



# Marine Onshore **Off-Highway Drive and Motion Technologies**

Market-leading motion systems by Brevini® and Fairfield® optimize machine performance while maximizing yields. Our products meet requirements for the broadest selection of applications.







Founded in 1904, Dana Incorporated 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.

We maintain a competitive advantage in the marketplace with a commitment to delivering on the five dimensions of our enterprise strategy – leveraging the core, strengthening customer centricity, expanding global markets, commercializing new technology, and accelerating hybridization and electrification.

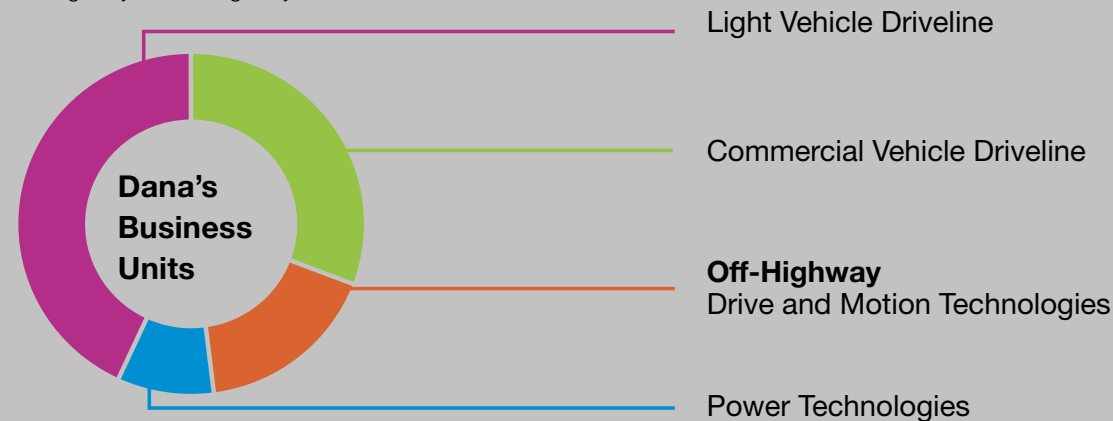
Employing thousands of people in 33 countries, on six continents, our people work tirelessly to deliver long-term value to customers around the world. We have earned our position as a trusted, top-tier supplier by collaborating with customers to develop, integrate, and support the innovations required to improve vehicle performance and efficiency.

Each day, in both large and small ways,  
**Dana is defined as People Finding A Better Way®.**



## Corporate Business Units

Dana serves global light vehicle, medium/heavy vehicle, and off-highway markets through four business units – Light Vehicle Driveline Technologies (Light Vehicle), Commercial Vehicle Driveline Technologies (Commercial Vehicle), Off-Highway Drive and Motion Technologies (Off-Highway), and 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.



## Off-Highway Brands

### Drivetrain Systems



### Motion Systems



### Thermal Management



### Sealing



## Off-Highway Sectors

### MOBILE

#### Agricultural

Our products are engineered to support increased crop yields, optimized harvesting operations, lower emissions, improved operator safety and comfort, and reduced total cost of ownership, while complying with evolving emissions standards

#### Construction

Integrated drive and motion systems from Dana enhance construction equipment performance, efficiency, and productivity with a range of solutions for vehicles ranging from 3 to 50 tonnes (4 to 55 tons). Spicer® axles, wheel drives, transmissions, driveshafts, and Brevini® motion products are integrated with the most advanced technologies for improved machine operation on any job site, in any condition.

#### Mining and Forestry

Dana designs complete drive and motion systems to meet increasing industry demands for automation and productivity, coupled with high safety standards. Our solutions are specially engineered to maximize vehicle performance in extremely harsh environments.

#### Material Handling

Our custom drive and motion systems enhance material-handling and surface-mining vehicle performance, productivity, and power. Spicer® transmissions, axles, and driveshafts are designed to work seamlessly in any vehicle to allow operators to engage, lift, and transport heavy loads with more precision.

### INDUSTRIAL

Dana's portfolio of advanced motion technologies has been engineered to support increased productivity and reliability, lower emissions, improved operator safety and comfort, and reduced total cost of ownership.





# Marine Applications

Dana works with customers in the marine industry around the world, offering solutions for both industrial applications and self-propelled machines.

Dana's offering includes consulting, systems design, engineering, procurement, manufacturing, and aftermarket support for turnkey projects, new equipment, upgrades, and modernizations.

Marine equipment varies from onshore port applications to offshore marine environments. Onshore includes industrial and mobile applications such as ship-to-shore (STS) cranes, rubber tyre gantry (RTG) cranes, rail-mounted gantry (RMG) cranes, harbor cranes (MHC and GHC), ship lift systems, reach stackers, and straddle carriers.

Offshore applications include Jack-Up systems, cable- and pipe-laying vessels, cargo ships, subsea systems, oil platform equipment, remotely operated vehicle (ROV) launch and recovery systems, and more.

Covering the needs of ports, shipyards and all offshore requirements, Dana is a one-stop opportunity for the marine industry worldwide.

Industrial and mobile solutions, including those for Reach Stackers and Forklift Trucks, are available thanks to the vast array of Brevini® motion systems and Spicer® drivetrain systems.

Moreover, with the recent acquisition of Fairfield®, providing custom gears and drives, Dana has increased its product portfolio and is even better to serve the marine industry today.



# Your Single-Source Provider for port handling equipment for **Drive and Motion Systems**

The port equipment market evolves according to the constant growth of global needs and to the different goods that must be handled.

Dana has a complete range of advanced drive and motion products for port handling equipment that address the market trends and is leading it. We design and manufacture fully integrated drive and motion products for all types of harbor cranes and any other equipment used within the port handling sector.

## **Dedicated gearbox** for harbor crane hoisting mechanisms

Dana Off-highway Drive and Motion Technologies will meet your port handling equipment requirements.

Dana’s innovative products improve the performance and efficiency of port handling equipment.



## Market-Driven **Innovations**

We deliver innovative technologies to meet worldwide customer demands. By anticipating market trends, Dana uses industry expertise to deliver product solutions to help customers achieve their goals.



Customized Technologies



Full-System Solutions



Low Cost of Ownership



Electrification



Global Support



# Loading and Unloading Area: Ship to Shore (STS)

A ship-to-shore crane is a large dockside gantry crane found at container terminals for loading and unloading intermodal containers from container ships.

STS Cranes are generally classified by their lifting capacity and the size of the container ships they can load and unload; additional parameters for the cranes are the traveling and lifting speeds where the market is always looking to be faster and faster in order to decrease the “deadtime” and be more efficient and profitable.

A classic crane is driven by an operator who sits in a cabin suspended from the trolley; the automation process avoids the need for an operator on top on the crane, also due to the height factor. The trolley runs along rails located on the top or sides of the boom and girder. The operator runs the trolley over the ship to lift the cargo. Once the spreader locks onto the container, the container is lifted, moved over the dock, and placed on the chassis to be taken for a direct shipment or to the storage yard. The crane also lifts containers from chassis on the dock to load them onto the ship.



## Brevini® Helical Bevel Helical Gearboxes – Posired 2 Series

- Dedicated design for single-drum drive
- Shape and cost customization
- Auxiliary drive system on board
- Marine painting
- Extensive ratio range
- Supports torque range up to 1300 kNm
- Spheroidal graphite cast iron housing
- High efficiency
- Diverse low speed shaft options
- Premium sealing
- Reliable operation



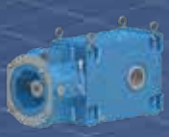
## Brevini® Helical Bevel Helical Gearboxes - Posired 2 Series

- Shape and cost customization
- Emergency brake on board as option
- Bevel set can be installed in different mounting position
- Marine painting
- Extensive ratio range
- Supports torque range up to 1300 kNm
- Spheroidal graphite cast iron housing
- High efficiency
- Diverse low speed shaft options
- Premium sealing
- Reliable operation



## Brevini® Helical Bevel Helical Gearboxes – Posired N Series

- Dedicated design for ENLARGED shaft center distance specific for hoisting application
- Shape and cost customization
- Auxiliary drive system on board
- Marine painting
- Two and 3 stage executions
- Supports torque range up to 1300 kNm
- Spheroidal graphite cast iron housing
- High efficiency
- Diverse low speed shaft options
- Premium sealing
- Reliable operation



## Brevini® Helical Bevel Helical Gearboxes – Posired D Series

- Dedicated design for compact drive including motor adapter specific for Gantry application
- Shape and cost customization
- No need of expansion tank for upright mounting position
- Marine painting
- Spheroidal graphite cast iron housing
- High efficiency
- Hollow low speed shaft execution
- Premium sealing
- Reliable operation



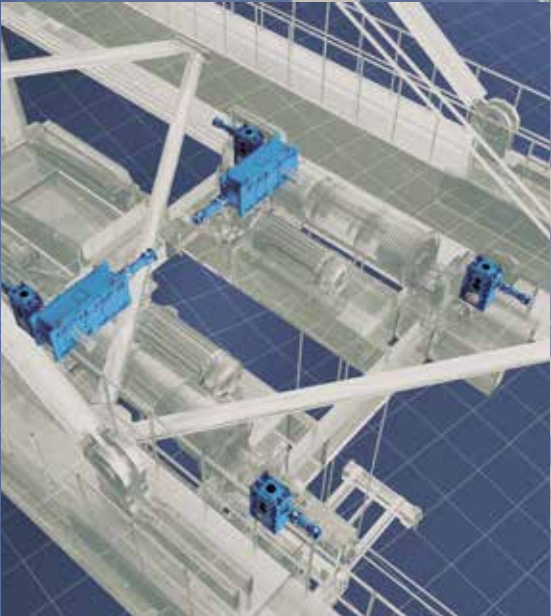
## GWB® Industrial Driveshafts

- Complete product range featuring flange/ swing diameter from 120 to 1300 mm
- Superior bearing life
- High torque capacity
- Designed for ease of maintenance with service-free option
- Engineered to withstand harsh conditions, proven with a 70-year history on the market
- Minimized total cost of ownership



## Brevini® Helical Bevel Helical Gearboxes

- Extensive torque range
- High efficiency
- Diverse low speed shaft options
- Low noise
- GG20-22 housing



Dana offers customized solutions to meet a range of customer needs, including modular designs and add-on accessories.



# Loading and Unloading Area: **Mobile Harbor Crane (MHC)**

Mobile Harbor Cranes were developed due to technological improvements from static harbor cranes. The cranes have been modernized and made mobile, which makes them a critical type of crane within ports able to handle every type of goods. Efficient, mobile and versatile, the harbor mobile crane can be used in any port for the handling of: bulk materials, steel or scrap metal, general cargo, heavy load and containers.



## **Brevini® Planetary Gearboxes Slewing Drives**

- Torque range up to 370 kNm
- Modular design, inline or right angle configuration
- Range of output support configurations (low angle, long and short support with eccentricity)
- Failsafe negative brakes
- Input flange for hydraulic and electric prime motor
- Compact, light solutions for a perfect fit on machine frames
- Flexible output pinion to meet customer needs
- Product marine/offshore class certification available
- Special solutions to meet requirements for low climate and ATEX certifications



## **Brevini® Winch Drives**

- Single (for electric motor) or multiple input (for hydraulic motors) available
- Ratio range up to 6.000:1
- Max torque up to 850 kNm
- Integrated hydraulic failsafe negative brake



## **Spicer® Wheel Drives**

- Internal multidisc parking brake
- Manual disengagement device for towing
- High radial and axial load capacity bearings
- Cartridge hydraulic motors for compact layouts
- Motion control valves with different options available
- Bevel gear unit at the input for electric motor and/or cardan shaft connection available
- Special sealing system designed for severe environmental conditions
- Hub and spindle made of strength material



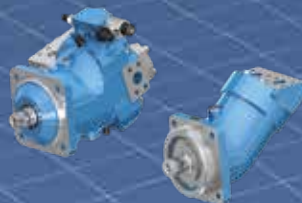
## **Brevini® Axial Piston Pumps**

- Displacement up to 226 cc
- Medium- and high-pressure options
- Fixed and variable displacement available
- Open or closed loop circuit
- ATEX certification
- Environmentally Acceptable Lubricants (EAL fluids)
- Suitable for working in harsh and aggressive environments



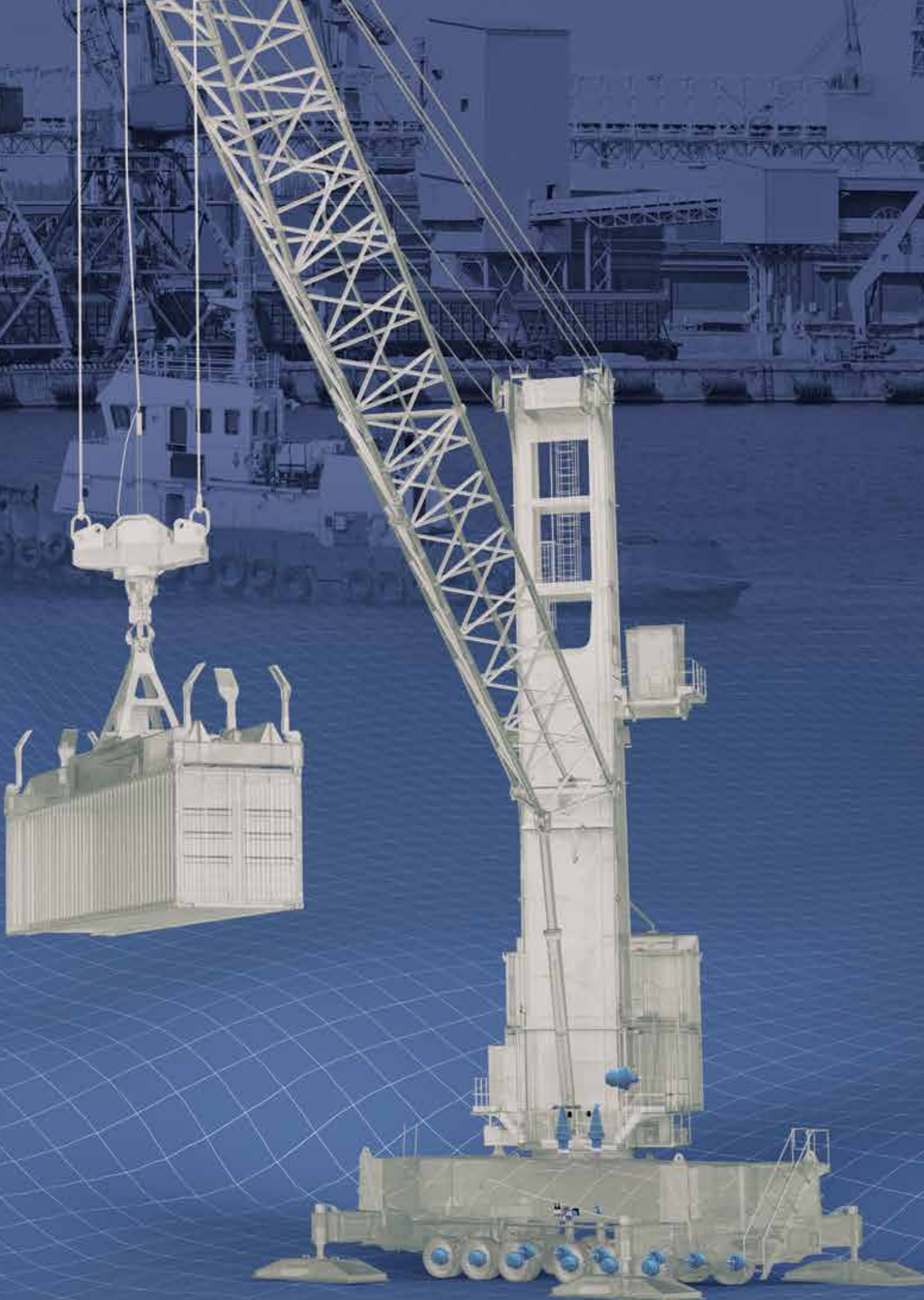
## **Brevini® Proportional Directional Valves**

- Oil flow up to 1,000 lt/min
- High modularity
- ATEX certification
- Remote control, electronic operation
- Smooth control co improve operation functionality and accuracy



## **Brevini® Axial Piston Motors**

- Main hoist drive motors
- Marine painting cycle
- Fixed and variable displacement
- Displacement up to 216 cc/rev
- Seven or nine piston options technologies
- Wide range of control valves
- Third-parties marine and ATEX certification
- Environmentally acceptable lubricants (EAL fluids)
- Suitable for working in harsh and aggressive environments



Dana offers customized solutions to meet a range of customer needs, including modular designs and add-on accessories.



# Loading and Unloading Area: **Luffing Cranes**

In a shipyard luffing cranes are a fundamental piece of equipment, able to perform countless lifting and installation tasks. Used for freight loading in ports, level-luffing cranes are also used in the construction of small to medium-sized ships. Luffing cranes incorporate traveling, slewing, luffing and lifting mechanisms and perform bucket loading, container loading as well as hook loading. Level-luffing cranes are designed to keep the level of the hook

always at the exact same height while luffing. The jib moves up and down so as to move the hook inwards and outwards from the crane base. When loads near ground level are to be moved with maximum care, level-luffing is a crucial capability, for example in shipbuilding or construction. Modern cranes now implement fixed horizontal jibs with an additional “horse head” section. In this case the interconnected action of the pivots is sufficient to maintain the level.



## **Brevini® Industrial Planetary Gearboxes**

- Pipe handling drives
- Nominal torques up to 26,000 Nm
- Inline and right angle configurations available
- Suitable for both hydraulic and electric motors
- Integrated motor adaptor
- Negative multidisc brake



## **Brevini® Helical Bevel Helical Gearboxes – Posired 2 Series**

- Dedicated design for single-drum drive shape and cost customization
- Auxiliary drive system on board
- Marine painting
- Extensive ratio range
- Supports torque range up to 1300 kNm
- Spheroidal graphite cast iron housing
- High efficiency
- Diverse low speed shaft options
- Premium sealing
- Reliable operation



## **Brevini® Planetary Gearbox Slewing Drives**

- Torque range up to 370 kNm
- Modular design, inline or right angle configuration
- Range of output support configurations (low angle, long and short support with eccentricity)
- Failsafe negative brakes
- Input flange for hydraulic and electric prime motor
- Compact, light solutions for a perfect fit on machine frames
- Flexible output pinion to meet customer needs
- Product marine/offshore class certification available
- Special solutions to meet requirements for low climate and ATEX certifications



## **Brevini® Industrial Planetary Gearboxes – S Series**

- Tensioner drive with integrated output support
- Nominal torques up to 2,170 kNm
- Multiple output shaft options
- Inline and right angle configurations available
- Suitable for both hydraulic and electric motors
- Negative multidisc brake



Dana offers customized solutions to meet a range of customer needs, including modular designs and add-on accessories.



# Loading and Unloading Area: **Shipyards**

Located near the sea or tidal rivers for easy access, a shipyard is a place where ships are built and repaired including yachts, military vessels, cruise liners, and other cargo or passenger ships. Many specialized cranes are used in large shipyards for lifting – mostly ship lifting and ship transport. These cranes may also be used in dry docks, slipways, dust-free warehouses, painting facilities, and extremely large areas for ship fabrication.

A shiplift is used to dry dock and launch ships. It consists of a structural platform that is lifted and lowered vertically by a number of hoists. First, the platform is lowered underwater, then the ship is floated above the support, and finally the platform and ship are lifted and the ship is brought to the level of the quay. A ship transport is the main way to move the ship into the dry dock, by wheel or rail trolleys and mobile boatlift.

## Ship-Lift System



## Winch



## Ship Transport System



### Brevini® Industrial Planetary Gearboxes

- Trolley ship transport dedicate GB
- Complete hydraulic gearmotor solution
- Special output sealing
- Marine painting cycle
- Driving flange/pinion included
- Subsea execution up to 13 m below sea level

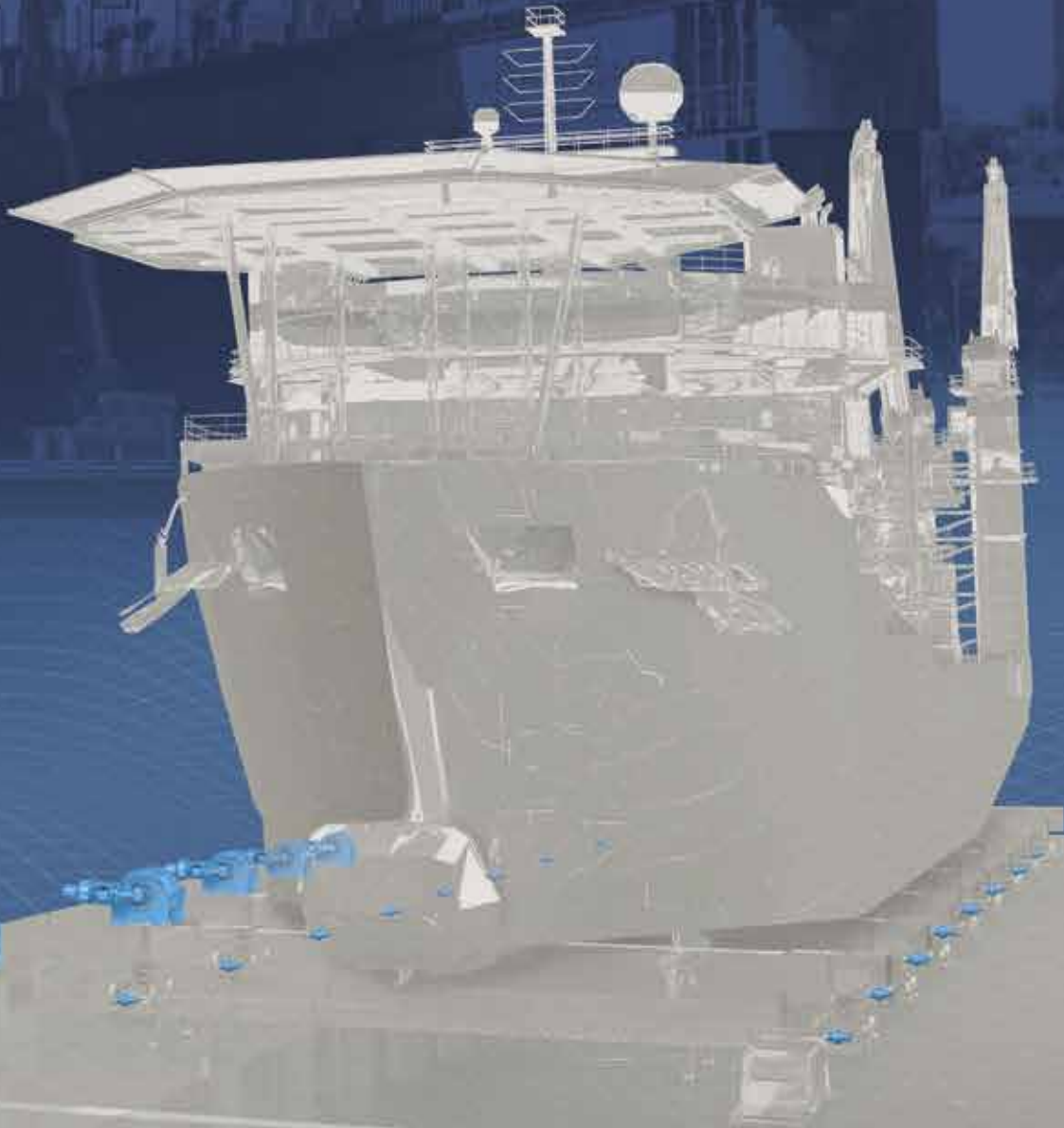
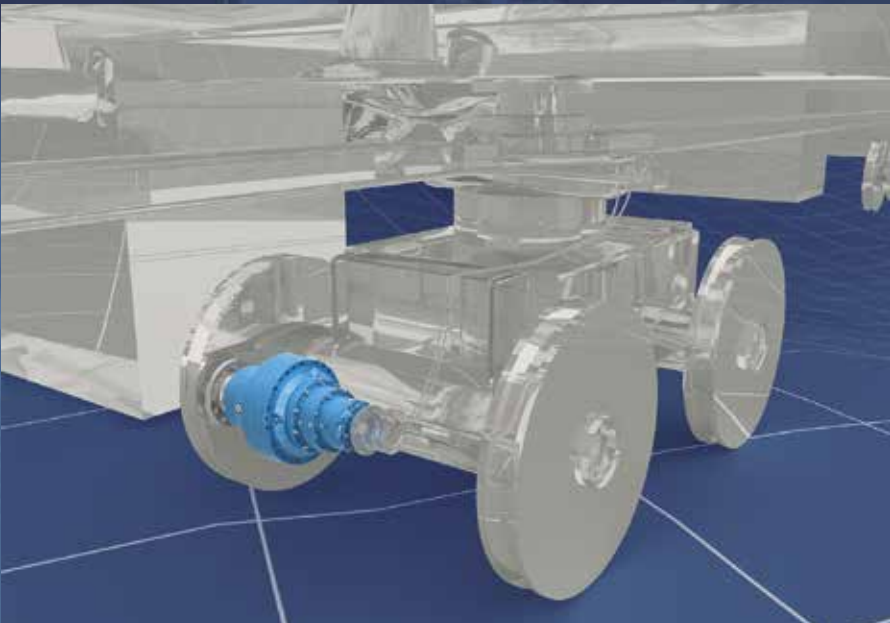


### Brevini® Winches

- Technical and application support up to commissioning on site
- Customized for ship-lifts
- Dimensions and layout can be designed to meet any requirements
- Pull line up to 50 tons to meet specific customer needs
- Third-parties marine certification available

### Brevini® Winch Drives

- Designed with dedicated gearboxes for large ship-lift installations
- Ratio range up to 6.000:1
- Maximum torque up to 850 kNm
- Third-parties marine certification available
- Inline and right angle configurations
- Electric motor connection available
- ATEX certification
- Integrated hydraulic failsafe negative brake and electromagnetic brake available
- Safety devices available as back stop, torque limiter, and sensors



Dana offers customized solutions to meet a range of customer needs, including modular designs and add-on accessories.



# Handling Area: Rubber Tyred Gantry (RTG) Crane

With the advantage of wheels providing easy mobility, RTG cranes are port handling equipment used in intermodal operations to ground or stack containers. They are located in the stock-handling areas of the terminal.

With RTG cranes, inbound containers are stored for future pickup and outbound containers are stored for future loading onto vessels. These cranes typically straddle multiple lanes, with one lane reserved for container transfers.



## Brevini® Industrial Planetary Gearboxes – S Series

Wheels steering system drive  
Ratio range up to 5.000:1  
Modular design  
Marine painting cycle  
Others options solution on request also for 16W



## Spicer® Wheel Drives

Wheel drive and driven  
Customized solution  
Developed for highly efficient electric drivetrain  
Benefit in cost in the of electric consumption



## GWB® Industrial Driveshafts

Complete product range featuring flange/ swing diameter from 120 to 1300 mm  
Superior bearing life  
High torque capacity  
Designed for ease of maintenance with service-free option  
Engineered to withstand harsh conditions, proven with a 70-year history on the market  
Minimized total cost of ownership



## Brevini® Industrial Planetary Gearboxes

Anti-sway drive  
New concept design with bevel set on second stage  
High efficiency  
Low noise  
Drum winch directly fixed on the output shaft



## Brevini® Winch Drives

Main hoist; innovative pure planetary solution  
Plug-in planetary solution  
More space for easy access to maintenance and service components  
Lighter weight and easier installation  
Mechanical efficiency improved



## Brevini® Helical Bevel Helical Gearboxes – Posired 2 Series

Main hoist  
Dedicated design for single-drum drive  
Shape and cost customization  
Auxiliary drive system on board  
Marine painting  
Extensive ratio range  
Supports torque range up to 1300 kNm  
Spheroidal graphite cast iron housing  
High efficiency  
Diverse low speed shaft options  
Premium sealing  
Reliable operation  
Low noise



## Brevini® Helical Bevel Helical Gearboxes

Extensive torque range  
High efficiency  
Diverse low speed shaft options  
Low noise  
GG20-22 housing



Dana offers customized solutions to meet a range of customer needs, including modular designs and add-on accessories.



# Handling and Stocking Area: Port Mobile Vehicles

Dana also provides mobile vehicle solutions for handling containers and material in port areas. We support the main OEMs with our transmission, hydraulic, mechanical and electronic products. In this segment Dana is able to support customers with a full selection of components.

Reach Stackers and Forklifts are the most common means used in this area due to their flexibility and easy management, both of the vehicles and the goods requiring handling. Such vehicles are designed to move containers from one place to another within and between the stocking and handling areas and they are one of the faster ways to achieve this.

## Drivetrain Systems



### Spicer® Transmissions

A variety of options for a complete vehicle design flexibility  
Smooth shift, driver comfort and enhanced vehicle performance  
Offered with basic or electronic controls and with different efficiency packages  
Converter and transmission packages available with integral, mid-mount or remote configurations



### Spicer® Driveshafts

Efficiently manages added input torque and heavy loads  
Designed for longer life, minimal maintenance, and lower operating costs



### Spicer® Axles

Differential lock and mounting options  
Inboard and outboard brake solutions  
Gearing solution for improved efficiency  
Modular concept

Spicer® drivetrain systems include a range of axle options, wheel and track drives, hydrodynamic transmissions, and electronic controls. In addition, Brevini® motion products for port handling equipment include gearboxes, winches, and hydraulic components. Dana's portfolio of advanced technologies has been engineered to support increased productivity and reliability and lower emissions, improve operator safety and comfort, and reduce total cost of ownership. Dana offers customized solutions to meet a range of customer needs in the most demanding environments, developed to match the robustness and duration required for the port handling equipment.



**SPICER®**

Drivetrain Systems



**BREVINI®**

Motion Systems

## Motion Systems



### Brevini® Axial Piston Pumps

Displacement up to 226 cc  
Medium- and high-pressure options  
Fixed and variable displacement available  
Open or closed loop circuit  
ATEX certification  
Environmentally Acceptable Lubricants (EAL fluids)  
Suitable for working in harsh and aggressive environments



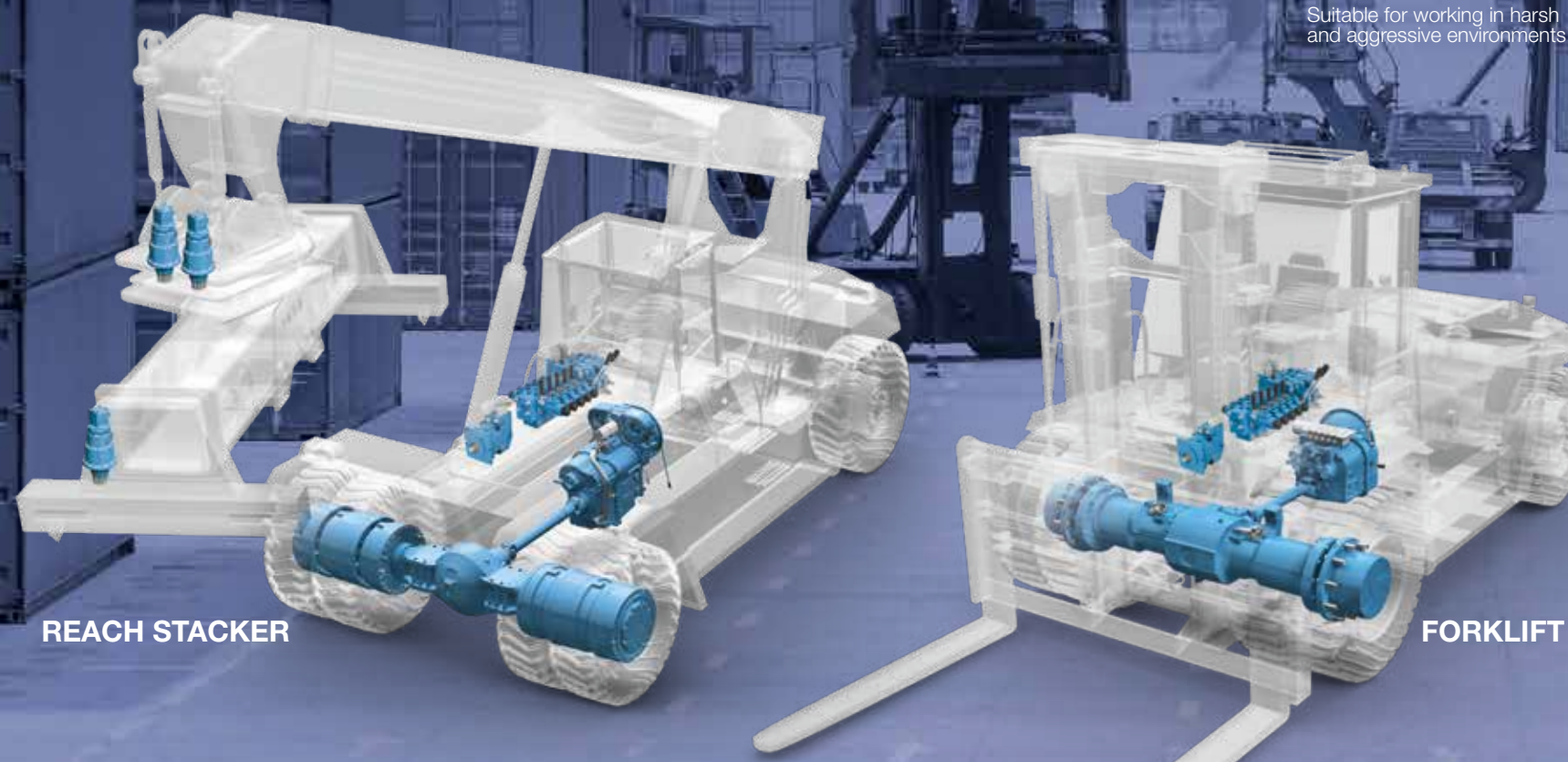
### Brevini® Proportional Directional Valves

Oil flow up to 1,000 lt/min  
High modularity  
ATEX certification  
Remote control, electronic operation  
Smooth control to improve operation functionality and accuracy



### Brevini® Planetary Gearboxes - Slewing Drives

Torque range up to 370 kNm  
Modular design, inline or right angle configuration  
Wide option of output support configuration (low lunge, long a short support with eccentricity)  
Failsafe negative brakes  
Input flange for hydraulic and electric prime mover  
Compact and light solutions for a perfect fit on the machine frames  
Output pinion for any customer needs  
Product marine / offshore class certification available  
Special solutions for Low Climate and ATEX



REACH STACKER

FORKLIFT



# Pioneering electrification, protecting the environment

As a key issue facing port operators and one of the key drivers behind Dana investment in research and development for the coming decades, electrification of port handling services is seen as a major benefit to the environment. Global port authorities are seriously addressing the environmental issue and financing projects to ensure reduced emissions of greenhouse gases and NOx. Projects for zero-emission cranes and other cargo-handling equipment for seaports are underway in advanced nations and will undoubtedly set the trend for greener solutions that electrification can offer. Switching to zero-emission equipment also saves on costly diesel fuel consumption.

Dana is pioneering a series of initiatives in keeping with the electrification trends. Initial solutions in the form of hydraulic forklift trucks and mobile electric cranes are already available, with performance standards fully in line with handling requirements. Further developments are in the pipeline and 2019 will see the implementation of a broad range of eco-friendly systems set to raise the bar in a fast-evolving market.



REDUCES  
OPERATING  
COSTS

IMPROVES  
EQUIPMENT  
SAFETY

REDUCES  
EMISSIONS  
INTO THE  
ATMOSPHERE

COMPLIANCE  
HEALTH  
AND SAFETY  
DIRECTIVES

INCREASES  
PRODUCTIVITY



# Dedicated gearbox for Port handling equipment hoisting mechanisms

Dana works with the main OEMs in the Port handling equipment industry around the world. Dana is integral to the development of new solutions for all applications. Dana's wide range of Brevini® planetary products and expertise, we are able to provide a new solution for the main hoist of the harbour cranes.

The planetary drive solution offers our customers and end users all the advantages required to optimize the hoisting system.



Planetary gearbox in rotating housing version  
direct installed plug-in into the drum

Nominal ratio 45

Monitoring Vibration sensor on input bearing  
as standard for maintenance control

External disk brake mounted  
on elastic coupling on input shaft

Lifetime according to FEM class T7

Option for External cooling system  
if needed

TYPE	SELW4013	SELW6003	SLW8503
T nom [Nm]	57.160	74.500	104.630
T max [Nm]	105.000	112.200	126.160
Ratio [i]	45.87	45.87	43.61
Drum spigot Ø [mm]	470	550	580
Drum fixing pitch Ø [mm]	520	590	630
Drum fixing bores Ø [mm]	26	26	26
Structure spigot Ø [mm]	325	370	420
Structure fixing Ø [mm]	370	430	470
Structure fixing bores Ø	M24	M24	M24



LESS WEIGHT  
ON THE TROLLEY  
LESS POWER  
TO MOVE IT

NO GEARBOX/  
MOTOR  
ALIGNMENT  
ISSUES

NO GEARBOX  
OUTPUT  
FLANGE/  
COUPLING

MORE FREE  
SPACE ON  
TROLLEY

COST  
RELATED  
BENEFITS



# Port Equipment

Brevini® planetary drives and helical gearboxes, along with Spicer® cardan driveshafts and Fairfield® gearboxes are operating around the clock in ports all over the world, loading and handling enormous containers onto ships.

In many ports, harbor cranes are the pillars of the logistics chain. These cranes are used in heavy-duty industrial processes such as loading and transportation of containers.

Both Fairfield® and Brevini® gearboxes and slewing gear drives operate smoothly and accurately to rotate the fully loaded cranes. With global expertise in the design and manufacturing of highly efficient technologies, Dana's extensive portfolio of products designed for onshore applications includes planetary and helical gears units, winches, and winch drives along with hydraulic solutions such as axial piston pumps and motors, proportional directional valves, and electronics.

**Boat lifts and straddle carriers**

**Ferry ramps**

**Mobile harbor cranes**

**Rail-mounted gantry (RMG) cranes**

**Rubber tyred gantry (RTG) cranes**

**Ship lifting systems**

**Straddle carriers**

**Ship to shore (STS) cranes**

**Boat Lifting**

**Ship to Shore (STS) Crane**

**Rail-Mounted Gantry (RMG) Crane**





# Global Strength

One of the ways we create value is by positioning our technical and manufacturing resources where customers need us globally. Today, that's 33 countries on six continents.

To help customers achieve success, top-tier suppliers must have a global perspective that can be adapted to meet local requirements and end-user expectations. Dana's worldwide leadership, strengthened by the international presence of Brevini®, is the key to serving over 5,000 clients around the world. We bring our

global expertise to the local level with technologies customized to individual requirements through a network of strategically placed technology centers, manufacturing locations, and distribution facilities.

Our global logistics network covers six continents, delivering strength and reliability to customers around the world.

## Brevini® and Fairfield® for Marine Applications

Dana benefits from the extensive experience of two leading brands that have been serving the marine industry since the middle of the last century. Both Brevini® and Fairfield® boast countless applications in which their products ensure efficient operation and safety.

With a deep understanding of market requirements, Dana adds value by ensuring that the right equipment is specified before any project begins. This means delivering quality, modularity, reliability, and providing dedicated features for marine applications. We value collaborative partnerships that allow us to develop strong, long-lasting relationships with original-equipment manufacturers (OEM) and end-users.

## Global Presence

We have the ability to deliver products that meet specific regional requirements through our vast network of nearly 100 engineering, manufacturing, and distribution facilities covering six continents. This global logistic network ensures maximum flexibility and punctuality in the delivery of the products.

## Dana Service and Assembly Centers

Customers can capitalize on the specific market knowledge and engineering expertise of 30 regional former Brevini subsidiaries—now known as Dana Service and Assembly Centers—to provide product customization and service.

## Engineering and Research and Development

We engage in ongoing engineering activities as well as research and development to improve the reliability, performance, and cost-effectiveness of our existing products. We are also focused on the design and development of innovative products that meet customer requirements for new applications. Our objective is to be an essential partner to our customers and we remain highly committed to offering superior product quality, technologically advanced solutions, world-class service, and competitive prices.

# Culture of innovation

Since our introduction of the automotive universal joint in 1904, we have been focused on technological innovation. Every day, Dana employees around the world work together to leverage our shared insight, developing the most innovative technologies that provide more value for our customers and solve their biggest challenges.

Innovation drives growth, and our ever-evolving products and technologies provide customers with cutting-edge solutions, address end-user needs, and capitalize on key market trends. In 2017, Dana engineers achieved a new milestone: the company's 10,000th patent, granted for a Long®-brand heat exchanger with an integrated thermal bypass valve.

## Electrification

Dana's comprehensive strategy for electrification in off-highway markets begins with a foundation of enabling OEM to accelerate their hybrid- and electric-vehicle development programs. We offer a series of market-ready modular hybrid- and electric-drive systems that can fit into existing vehicle design envelopes and provide OEMs with effective, low-risk, quick-to-market solutions. These products can be connected to traditional Spicer® wheel drives, track drives, axles, and transmissions to deliver hybrid or electric functionality. A wide selection of Brevini® motion products to support the unique power distribution requirements of hybrid and electric off-highway vehicles is also currently available.







## About Dana Incorporated



Learn more about Dana's drivetrain and motion systems at [dana.com/offhighway](http://dana.com/offhighway).



©2019 Dana Limited 112019