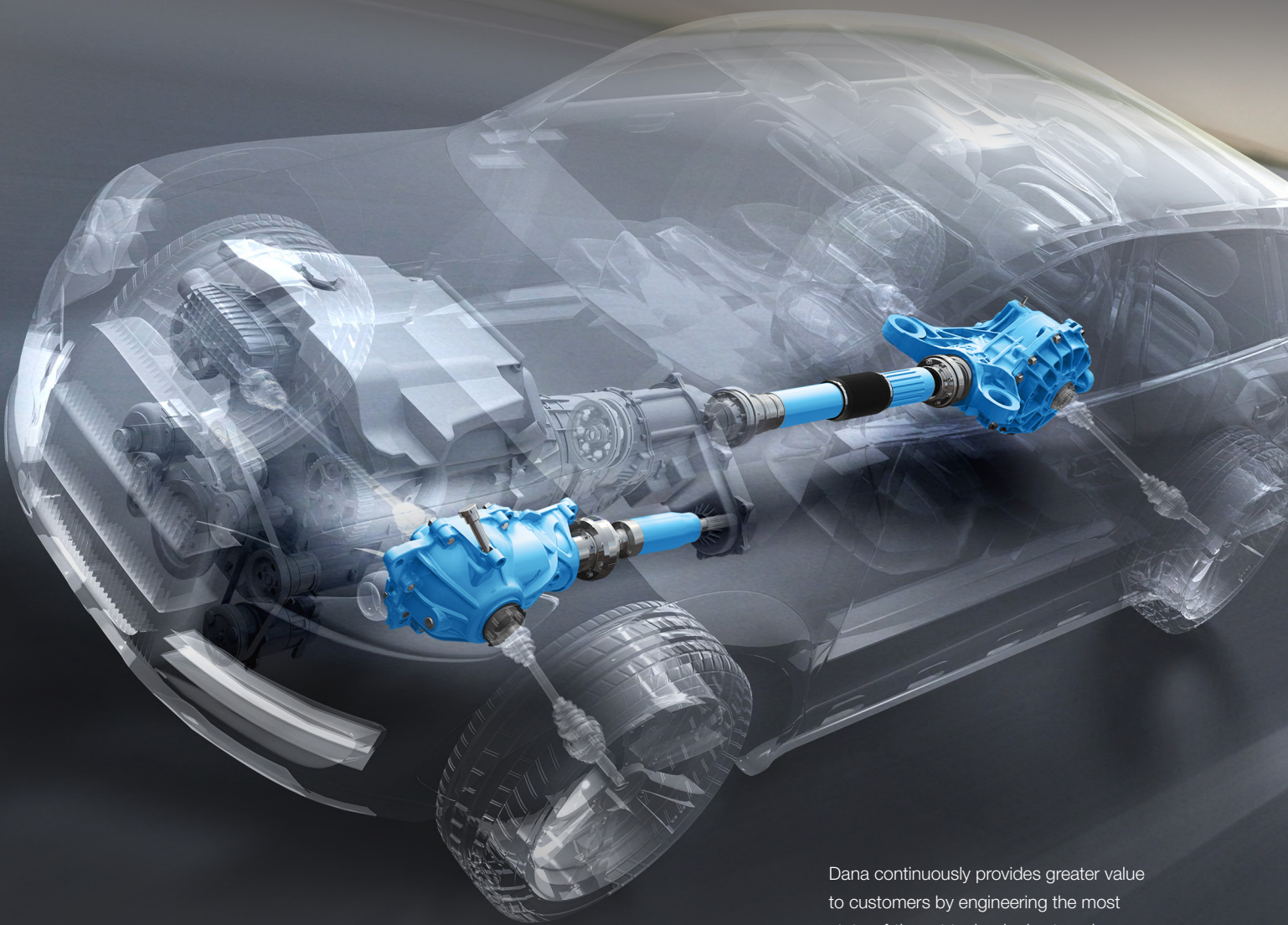


**SPICER®**

*Drivetrain Systems*

# Light Vehicle Driveline Technologies

Delivering innovative solutions for all driveline configurations

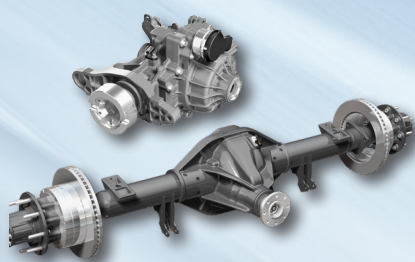
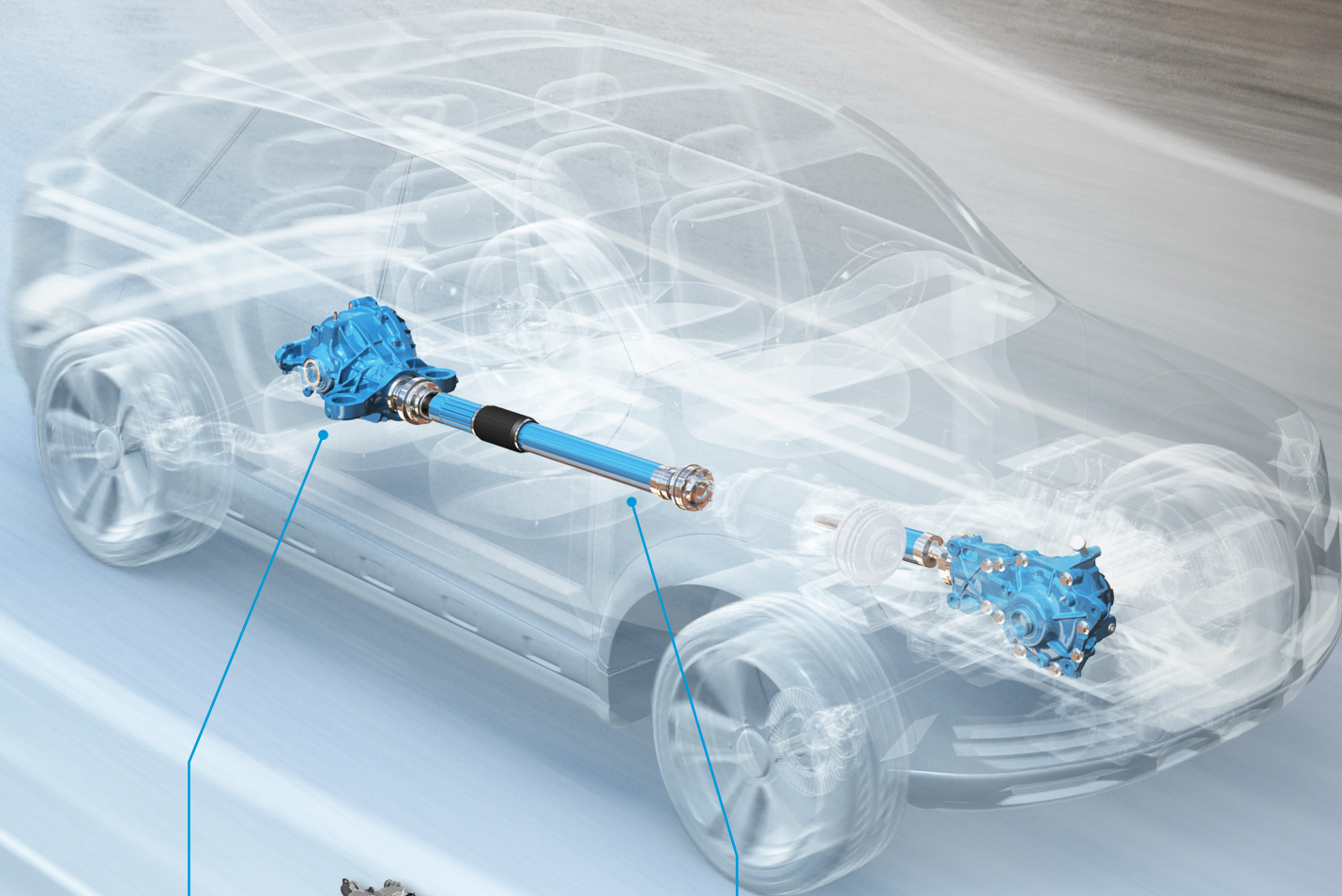


Dana continuously provides greater value to customers by engineering the most state-of-the-art technologies to enhance the fuel economy and durability of today's light vehicles.



# 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.



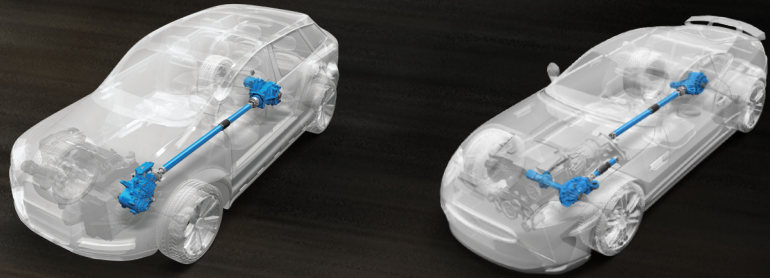
# Systems for Passenger Cars, Crossovers, SUVs, and Pickup Trucks

## AWD

---

### All-Wheel Drive

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

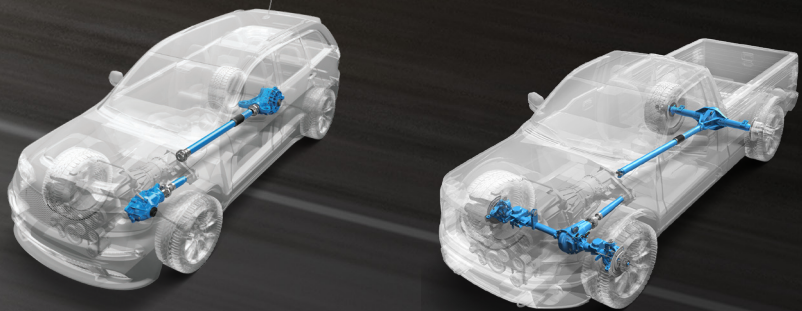


## 4WD

---

### Four-Wheel Drive

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

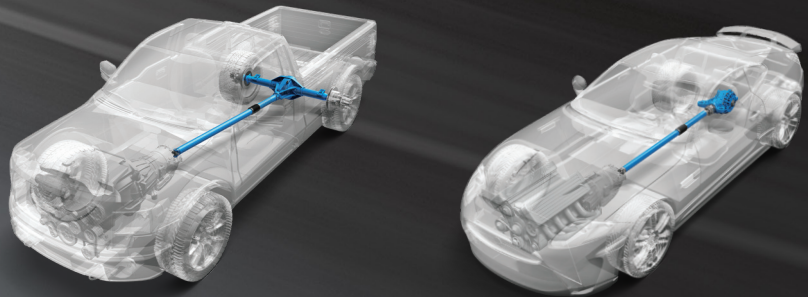


## RWD

---

### 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.

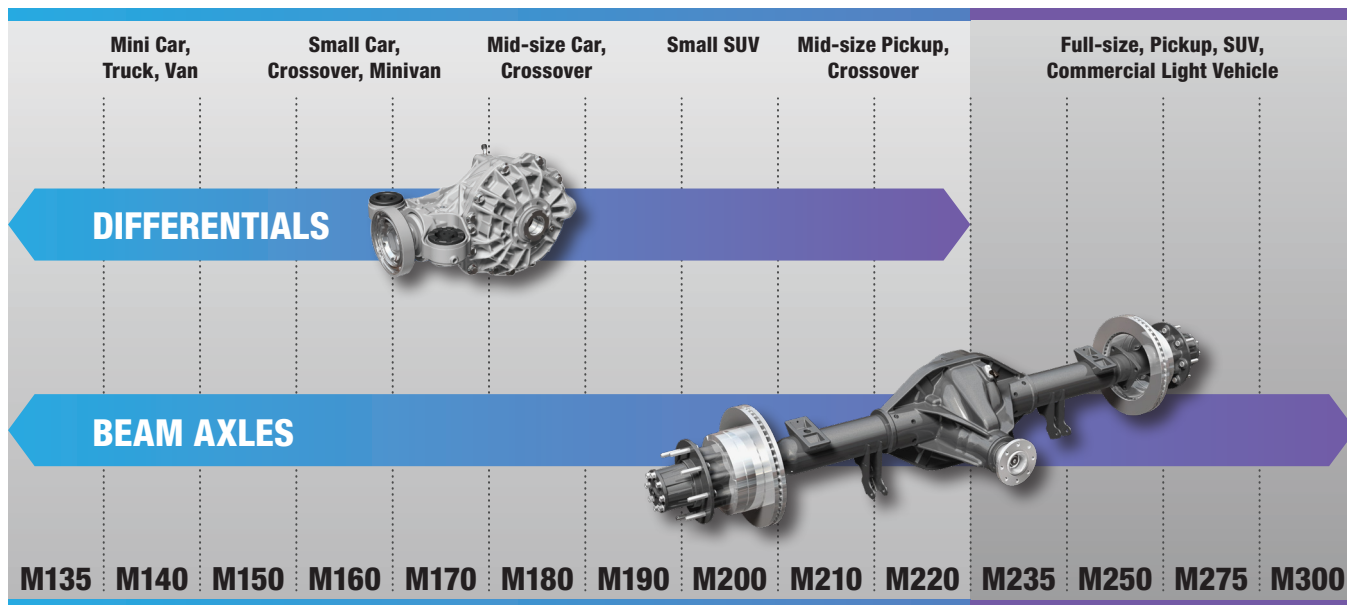




# Spicer® AdvanTEK® Axles

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



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.





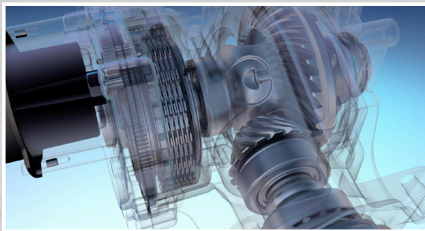
# Advanced Axle Technologies for Improved Mobility and Handling

As fuel economy and emissions standards become more stringent, OEMs can rely on Dana for AWD systems that provide efficiency, performance, and safety.

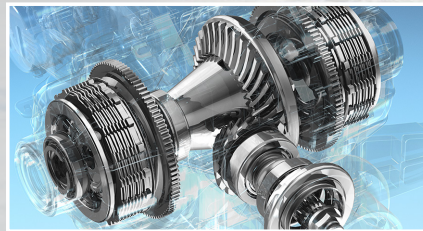
## All-Wheel Drive (AWD) Systems

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.

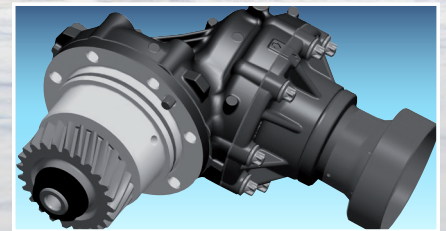
With decades of expertise as a full systems solution provider, Dana is bringing next-generation AWD performance to OEMs of passenger cars, crossovers, and vans. Delivering best-in-class fuel economy and safety, our SmartConnect™ disconnecting AWD system automatically connects and disconnects the secondary 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.



Single-side Disconnect



Dual-side Disconnect



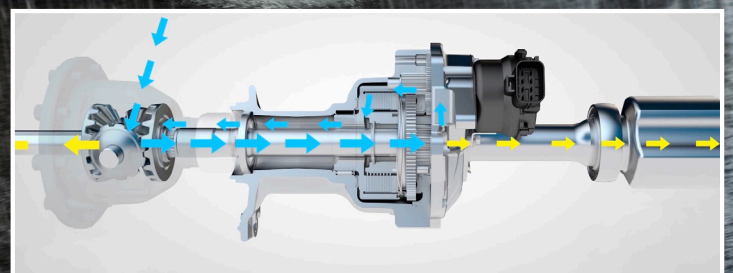
Front Power Transfer Unit

## 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

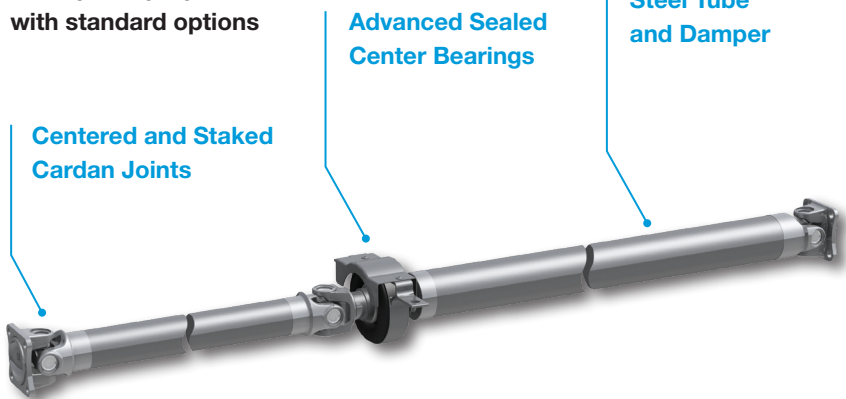
Spicer propshafts offer significant benefits for passenger cars, crossovers, SUVs, and light commercial vehicles all around the world. Our propshafts, from U-joints and tubes to the materials and manufacturing processes used, are customized to meet customer specifications and challenging space requirements. 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

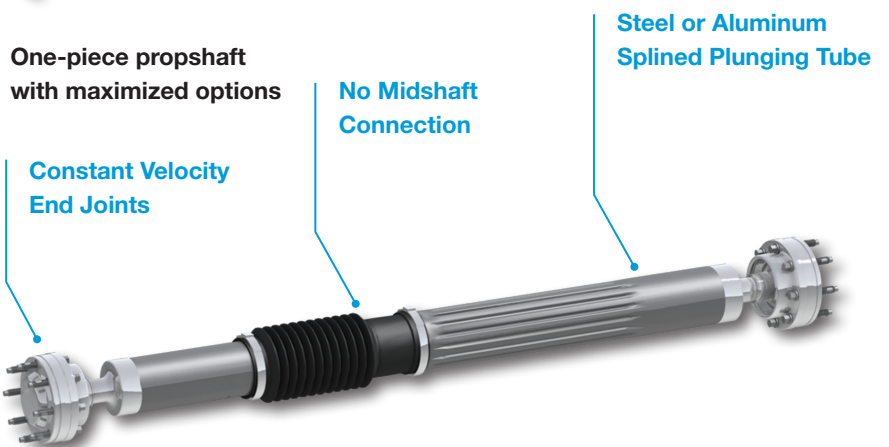
Our expert engineering/sales team can help you optimize your drivetrain with various packaging options to accommodate specific requirements while improving vehicle performance and efficiency.



Multi-piece propshaft with standard options



One-piece propshaft with maximized options



## Wide Range of Torque Capacities

Vehicle Segment	A, Mini Car, Truck, Van	B, Small Car, Crossover, M-Van	C, Mid-Size Car, Crossover	Small SUV	Compact Pickup, SUV	Full-size Pickup Truck, Car				Commercial Light Truck, Cargo Van, Passenger Van	
	AWD, RWD	AWD, RWD	AWD, RWD, 4WD	AWD, RWD	AWD, RWD, 4WD	RWD, 4WD				RWD	
PROPSHAFTS	Snap Rings Cardan Joints	S103	S1120	S1125	1310	1330	1350	1410	SPL-55		SPL-70
	Centered and Staked Cardan Joints	SPL-10	SPL-14	SPL-18	SPL-27		SPL-38				
	Fixed, Rzeppa, and DPM CV Joints	1,000 Nm DOJ	1,400 Nm Rzeppa	3,300 Nm Rzeppa				6,000 Nm Rzeppa			
	Plunging, Double Offset, and Cross Groove CV Joints	1,000 Nm DOJ	1,400 Nm DOJ	3,300 Nm Cross Groove							
Torque Capacity (Nm)	700 900	1,100 1,300	1,500 1,700 1,900	2,100 2,300 2,500	2,700 2,900 3,100 3,300	3,500 3,700 3,900	4,100 4,300 4,500	4,700 4,900 5,100	5,300 5,500 5,700	5,900 6,100 6,300 6,500	6,700 6,900



# Customized propshaft options to meet customer design requirements

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

## 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.



Double Offset



Rzeppa



Plunging Cross Groove



Direct Pinion Mount

### 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.



Snap Ring Cardan



Centered and Staked Cardan



Double Cardan

### 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.



Flexible Coupling

Providing longer life, increased bearing capacity, and lower maintenance costs, Spicer Life® Series U-joints consistently outperform competing products.



# Electrified Powertrain Solutions

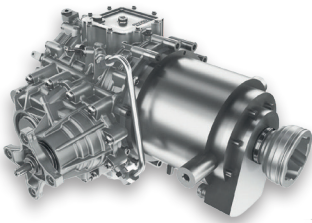
## For Today and Tomorrow

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.

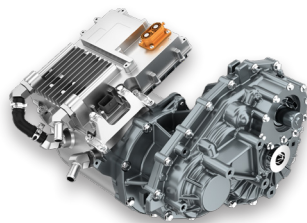
Below are just a few highlights of the electrified solutions we have available today. To view our entire portfolio of electrified solutions, visit [Dana.com/electrified](http://Dana.com/electrified).

### Transmission Systems



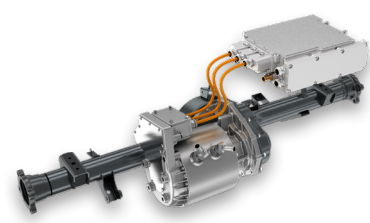
Graziano®  
**Hybrid Rear Axle  
Module (HRAM)**

### e-Drives



Spicer® Electrified with TM4  
**eS4500i e-Drive System**

### e-Axle



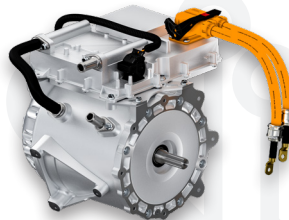
Spicer® Electrified with TM4  
**eS4500r Rigid e-Axle System**

### Vehicle Controller



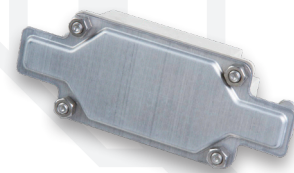
TM4 NEURO™  
**200 Vehicle Controller**

### Motor & Inverter



TM4 MOTIVE™  
**Motor/Inverter System**

### Thermal Management



Long®  
**IGBT Chip Cooling Module**

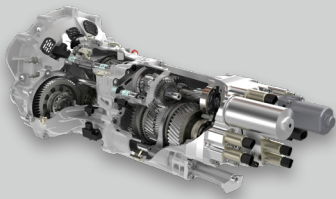


# Transmission Solutions

## For High-Performance Cars

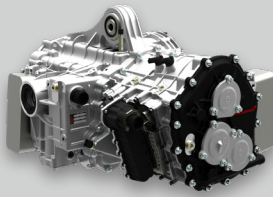
High-performance vehicles demand the best in all components. Graziano™ manual, automated manual, and dual clutch transmission systems are engineered specifically for the highest performance sports cars.

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.



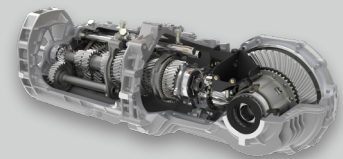
---

Graziano™  
**High-Performance  
7-Speed AMT**



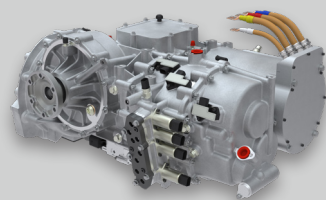
---

Graziano™  
**High-Performance  
Dual-Clutch Transaxle**



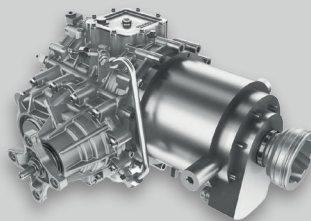
---

Graziano™  
**High-Performance Automated  
Manual Rear Transaxle**



---

Graziano™  
**Hybrid Powershifting AMT**



---

Graziano™  
**Hybrid Rear Axle  
Module (HRAM)**



**GRAZIANO™**

*High-Performance Transmissions*



# 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)
- Gordonsville, TN (M)
- Louisville, KY (M)
- Maumee, OH (T)
- Mexico City, Mexico (M-2)
- Novi, 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)
- Gravataí, Brazil (T)
- Gravataí, Brazil (M)
- Sorocoba, Brazil (M)
- Bogota, Colombia (M)
- Bucaramanga, Colombia (M)
- Quito, Ecuador (M)

## Europe

- Bruges, Belgium (T)
- Győr, Hungary (M)
- Moscow, Russia (S)
- Itzia-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)
- Jodalli, 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

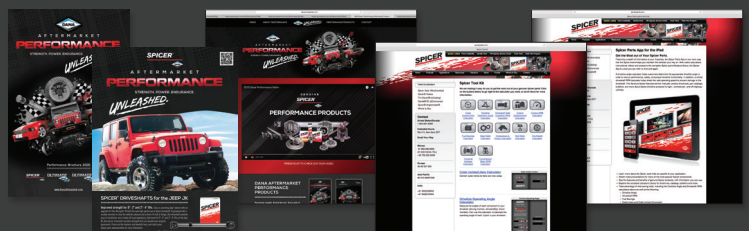
Year after year, Dana puts its technologies to the test by taking part in a number of popular off-roading events. In the past year, Spicer products played an active role in more than two dozen off-roading competitions in three countries. We appreciate that the off-road community values Dana drivetrains. 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](http://spicerparts.com).



THE  
**ULTIMATE**  
FOR THE JEEP® WRANGLER® JK  
DANA  
**60**





# Market-Driven Innovation

With 115 years of experience, Dana is a world-leading supplier of complete drivetrain solutions for all light vehicles – from mini-cars to light commercial trucks to vans. Spicer® products are consistently proven to outperform the competition with unique features designed to enhance performance, versatility, and durability.

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.



Emissions Reduction



Noise, Vibration, and Harshness (NVH)



Electrification



Hybridization



Mobility and Performance



Emerging Markets

## 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](http://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.



**SPICER®**

*Drivetrain Systems*