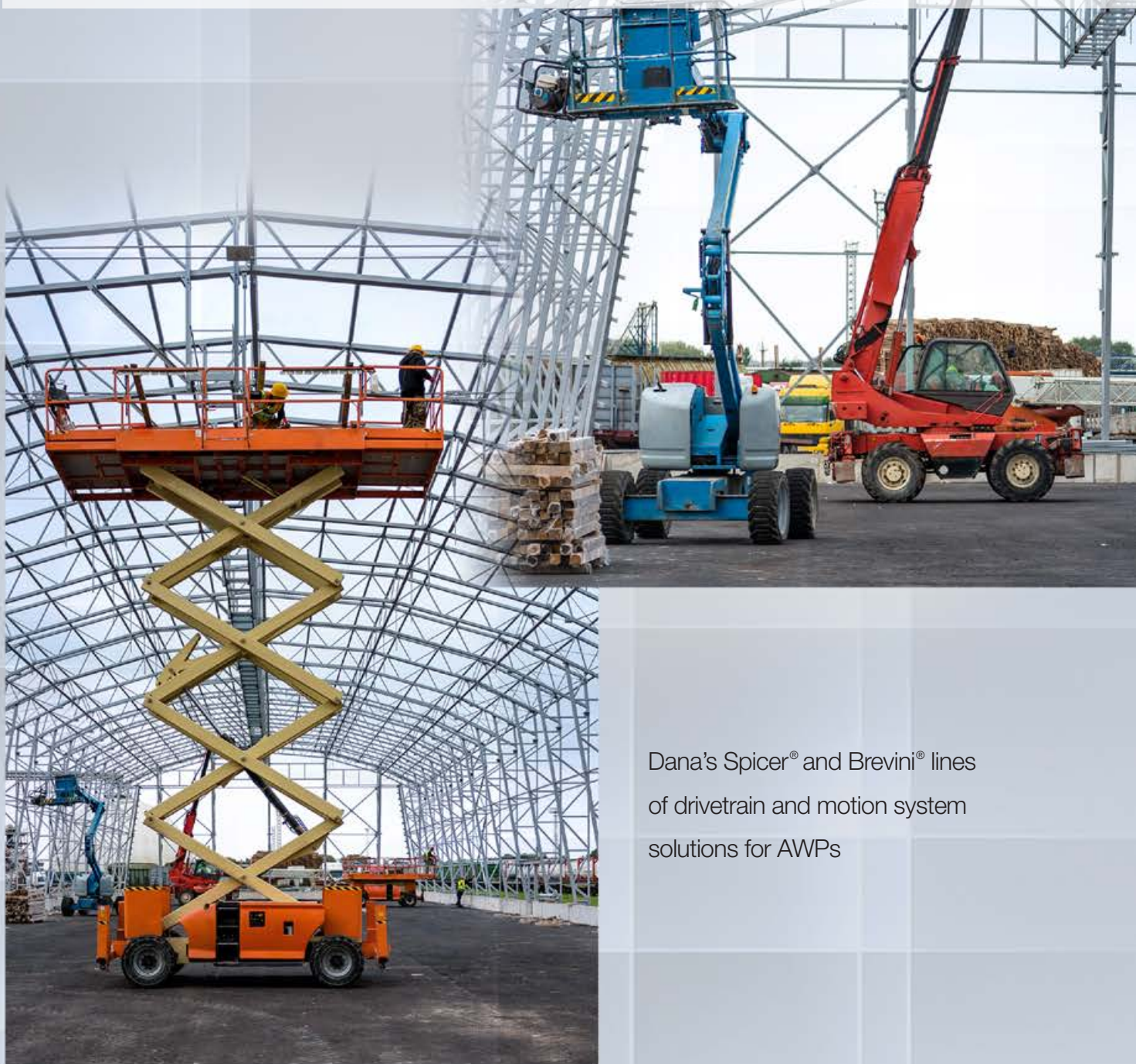




Drive and Motion Systems for **Aerial Work Platforms**



Dana's Spicer® and Brevini® lines
of drivetrain and motion system
solutions for AWP's

Your Single-Source Provider of Aerial Work Platform Drive and Motion Systems

The aerial work platform (AWP) market is transforming rapidly. OEMs must respond to more stringent emissions regulations, while end-users are looking to lower noise levels and environmental impact.

Dana has a complete range of advanced drive and motion products for AWP that address these trends while boosting productivity. We design and manufacture fully integrated drive and motion products

for many types of AWP, including scissor lifts, vertical mast lifts, articulating and telescopic boom lifts, crawler lifts, and truck-mounted lifts.

By adding Brevini® motion systems to its Spicer® drive systems, Dana has a full array of mechanical, hydraulic, and electronic advanced technologies to support customer application designs.

Vehicle Development Lab

As part of Dana's mission to be a global technology leader in efficient power conveyance and energy maintenance solutions, we operate a state-of-the-art vehicle development lab in Arco, Italy.

Dana's flexibility and engineering expertise deliver the right solution for your vehicle.



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.



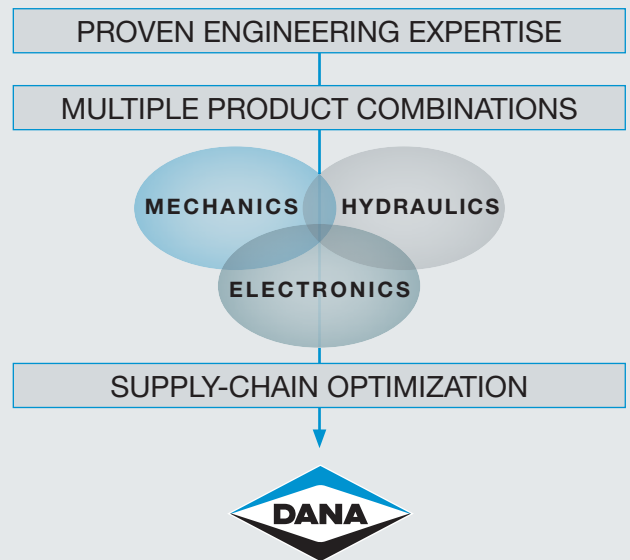
Emissions Reduction



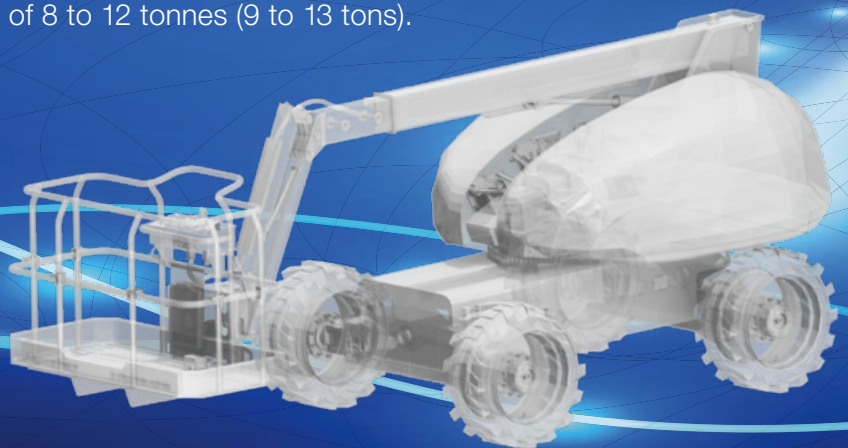
Noise, Vibration, and Harshness (NVH)

The Right Partner for Your AWP

Dana's engineering capabilities and broad portfolio allow us to team with our customers to provide optimal solutions. Our integrated solutions deliver the performance necessary to support high levels of efficiency. Meanwhile, as a single supplier, we can help optimize supply chains and serve the overall performance needs of our customers.



Spicer® wheel drives can be paired with a motor for electric-driven AWP's ranging from 3 to 7 tonnes (3 to 8 tons), with additional solutions in development for wheel-drive and axle-based solutions up to 24 tonnes (26 tons). Additionally, Dana is developing drive systems that integrate advanced electric motor and wheel-drive technologies in a single, compact package to optimize the performance of electric-powered AWP's with overall weights of 8 to 12 tonnes (9 to 13 tons).



Cost of Ownership



Hybridization



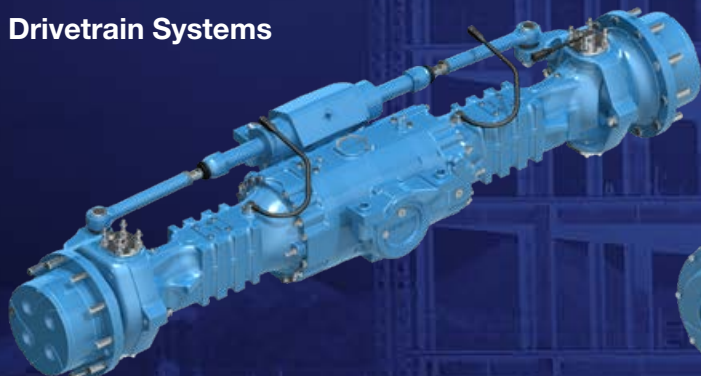
Mobility and Performance



Emerging Markets

Complete **System Solutions** for Telescopic Boom Lifts and Scissor Lifts

Drivetrain Systems



Planetary Rigid Steering Axle

With integrated Intelligent Load Monitoring System (ILMS)



Wheel Drive Range with Plug-In Motor

Designed for new generation machines as well as for electromobility



Hydraulic Motor Direct Drive

With integrated brake

Power Electronics



Angle/Length Transducer ASu Series

Simultaneously provides data on boom tilt and outreach



Tilt Sensor SP Series

Constantly measures platform tilt



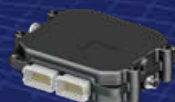
Tilt Switch IDXYmp Series

Provides safety alarm in case of exceeded tilt threshold



Safety Controller M92sc Series

Provides safety alarm signal in case of basket overload



Master Control Vehicle BMS Series

ECU for overall platform management



Load Sensors TPE/TT Series

Directly measures load on basket



Angle Sensor TAC Series

Indirectly measures platform height



Graphic Display Opus Series

Provides information about platform status



Motion Systems



Variable and Fixed Displacement Motor

Customized solutions



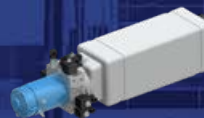
Slewing Drive Unit

Swing gearbox with plug-in hydraulic motor and shockless type pressure relief valves



Gearpumps and Power Units

Customized solutions



Compact Hydraulic Power Unit

Powered with DC and AC motors



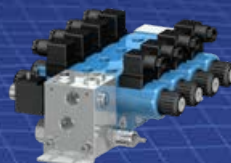
Hydraulic Pumps

High and medium duty, open and closed circuit



On-Off and Proportional Bankable Valve

Fully controls all machine movements



Pressure Compensated Proportional Bankable Valve

Fully controls all machine movements and load independently



Flow Sharing Bankable Valve

Fully controls all machine movements and load independently



Hydraulic Integrated Circuit (HIC)

Fully controls all machine movements

Market-Driven Innovation

Aerial Work Platform Product Range		Scissor	Articulated Boom	Telescopic Boom	Truck Mounted
Drivetrain System	Hydraulic transmission	●	●	●	▼
	Steering	●	●	●	▼
Work Functions	Swing drive package	▼	●	●	●
	Complete hydraulic system for functional control	●	●	●	●
	Outrigger control	●	▼	▼	●
Controls	Hydraulic electronic management	●	●	●	●
	Human machine interface (HMI)	●	●	●	●
Safety	Tilt control	●	●	●	●
	Basket overload control	●	●	●	●
	Working area limitation	▼	●	●	●
	Moment limitation	▼	●	●	●
Options	Basket electro-hydraulic self-leveling	▼	●	●	●
	Outrigger electro-hydraulic self-leveling	●	▼	▼	●

● Solution available ▼ Not available in machine



SPICER®

BREVINI®

Smart Technologies for Tomorrow's Needs

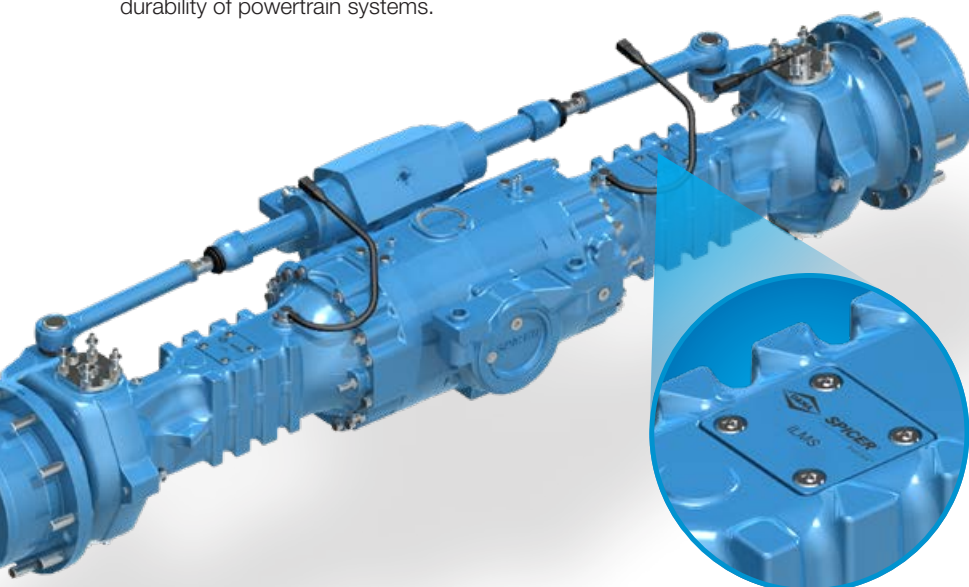
Spicer® Smart Suite™ for aerial work platforms uses patented and proprietary data-collecting technologies across the vehicle.

SMART SUITE™ Connected Drivetrain Technology



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.



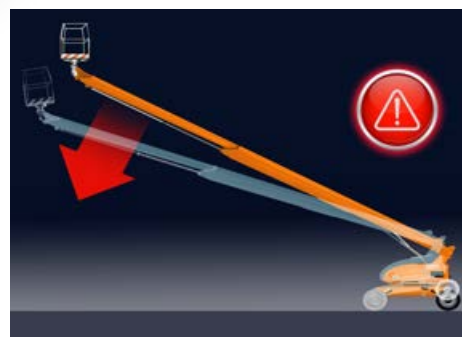
Prevents Boom Overextension

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.





Technologies Customized to **Every Part of the Globe**

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 axles and wheel drives for aerial work platforms at dana.com/offhighway.

dana.com/oh/contact



SPICER® **BREVINI®**

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.