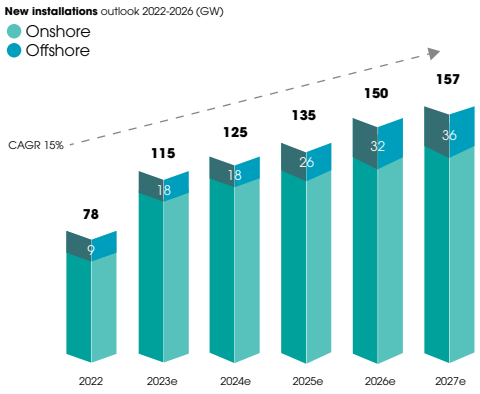
DAVI

WIND ENERGY

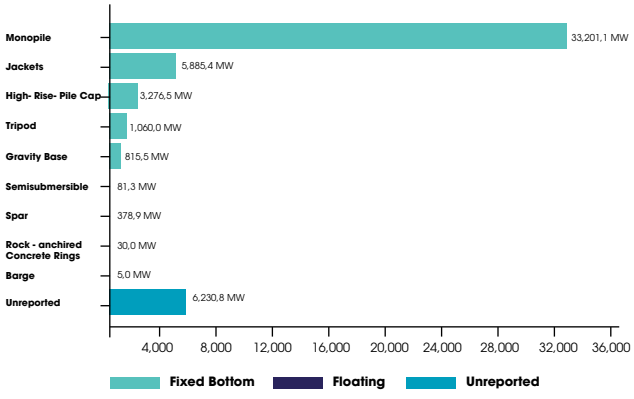
WIND ENERGY INDUSTRY

Present and future



Wind energy is experiencing significant global expansion and growth. According to a **BloombergNEF** (BNEF) report, it is projected that by 2030, the world will generate a total of 2 terawatts (TW) of power through onshore and offshore wind sources. The Global Wind Energy Council (GWEC) anticipates the addition of 680 gigawatts (GW) of wind energy capacity worldwide by 2027, with 130 GW of that coming from offshore installations.

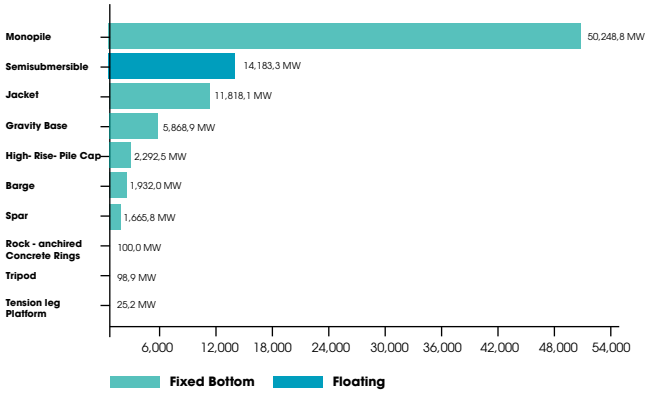
Global Operating Substructure Capacity (MW) at the end 2022



By 2030, it is expected that offshore wind energy alone should reach a total of 268 GW (with a CAGR of +14.8%), with a clear predominance of fixed-bottom foundations over floating foundations (223.7 GW from fixed-bottom foundation parks compared to 44.3 GW from floating foundation parks).

As for the projects currently under construction and those announced in the coming years, the prevalence of fixed-bottom foundations is expected to be monopile.

Global Announced Substructure Capacity (MW)



DAVI IN THE WIND ENERGY INDUSTRY

Advantages of our solutions in the world of wind energy

Tested by the industry's top players, flexible as a mix of customer products, and adaptable to customer layout or production needs thanks to the constant contact between Davi and the major players, we get to know the specific requirements of the developers.

Around 70% of the Plate Rolls market in the wind energy sector with over 300 references worldwide

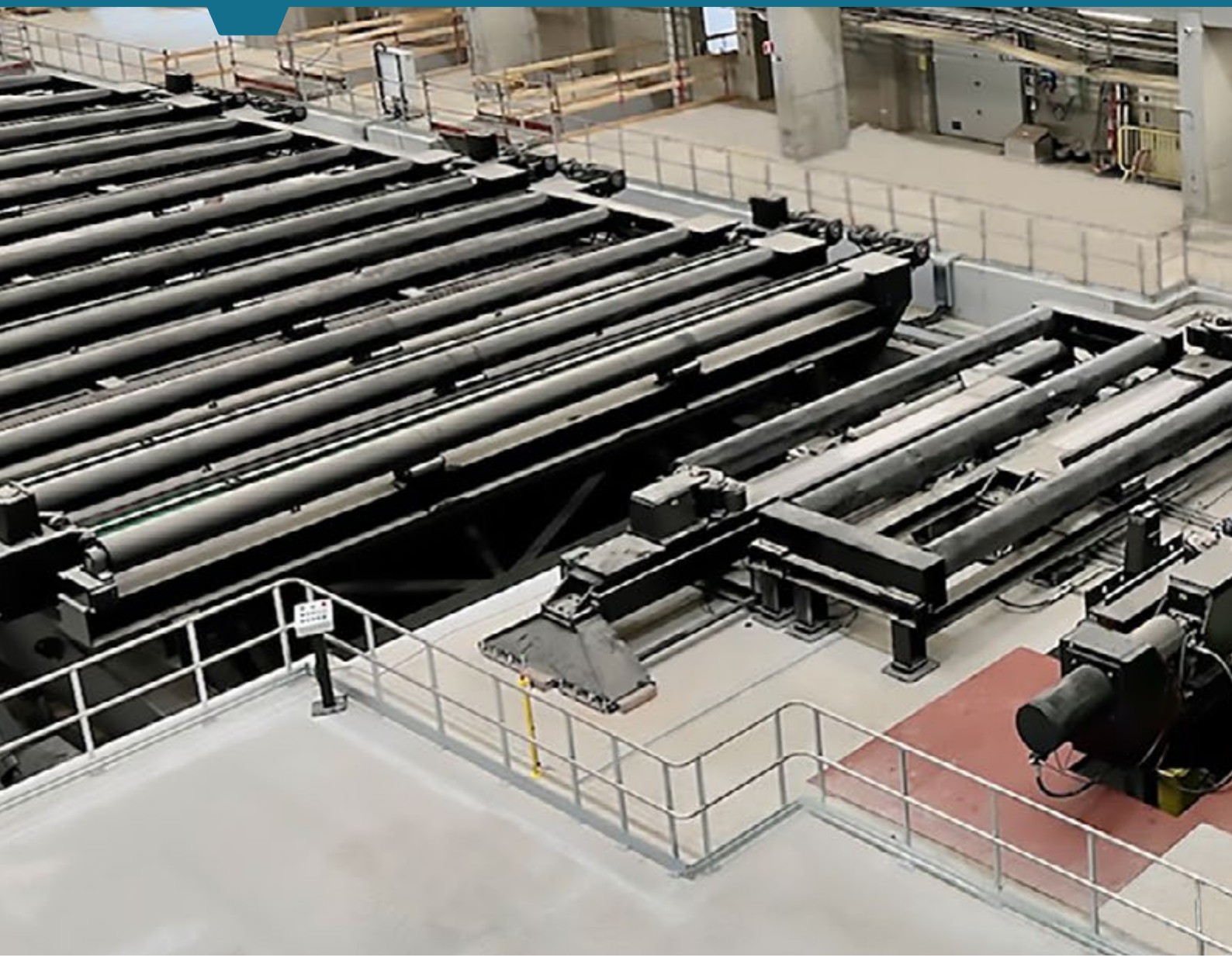
Davi distinguishes itself as the only company in the Plate Roll industry with an exclusive team committed to Research and Development, as well as Customer Support.

Our specialized R&D team continuously strives to push the boundaries of what is possible in plate rolling technology. Their pursuit of cutting-edge solutions ensures that we stay at the forefront of the industry, offering you state-of-the-art, tailor-made solutions.

Our dedicated Customer Support team is always ready to assist you throughout your journey with Davi. We understand that responsive and knowledgeable support is essential to the success of your projects. Whether you have questions, require technical assistance, or need guidance, our team is here to provide you with the expertise and support you deserve.

At Davi, we firmly believe that our commitment to R&D and Customer Support sets us apart in the industry, allowing us to deliver unparalleled quality and service to our customers.

TCO (Total Cost of Ownership): TCO is defined as: "the total cost of acquiring, using, managing, and disposing of an asset throughout its entire lifecycle." TCO is therefore an estimate of any expenses associated with the purchase, implementation, use, and disposal of a product or equipment.
When considering a total cost of ownership approach over a 10-year period (investment plus operating costs), it can be concluded that the Davi solution is much more cost-effective than low-cost manufacturers. In addition to the initial investment, there are many other costs related to spare parts, safety, maintenance, downtime, technical support, etc.
In conclusion, we believe that total cost of ownership is of great importance when purchasing a machine intended to be used for many years.



Davi solutions for the following applications

MONOPILES & TRASITION PIECES

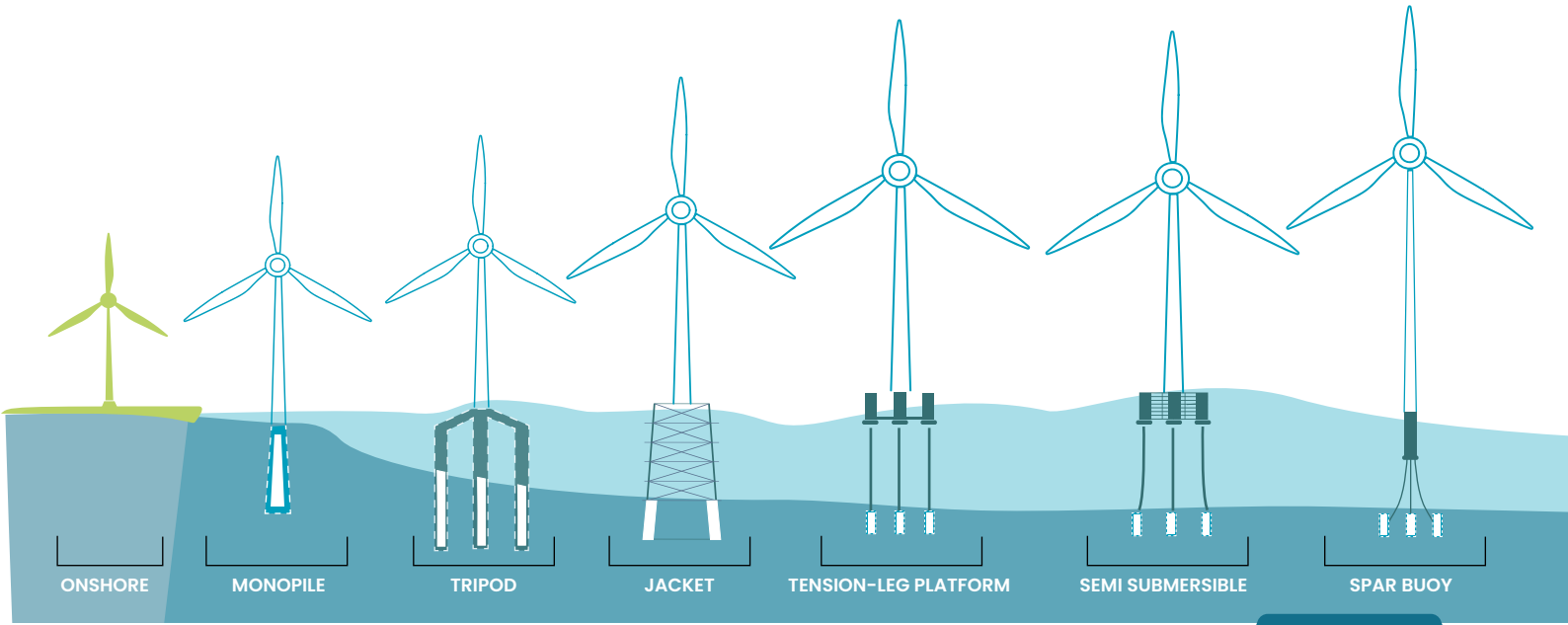
TRIPOD FOUNDATIONS

JACKET FOUNDATIONS

FLOATING FOUNDATIONS

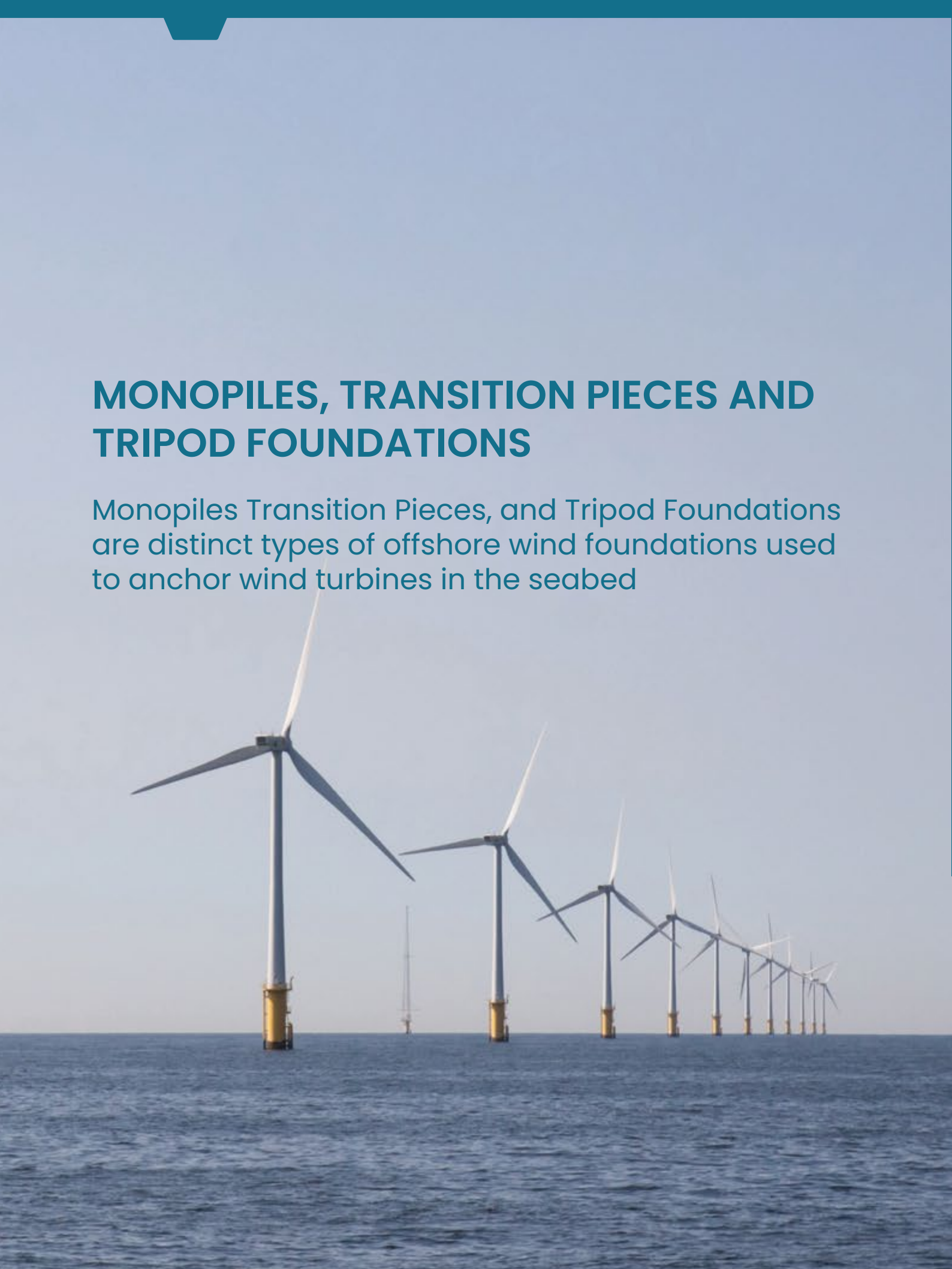
OFFSHORE AND ONSHORE TOWERS

TOWERS & FOUNDATIONS



MONOPILES, TRANSITION PIECES AND TRIPOD FOUNDATIONS

Monopiles Transition Pieces, and Tripod Foundations are distinct types of offshore wind foundations used to anchor wind turbines in the seabed



Monopiles:

Monopiles are foundation structures that typically have a diameter ranging from 7 to 15 metres; they are made of steel, using plate up to 4 or 4,5 metres width and thicknesses varying between 50 and 170 millimetres. Monopiles sections are cylindrical and conical in shape. Their maximum length can reach between 80 and 120 metres; they weigh between 3,000 and 4,000 tons. Monopiles are designed to be driven into the seabed and provide support for wind turbine towers. They are used in water depths ranging from 50 to 60 metres. The angle of conicity, which is the tapering of the conical part of the structure, varies between 10 and 16 degrees.

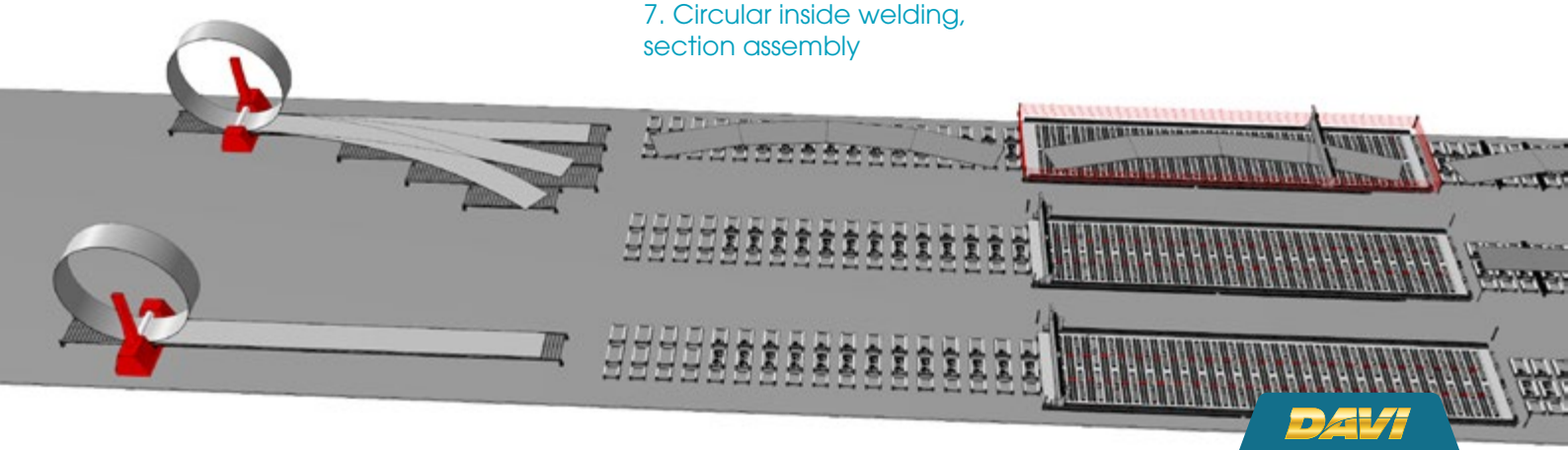
Transition Pieces:

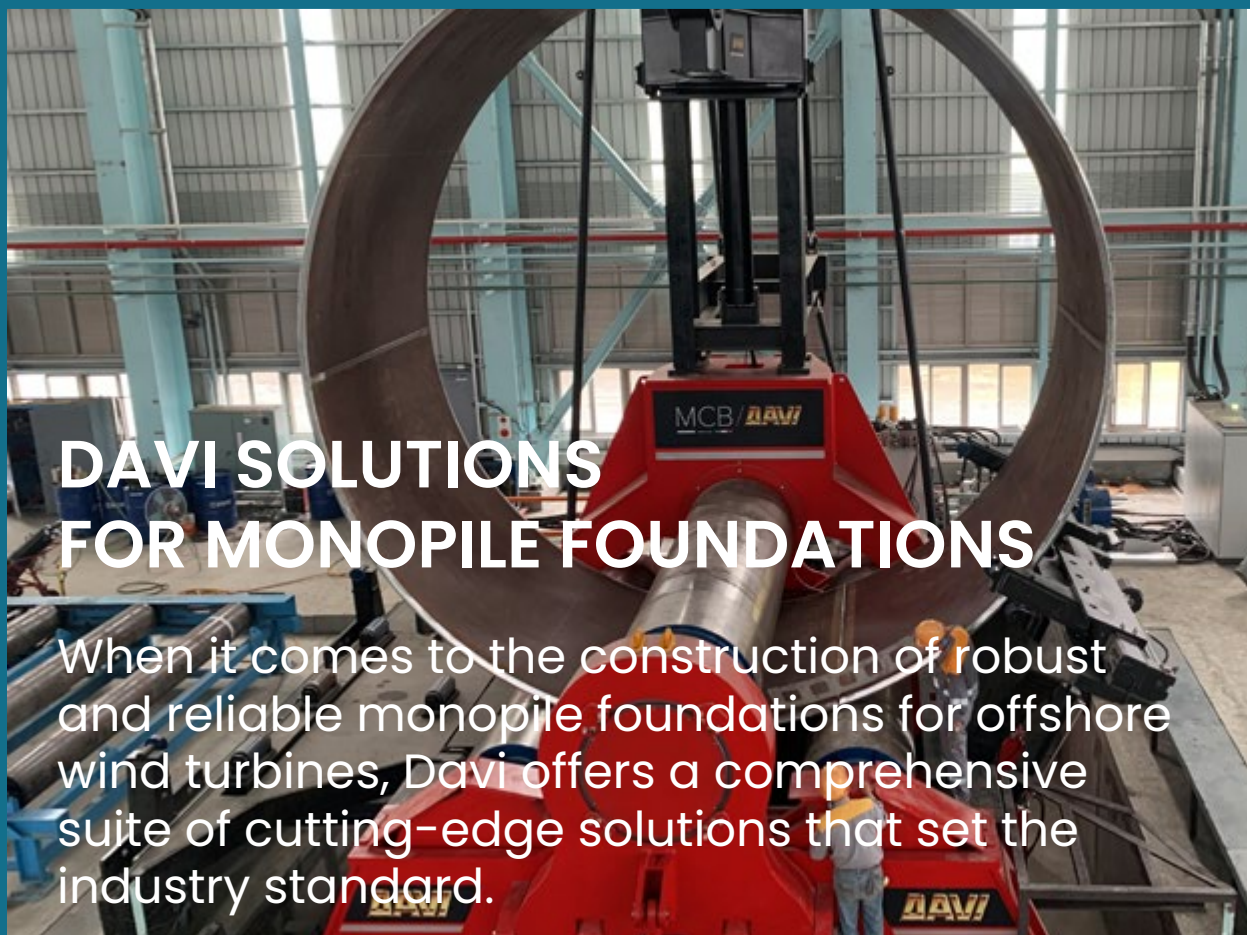
Transition pieces serve as a crucial connection between the monopile foundation and the wind turbine tower. They have a diameter that typically falls in the range of 6 to 12 metres, with a maximum thickness of 150 to 170 millimetres. Transition pieces are designed to accommodate the transition from the wider monopile to the narrower tower. They are made of plate up to 4 or 4.5 metres wide; in general they are cylindrical with flanges but sometimes conical with an angular configuration of 10 to 12 degrees. The maximum length of a transition piece is about 32 metres, and they typically weigh between 1,500 and 2,000 tons. These pieces play a vital role in ensuring the stability and integrity of the entire offshore wind turbine structure.

Tripods:

Tripods are specialized foundation structures used particularly in water depths ranging from 45 to 50 meters. They have a unique three-legged design, which is why they are called tripods. The diameter of each leg can vary from 3 to 10 meters, and the steel thickness can be as thick as 120 millimeters. The width of the tripod's steel plates is typically 4 to 4.5 meters, and they can weigh up to 4,000 tons. Tripods are designed to provide stable support for wind turbines in deeper waters. Their triangular configuration helps distribute the load evenly and secure the turbine tower in place. Tripods are an innovative solution for harnessing wind energy in challenging offshore environments.

1. Plate joining
2. Plate cutting and edge beveling
3. Plate rolling
4. Longitudinal Milling
5. Longitudinal welding
6. Flange fitting and welding
7. Circular inside welding, section assembly
8. Circular milling
9. Circular outside welding
10. Full monopile assembly





DAVI SOLUTIONS FOR MONOPILE FOUNDATIONS

When it comes to the construction of robust and reliable monopile foundations for offshore wind turbines, Davi offers a comprehensive suite of cutting-edge solutions that set the industry standard.

Machine Expertise:

Davi's core offering includes state-of the-art machinery specially designed for monopile production. Our machines are equipped with a range of accessories, including vertical and lateral positioning capabilities, which allow for precise and efficient manufacturing. These accessories ensure that the fabrication process is not only highly accurate but also adaptable to the unique requirements of each project.

Computer Numerical Control (CNC):

The heart of our monopile production process lies in our advanced CNC technology. Through CNC, we can meticulously control and manage the entire manufacturing process. This results in superior reliability, unparalleled quality, optimized output performance, and substantial energy savings. Our CNC systems are at the forefront of automation and precision, ensuring that every monopile meets the highest industry standards.

Circumference Measurement:

Davi incorporates cutting-edge techno-logy for the shell's circumference measurement. This specialized measurement tool provides accurate data on the shell's circumference, a vital parameter for an accurate fitting in the following Monopile growing line.

Ensuring the monopile structural performance and the utmost safety and reliability in offshore wind installations.

Automatic Radius Measurement:

Davi's solutions include automatic radius measurement, a critical feature that guarantees the exact dimensions required for proper fit and stability. This auto-mated process not only enhances the precision of the monopiles produced with DAVI machines but also expedites production, reducing project timelines and costs. The measurement operation is safer and more accurate compared to standard manual measurement methods with templates.

In conclusion, Davi's solutions for monopile foundations are characterized by innovation, precision, and efficiency. Our machinery, coupled with advanced CNC technology and automatic measurement systems, guarantees that every monopile produced meets the highest industry standards for reliability, quality, and energy efficiency.

Davi Solutions
Feeding Systems

Linear

Ideal to intensively produce cylindrical cans. In case of cones, the plate must be partially supported by cranes.

Modular

To intensively produce cylindrical cans. Cones are also possible with repetitive plate adjustments. The plate must be loaded and positioned by cranes; only a fine tuning alignment is possible with pushers. In case of cone forming, the intermittent and time consuming plate rotation is made through pushers.

Extended

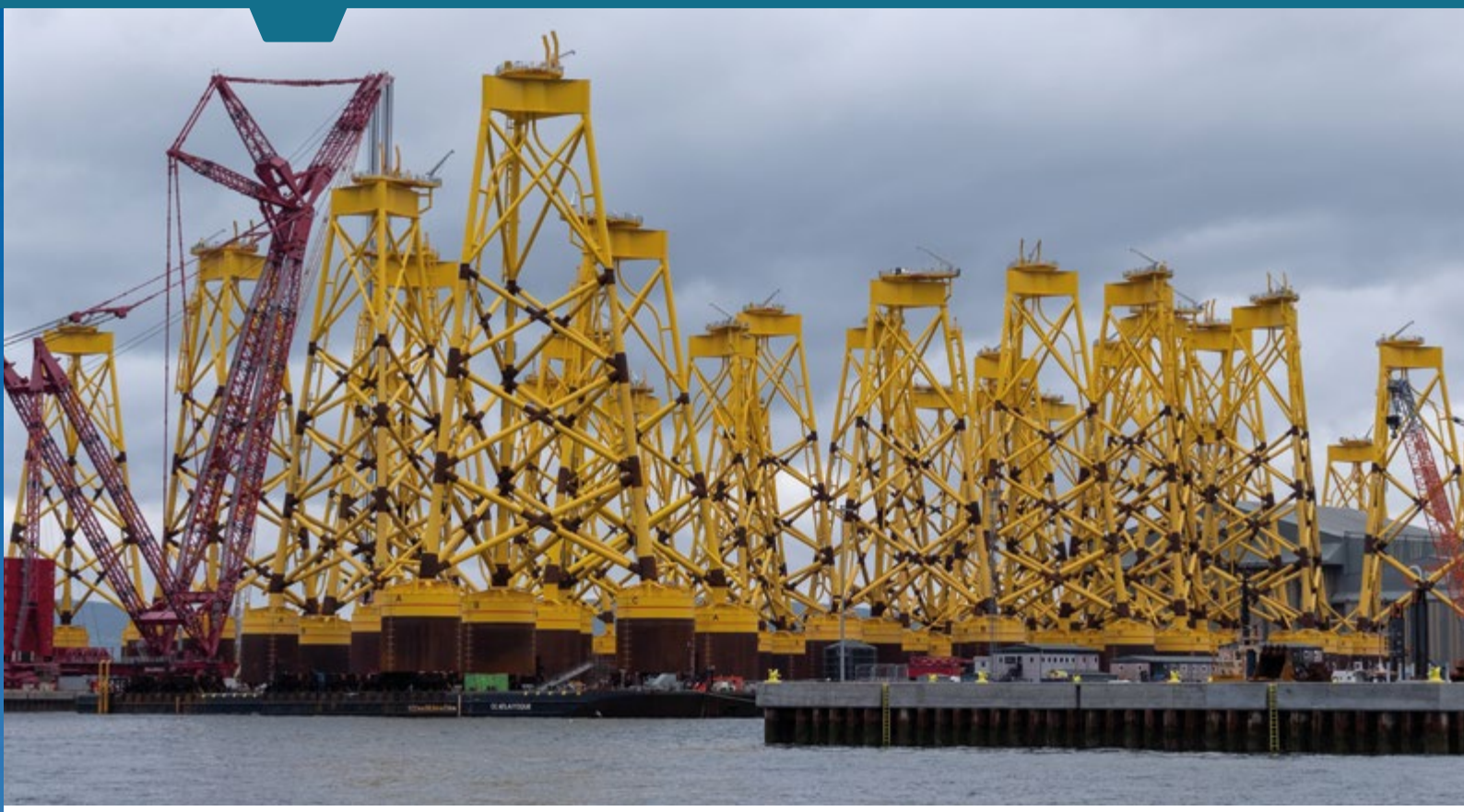
To intensively produce cylindrical cans and cones. The plate can be loaded on conveyor in any position and the manipulator system automatically operates the plate positioning and alignment. In case of cone forming, the plate rotation is made continuously and automatically with the SMART LINE feeding system; or intermittently with time consuming repositioning through pushers.

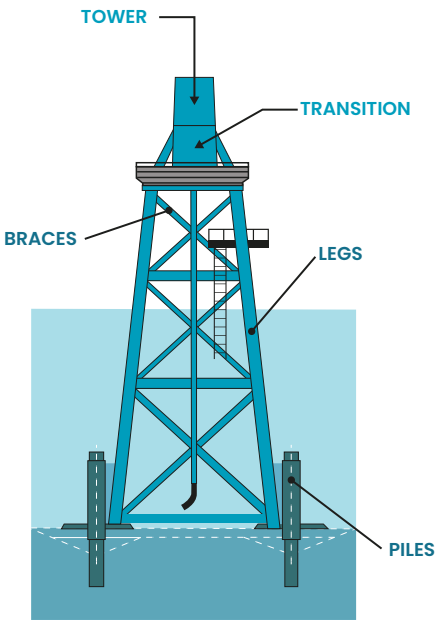
Adaptive

To intensively produce cylindrical cans and cones. The plate must be loaded and positioned by cranes; only a fine tuning alignment is possible with pushers. In case of cone forming, the plate rotation is made continuously and automatically with the SMART LINE feeding system; or intermittently with time consuming repositioning through pushers.

JACKET FOUNDATIONS

Jacket foundations are a complex assembly composed of several essential components, each contributing to the stability and durability of offshore installations





1. Transition Piece (TP):

At the top of the jacket founda tion, you'll find the Transition Piece (TP), which acts as the connection point between the structure and the tower. With diameters ranging from 6 to 10 meters and thicknesses of up to 100-120 millimeters, the TP plays a critical role in anchoring the entire tower securely.

2. Legs:

The sturdy legs of a jacket foundation are the primary load-bearing components. These robust structural elements come in diameters ranging from 1000 to 2500 millimeters, with thicknesses varying from 50 to 120 millimeters. The legs provide the necessary strength and stability to support the weight of the offshore structure.

3. Braces:

Braces serve as diagonal supports within the jacket foundation structure. With diameters ranging from 600 to 1200 millimeters and thicknesses of 35 to 40 millimeters, they play a crucial role in distributing loads evenly across the entire assembly. This ensures that the foundation can withstand the dynamic forces of the marine environment.

4. Pin Piles:

The pin piles are integral components that penetrate the seabed, anchoring the jacket foundation firmly in place. Usually these piles come in diametres ranging from 1.5 to 2 metres, with thicknesses typically ranging from 40 to 80 millimetres; however, in earthquake prone areas, the diametres can go up to 3,5/4m. The pin piles provide the necessary stability to withstand the forces of waves and currents.

DAVI SOLUTIONS FOR JACKET FOUNDATIONS

ENHANCED FLEXIBILITY FOR BETTER FORCE DISTRIBUTION:

One of the key advantages of Davi's MAV 3-Roll lies in its exceptional flexibility. This flexibility translates into improved force distribution during the fabrication process. With the MAV system, we can expertly handle various aspects of jacket foundation production, including the shaping of critical components like legs, nodes, braces, and transition pieces.

THE UNPARALLELED PERFORMANCES:

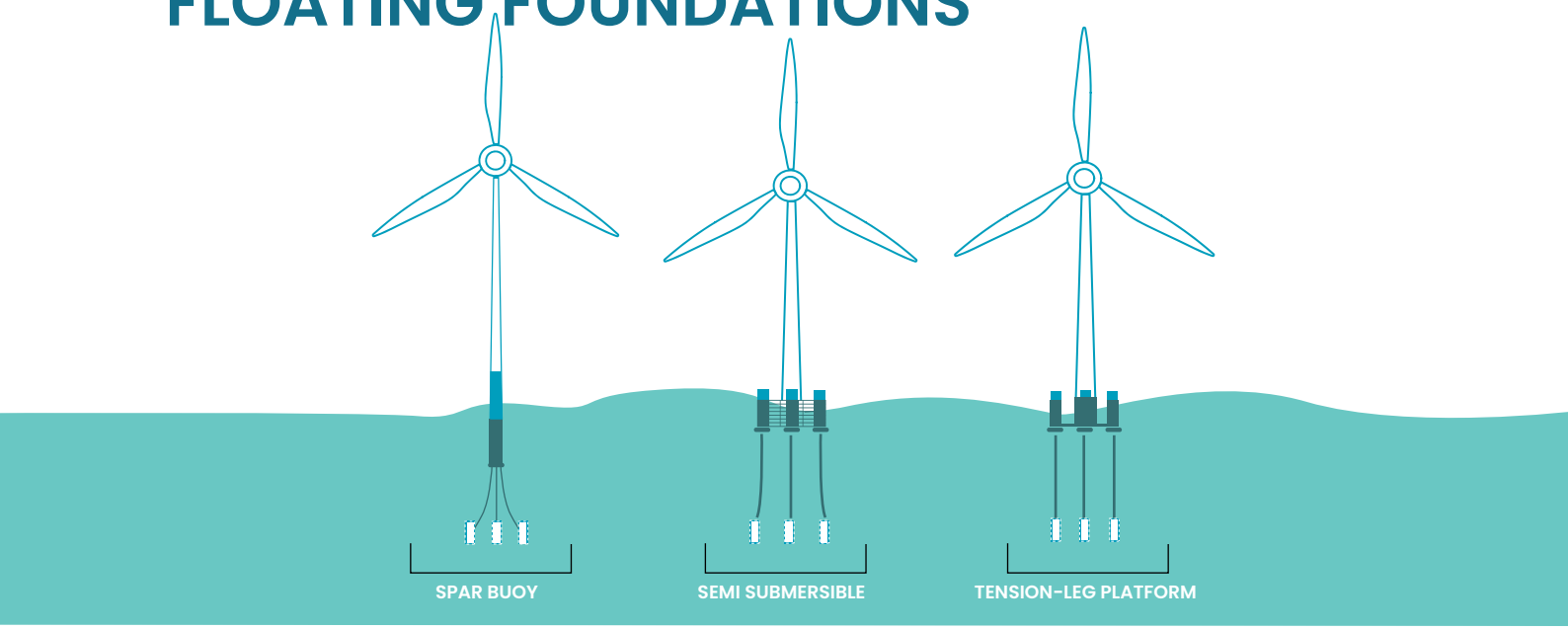
Davi's MAV 3-Roll with Variable Axis sets standards for performance in jacket foundation fabrication. Its cutting-edge technology, combined with the expertise of our team, guarantees that every component is crafted with the utmost precision and consistency. This level of excellence ensures that the jacket foundation will not only meet but exceed industry standards. and stability to support the weight of the offshore structure.

GREATER PRECISION IN NARROW DIAMETERS:

Fabricating jacket foundations often involves working with components of varying diameters, some of which can be quite narrow. Davi's MAV 3-Roll excels in these scenarios, providing superior precision in shaping and forming even the smallest elements of the foundation structure. This precision ensures that the jacket foundation components meet the exact specifications required for stability and structural integrity.

With this solution, we offer our clients the assurance of superior quality, precision, and adaptability, ensuring the success and reliability of offshore installations for years to come.

FLOATING FOUNDATIONS



The world of offshore wind energy is witnessing a rapid evolution in floating foundation technology, driven by the competition among various providers striving to offer economically viable solutions for the first generation of commercial floating projects. These advancements are vital in unlocking the potential of wind energy in deeper waters, where fixed-bottom foundations are not feasible. Let's explore the main types of floating foundations currently available in the market:

1. SEMI-SUBMERSIBLE:
Semi-submersible platforms are among the leading contenders in the realm of floating foundations. These platforms are designed to partially submerge in the water, relying on buoyancy to remain afloat. Semi-submersibles offer stability in harsh marine environments and are known for their versatility.

2. SPAR-BUOY:
Spar-buoy foundations are another innovative solution that has gained recognition in the industry. These structures consist of a vertical cylinder (the spar) that extends below the water surface, with a buoyant section on top. Spar-buoys are known for their stability and the ability to support tall wind turbines. They have proven effective in offshore conditions with significant wave heights.

3. TENSION-LEG:
Tension-leg platforms provide a unique approach to floating foundations. They are tethered to the seabed with tensioned vertical tendons, ensuring stability. Tension-leg platforms are renowned for their minimal motion in response to waves and are well-suited for locations with challenging environmental conditions.

As the competition in the floating foundation sector intensifies, innovative solutions continue to emerge, addressing cost-efficiency, adaptability, and overall feasibility.

Davi Solutions for Floating Foundations

Davi Solutions for Semi-submersible or Tension-leg Foundations

Semi-sub

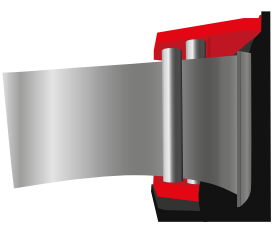
Davi Solutions for Spar-buoy Foundations

Spar-buoy

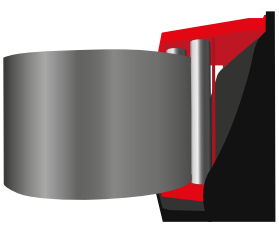
Based on slenderness (Ø) there are different recommendable rolling processes

Vertical rolling

1-Open Section



2-Full Can



Horizontal rolling

1-Open Section

2-Full Can

OFFSHORE AND ONSHORE WIND TOWERS

OFFSHORE

OFFSHORE WIND TOWERS:

Height: Soaring to impressive heights of up to 120 meters, offshore wind turbine towers are engineered to harness the stronger and more consistent winds found over open waters.

Structure: Comprising 3-4 sections, these towers are designed for stability and resilience in challenging offshore conditions.

Diameter: Ranging from 6 to 12 meters, these towers are substantial, ensuring they can support the massive turbines required for offshore wind farms.

Thickness: With steel thicknesses between 100-120 millimeters, offshore towers are built to withstand the corrosive effects of saltwater and the relentless forces of the sea.

Width: Measuring 3-4 meters in width, these towers are engineered for stability, even in the face of powerful ocean winds.

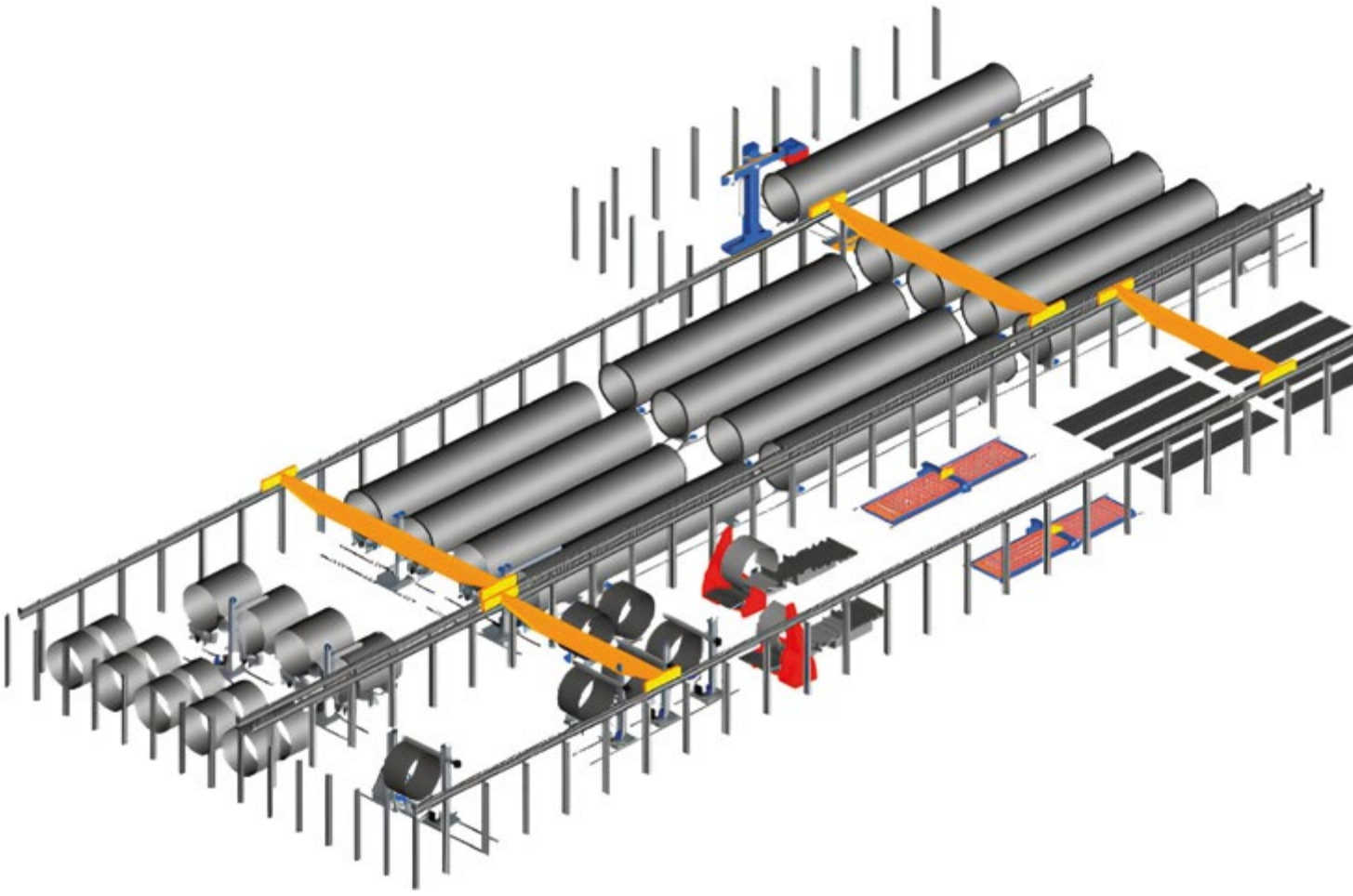
ONSHORE

ONSHORE WIND TOWERS:

Height: Standing at heights of 80 to 100 meters, onshore wind turbine towers are strategically positioned to harness the wind resources available on land.
Structure: They are typically constructed as single-section towers, simplifying their assembly on solid ground.
Diameter: Onshore towers have diameters ranging from 5 to 7 meters, providing ample support for the turbines placed atop them.

Thickness: The steel used for onshore towers can reach thicknesses of up to 80-100 millimeters, ensuring the towers' durability in various environmental conditions.
Width: These towers typically have a width of 3 meters, designed to maintain stability while minimizing the footprint on the land.

TOWER (OFFSHORE AND ONSHORE) SAMPLE FACTORY



1. Plate cutting
2. Plate rolling
3. Longseam welding
4. Flange fitting and welding
5. Double can assembly and welding
6. Section assembly and welding
7. Quality control and internal fittings
8. Blasting
9. Painting

DAVI SOLUTIONS FOR OFFSHORE AND ONSHORE WIND TOWERS

1. Wind Energy Line:

Our Wind Energy Line is a comprehensive solution that combines advanced machinery with essential accessories and a feeding system. This system streamlines the tower manufacturing process, making it more efficient and precise. Davi empowers manufacturers to produce towers with accuracy and reliability, meeting the rigorous standards of the industry.

2. High Productivity Line:

Davi's High Productivity Line takes tower manufacturing to the next level. This solution includes a lifting feeding system (for a safe, fast and accurate pre-bending) and incorporates intermittent plate repositioning to form the necessary cone shapes. This innovative approach significantly enhances productivity while maintaining the highest quality standards. It is ideal for meeting the demands of high-volume tower production, ensuring efficiency without compromising on precision.

3. Smart Line:

Davi's Smart Line represents the pinnacle of wind tower manufacturing technology. This solution offers continuous plate feeding, enabling the seamless formation of cones. The benefits are manifold, including faster production rates, enhanced product quality, a safer operational environment, and simplified machinery operation. The Smart Line is engineered to optimize the entire manufacturing process, from start to finish.

1. Wind Energy Line

2. High Productivity Line

3. Smart Line

iRoll EXTREME + iCONE SOFTWARE + LASER MEASURING SYSTEM

iRoll eXtreme is the most advanced control system in the industry:
an ergonomic console with a high-resolution touchscreen and a live 3D interface. It's as easy to use as a smartphone for creating programs, thanks in part to the exclusive AI.

iCone software is an exclusive software designed by Davi that allows you to manage the position of pushers and hydro-guides as the sheet is positioned and moves during processing.

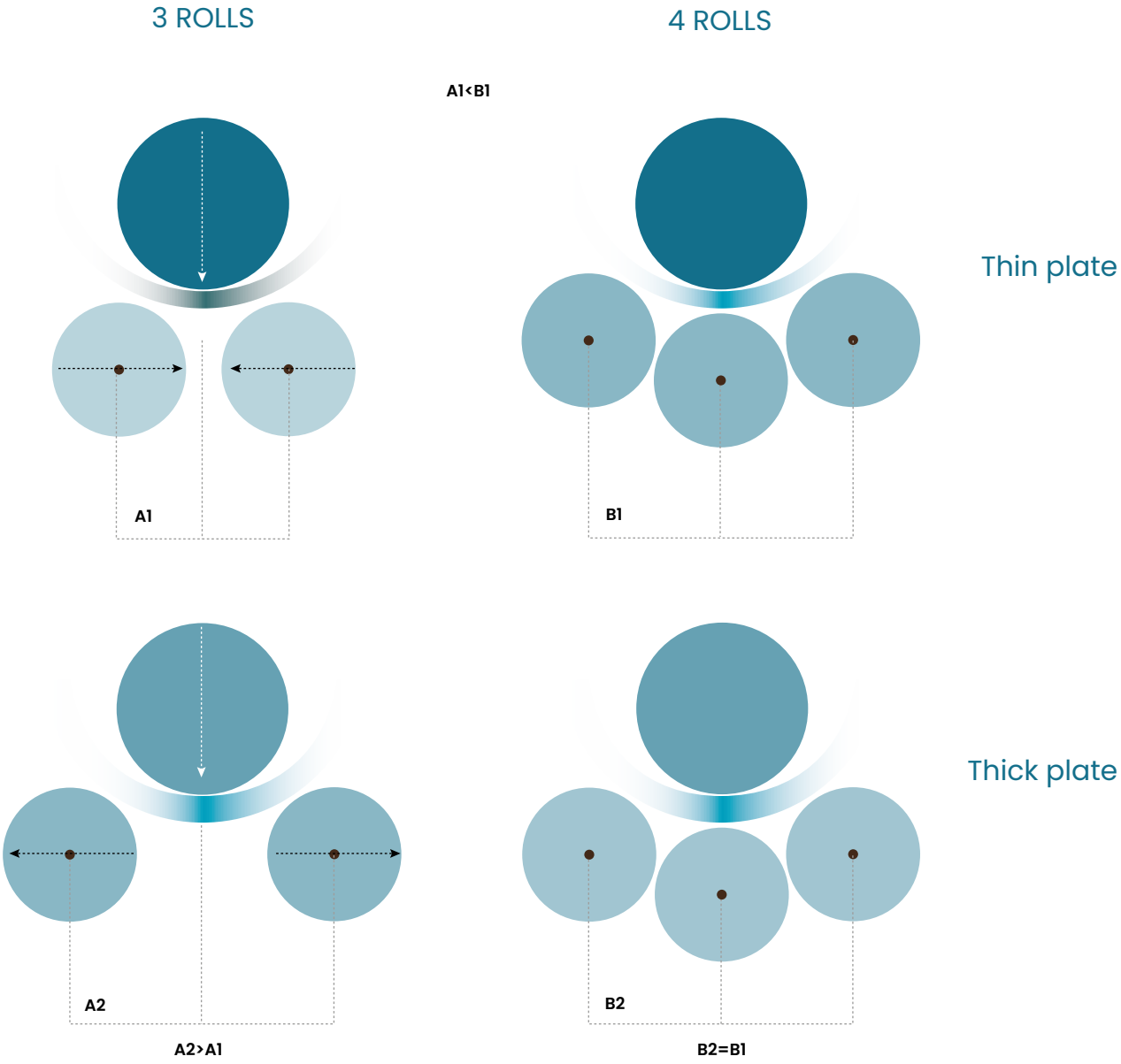
Laser measuring system:
Maximum measurement accuracy.

Ability to track and record forming tolerances. Full automation thanks to seamless integration with iRoll eXtreme software.

Safer operation (operators are always kept away from trapped parts).

Real ability to operate the machine with just one operator.

RE-ROLLING



Re-rolling can be done with both the 3-roll (preferred solution) or the 4-roll. The 3-roll MAV is more flexible as it can adapt its geometry based on the thickness of the sheet to be calibrated. It can also tilt all three rolls, allowing for precise alignment of the point of tangency between the rolls and the shell along the generatrices of the cone. The re-rolling process is particularly used for foundations.

DAVI REFERENCES IN THE

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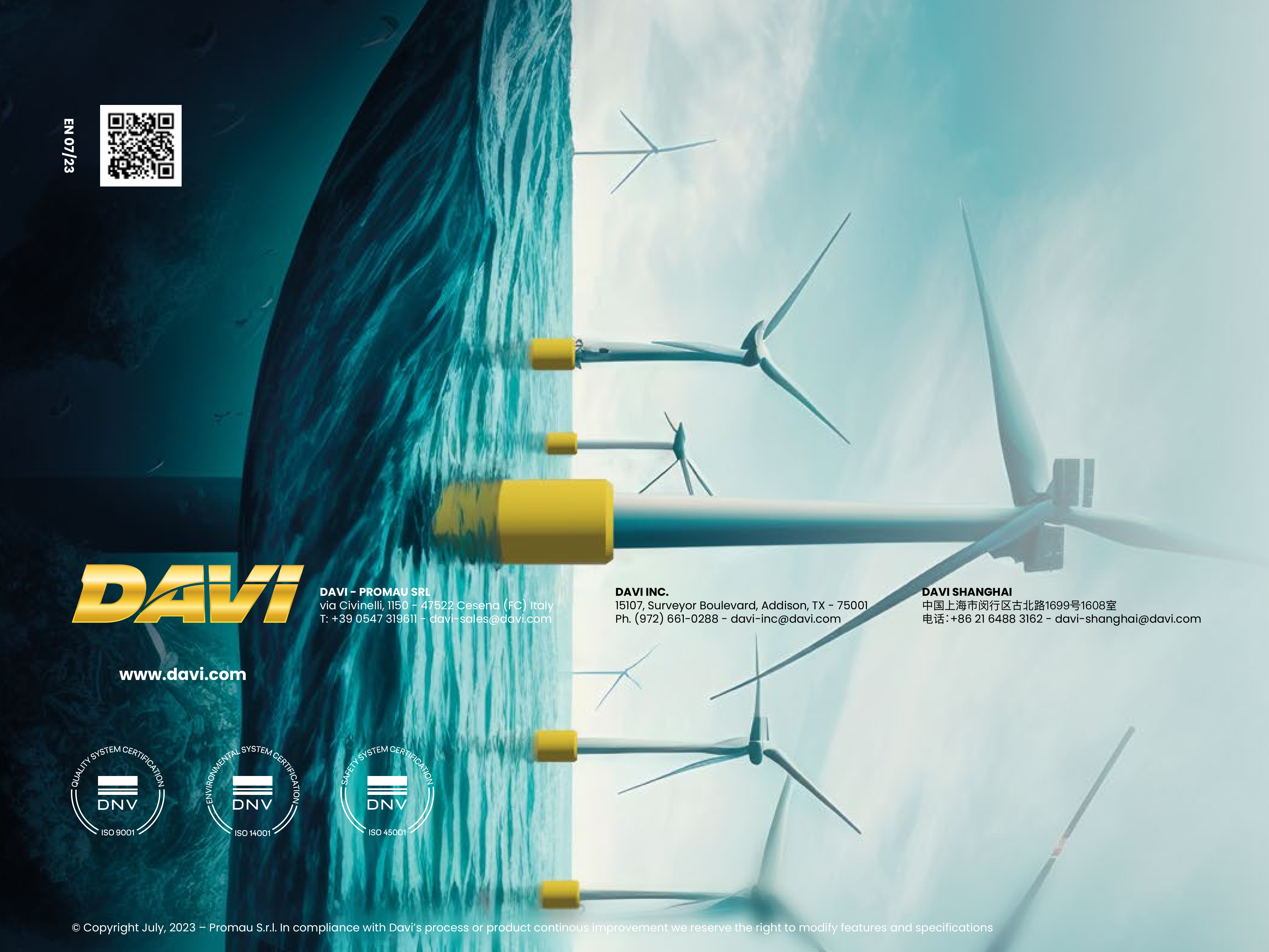

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DAVI

DAVI – PROMAU SRL
via Civinelli, 1150 - 47522 Cesena (FC) Italy
T: +39 0547 319611 - davi-sales@davi.com

DAVI INC.
15107, Surveyor Boulevard, Addison, TX - 75001
Ph. (972) 661-0288 - davi-inc@davi.com

DAVI SHANGHAI
中国上海市闵行区古北路1699号1608室
电话:+86 21 6488 3162 - davi-shanghai@davi.com

www.davi.com

QUALITY SYSTEM CERTIFICATION – DNV – ISO 9001

ENVIRONMENTAL SYSTEM CERTIFICATION – DNV – ISO 14001

SAFETY SYSTEM CERTIFICATION – DNV – ISO 45001