



Railway Solutions

Drive and Motion Systems

Market-leading drive and motion systems by Spicer® and GWB™ optimize vehicle performance while maximizing yields. Our products meet requirements for the broadest selection of applications.





People Finding A Better Way[®]

Established in **1904**. Employing **40,000** people across **141** major facilities in **31** countries. Shipping to **14,000** customers, leveraging a global network of technology centers across **9** countries

Our Vision

Powering Innovation
To Move Our World

Our Mission

This mission is embodied in our company theme: People Finding A Better Way.

Driving stakeholder value by:

- powering vehicles and machines around the world
- shaping sustainable progress through invention and execution
- making the amazing happen wherever people live, work, and play.

Our Values

- Value Others
- Inspire Innovation
- Grow Responsibly
- Win Together

Corporate Business Units

Dana serves the global light vehicle, medium- and heavy-duty vehicle, and off-highway markets through four business units: Light Vehicle Driveline Technologies, Commercial Vehicle Driveline Technologies, Off-Highway Drive and Motion Technologies, 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.



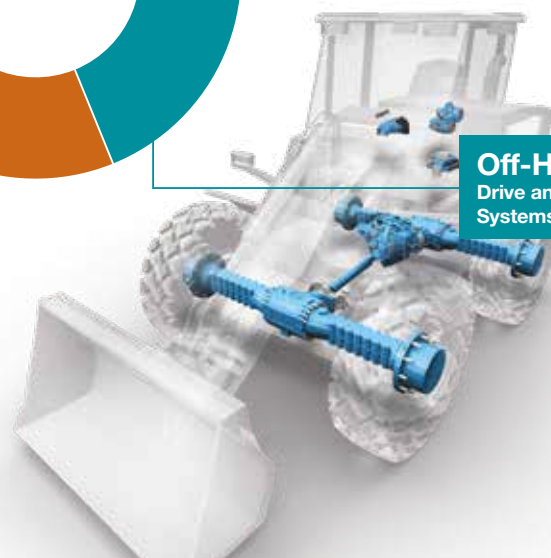
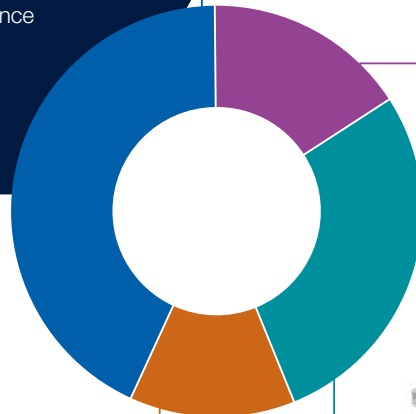
Light Vehicle Drive Systems



Commercial Vehicle Drive and Motion Systems



Power Technologies



Off-Highway Drive and Motion Systems

Where there is a need, Dana finds a better way.

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.

Why should you rely on Dana?

Solutions designed, engineered, and manufactured for maximum efficiency.

We approach electrification with a trained eye and an insightful, innovative perspective, utilizing market synergies to provide an advantage in electrifying offerings across multiple applications.

A component is only as good as the system in which it operates. That's why we take a systems-focused approach, seamlessly integrating our components into complete electrified systems.

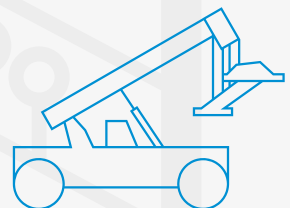
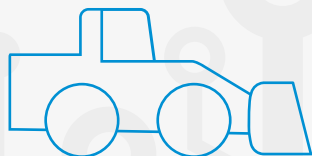
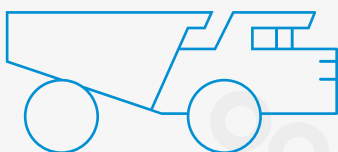
We have an in-house, multi-disciplinary team of system solutions engineers who provide turnkey software and controls for our entire portfolio of technologies. This in-house knowledge and integration produces solutions that provide enhanced performance, packaging optimization, and reduced system weight. All of which results in savings to your bottom line.



LIGHT VEHICLE



COMMERCIAL VEHICLE



OFF-HIGHWAY VEHICLES

Off-Highway Drive and Motion Systems

As an innovation leader in off-highway drive and motion systems, Dana continuously improves the performance and efficiency of vehicles and machines worldwide. We aim to be the global technology pacesetter in efficient power conveyance and energy-management solutions.

Enhanced Brand Portfolio Off-Highway brands

Drivetrain Systems



Motion Systems



Gears and Shifting Solutions



Thermal Management



Sealing



Leading the Charge in Vehicle Electrification

Dana is a leading drivetrain and motion systems provider for electrified off-highway applications.

Supported by a legacy of innovation in conventional drivetrains, Dana is at the forefront of integrating mechanical and electrical components for alternative propulsion applications. We embrace evolution to be a step ahead in supporting new applications as they emerge and collaborating with customers as they develop tomorrow's vehicles.

Electrification. **Delivered.**TM

Fully integrated e-Drive and e-Motion systems

e-Drive Systems



e-Motion Systems



Electric and Hybrid
e-Drive Systems



A Full Offering of Drive and Motion Systems for **Railway Applications**

With Dana's innovative engineering solutions, our customers benefit from tailor-made solutions to optimize their performance in the railway sector. We cater for several applications including shunters and railway maintenance vehicles, high-speed trains, regional and interregional trains, and urban monorails. Our Spicer® and GWB™ products improve vehicle productivity, ensure precise vehicle handling for a greater operating comfort, plus reliability and durability in all conditions. Present across six continents, Dana is always available to provide local support, from the design phase right up to after-sales service and maintenance requirements.





SPICER[®]
Drivetrain Systems

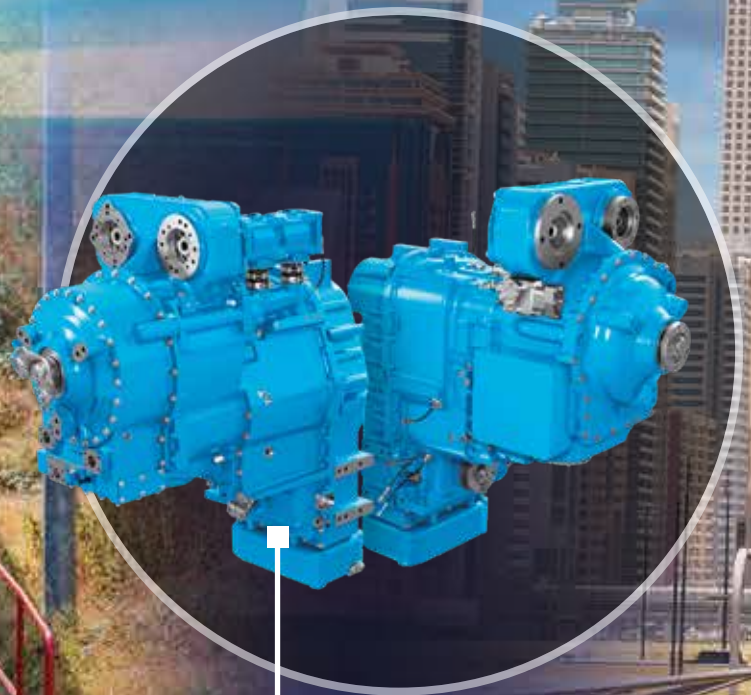


Railway Solutions for Shunters

The Spicer® TE50 powershift transmission, with its two configurations - 4 speed and 8 speed - is the new benchmark for the shunter and railway maintenance market. It is customizable for all customer needs, offering a flexible design to adapt to every requirement.

TE50

- 4 and 8 Forward and Reverse gears
- 600 kW driving power
- Optional retarder with 425 kW capacity
- Max input 2400 rpm
- Drop 686 mm (27")
- Flanges: 9C, T-180



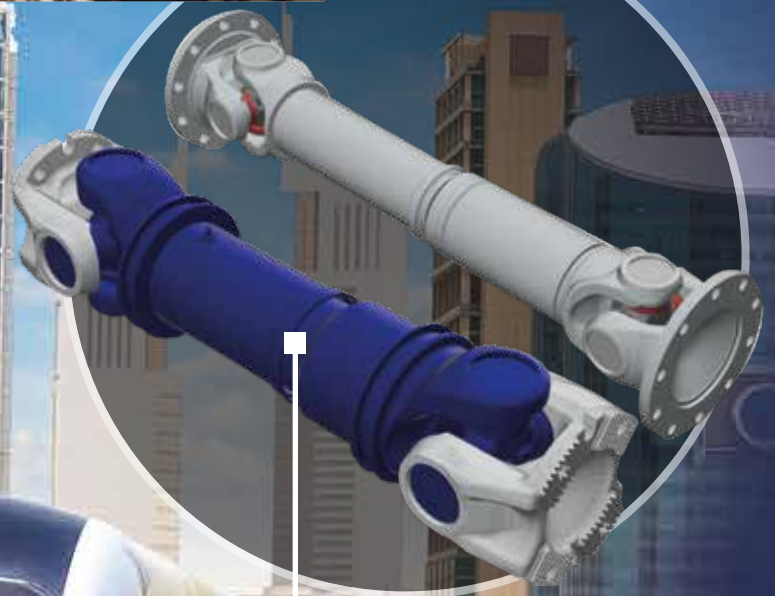
- Improved fuel efficiency and smoother shifting
- More precise vehicle handling and optimized braking
- Greater operating comfort and improved safety
- Increased productivity
- Reduced maintenance requirements, less downtime

Railway Solutions for Monorails

The Dana GWB™ customized 688 driveshaft is specifically studied for city monorails on two parallel elevated tracks with data proving its reliability and durability. Dana GWB™ is currently researching driveshaft solutions to address likely evolutions in rail coaches of the future.

GWB™ Driveshaft

- Short Coupled Shaft with Flange 180 mm & Standard Type with Flange 225 mm
- Functional Limit Torque, TCS: 35k Nm & 25 kNm
- Compressed Length: 514 mm & 900 mm
- Max Speed: 700 (rpm) & 1500 (rpm)



- Reliable with less downtime
- Safety improvement on vehicle handling
- Better customer experience
- Lower overall operating costs

Railway Solutions for High-Speed Trains and Regional Trains

Train suppliers are increasingly building trains which operate at higher speeds around the globe. Dana GWB™ is the world market leader in cardan shafts specifically engineered for High-Speed Trains. Our shafts for Regional Trains are designed to improve safety and reliability, to increase performance and lower operating costs.

Tripod, new generation GWB™ Cardan Shaft

- Integrated torque release device:
 $T_{\text{release}} = 20,000 \text{ Nm} - 24,000 \text{ Nm}$
- Reusable 10 times after torque release (overload)
- Flange connection with increased friction torque
- Reduced unbalance (extended guiding length)
- Reduced weight and moment of inertia
- Improved fatigue performance



- Increased reliability and durability
- More simple and cost reduced maintenance work procedures
- No breakage of cardan shaft components during torque overload
- Tripod shaft can be reused 10-times after torque overload release



GWM™ Cardan Shaft 688

- Functional Limit Torque, TCS: between 5 kNm and 35 kNm
- Length compensation up to 160 mm
- Max speed 3600 rpm
- Standard Type Flange and Cross Serrated
- Flange optional from 150 mm to 225 mm
- Compressed Length from 300 mm to 1870 mm



- Multiple size and features to better fit the application
- Best-in-class bearing capacity and lifetime
- Higher safety and reliability
- Low operating costs
- Spline Rilsan Coated - reduces the friction during operation
- Self-centering cross assembly – for precise balance
- Extended Service Interval



Market-Driven **Innovation**

Off-Highway Performance Expectations

Safety

Productivity

Maneuverability

Durability

Serviceability

Total Cost of Ownership

About Dana Incorporated

Dana is a leader in the design and manufacture of highly efficient propulsion and energy-management solutions for all mobility markets across the globe.

The company's conventional and clean-energy solutions support nearly every vehicle manufacturer with drive and motion systems, electrodynamic technologies, thermal, sealing, and digital solutions.

About Dana Off-Highway Drive and Motion Systems

Dana delivers fully optimized solutions to customers in the construction, agriculture, material handling, mining, and industrial markets.



Dana.com/oh
Dana-industrial.com/contact-us

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.

