PEMAMEK

THE WELDING AUTOMATION COMPANY

Steel Floating Substructures event

Edinburgh, 18th of September

Solutions for Floating Wind Structures

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PEMAMEK

Pema

PEMAMEK

THE WELDING AUTOMATION COMPANY

World's leader in welding and production automation

400
Pemamek employs over 400 industry experts

€120m
Pemamek's revenue

90%
Products and solutions exported annually

Welding automation and services:
Winning solutions for heavy industries

At Pemamek we are on a mission to optimize heavy manufacturing processes. We have taken pride in engineering and manufacturing cutting-edge welding automation solutions for over 50 years.

Transform your business and manufacturing

Pemamek's offering expands from stand-alone machines to extensive production lines and dedicated expertise services. Our global customer references across **six segments** are the best proof of our ability to deliver promised results and added value.

- **Wind Energy**
- **Shipbuilding**
- **Heavy Equipment**
- **General Fabrication**
- **Power Generation**
- **Offshore & Process Industry**

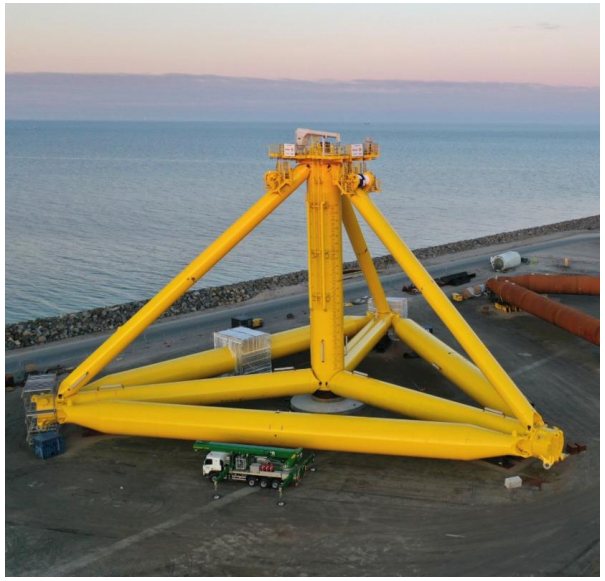
LIEBHERR · WEG · Navantia · HII · Sif OFFSHORE FOUNDATIONS · haizea windgroup

Wind floater structures

- **Plate thickness:** 10-50 (100mm)
- **Column diameters:** 8-20 m
- **Column heights:** 25-80 m
- **Diagonal stiffener diameters:** 1-4 m

Pemamek's local partner

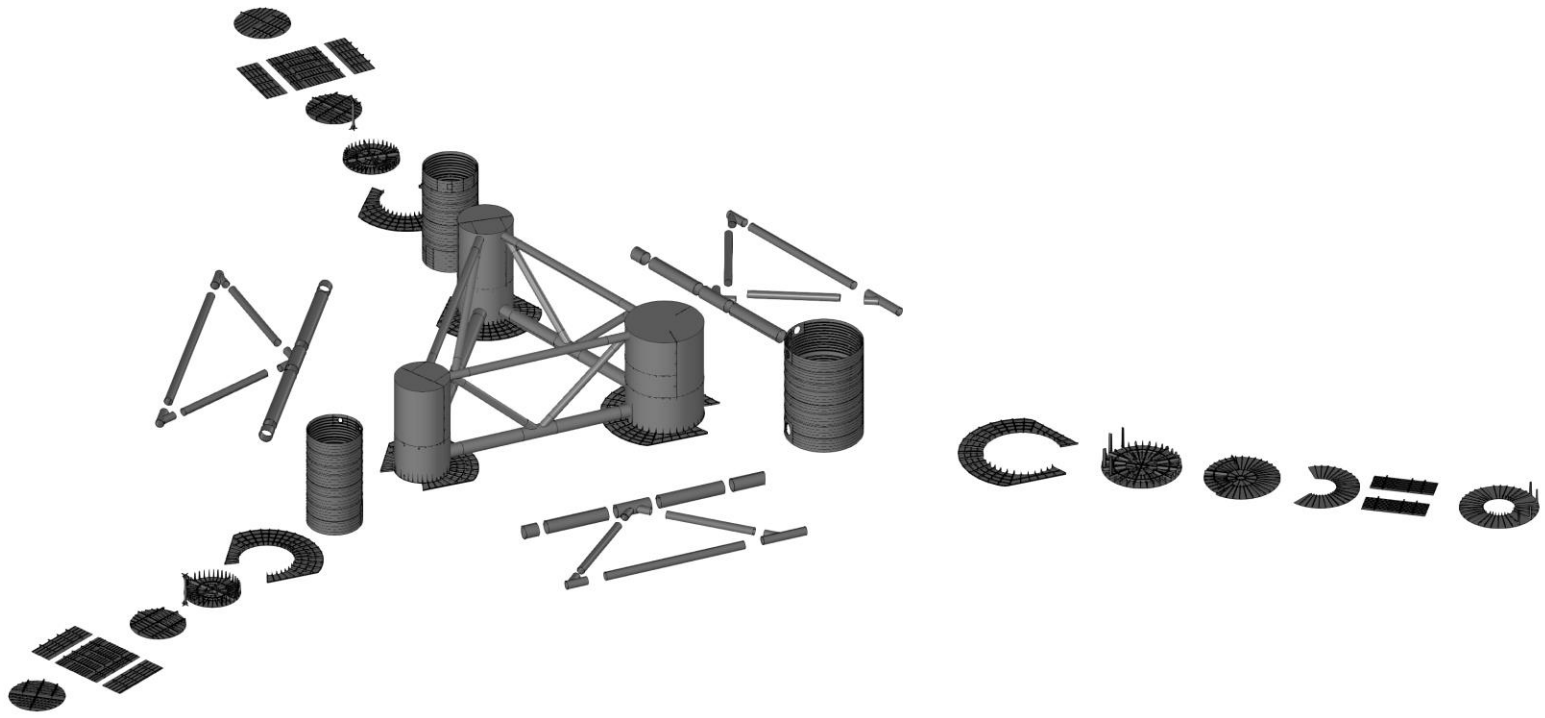
TPS WeldTech



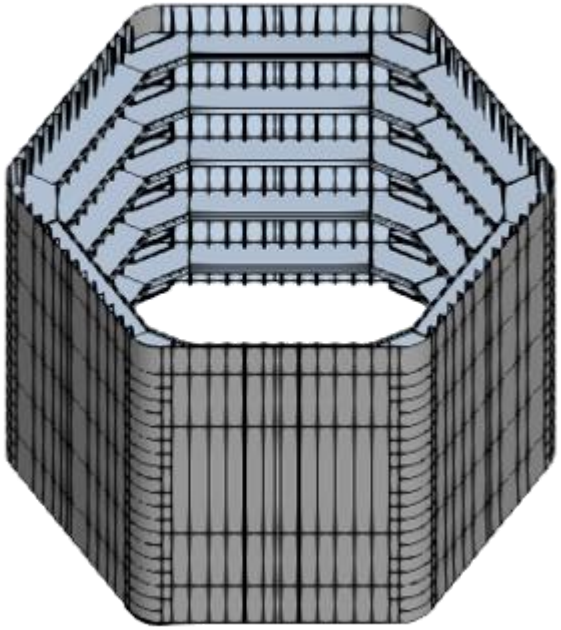
Multiple floater designs and high variation of structures

Breaking floater structure into sub-assemblies and parts:

- Columns
- Flats, bulkheads & webs
- Bracings
- Parts manufacturing



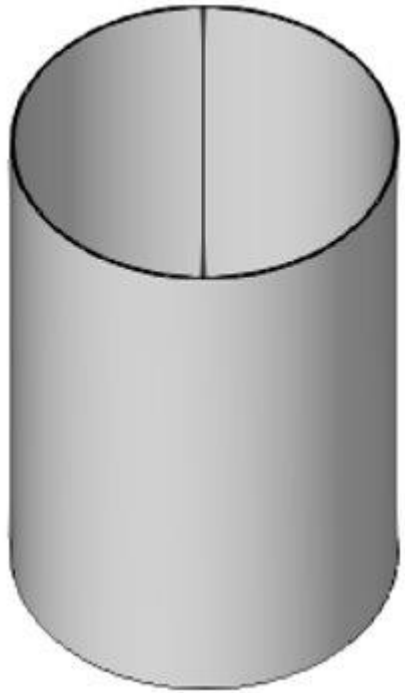
Floater column types



Hexagonal column with vertical & ring stiffeners

Tubular column with vertical & ring stiffeners

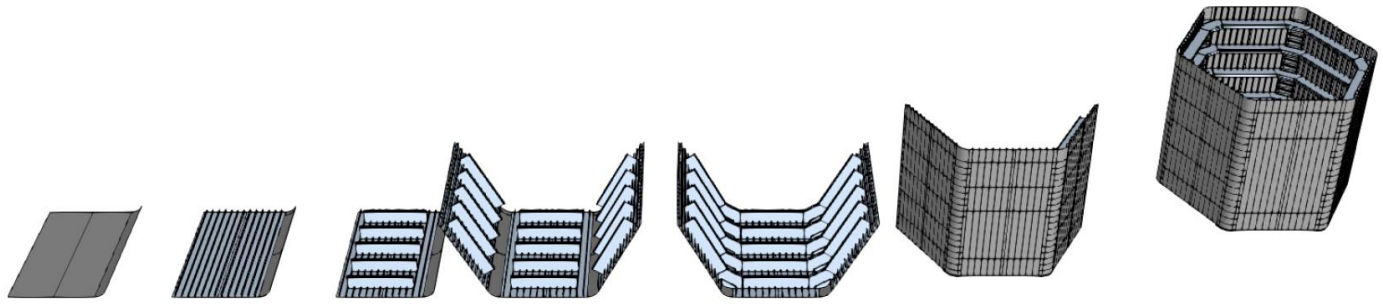
Tubular column with ring stiffeners



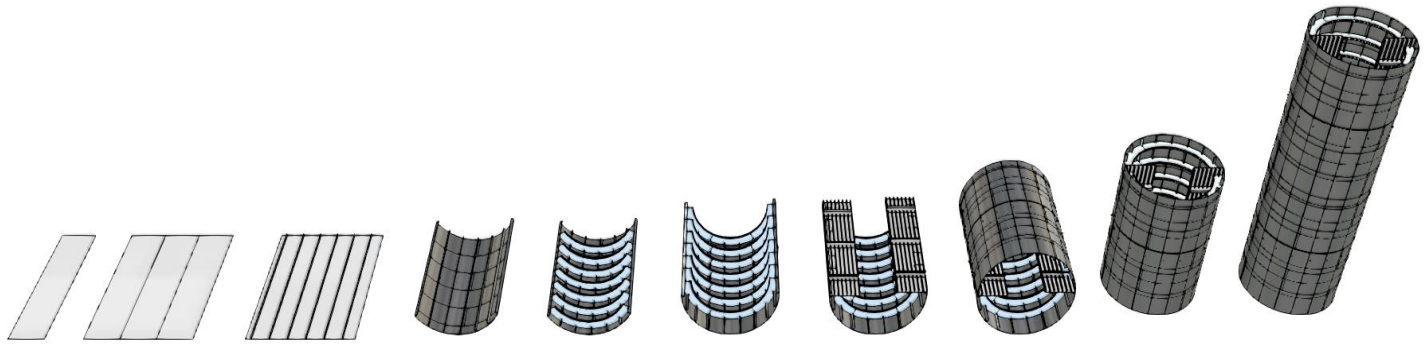
Tubular column without stiffeners

Floater column manufacturing types

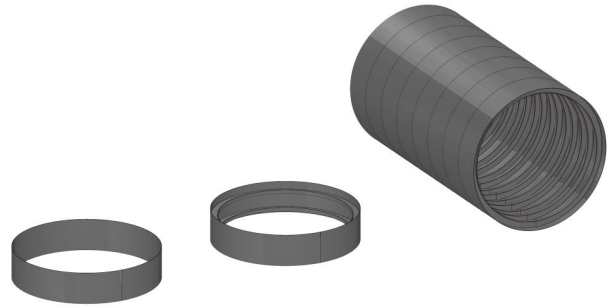
1. Panel Fabrication, Assembly Of Hexagonal Segments



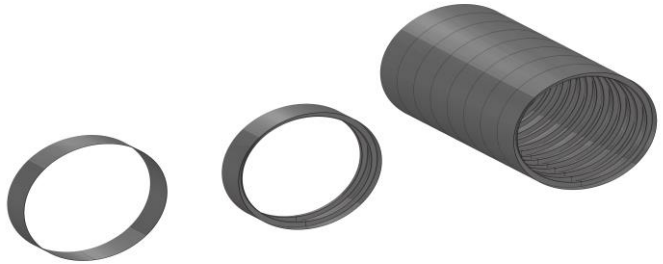
2. Panel Fabrication, Gravity Bending, Assembly Of Tubular Segments



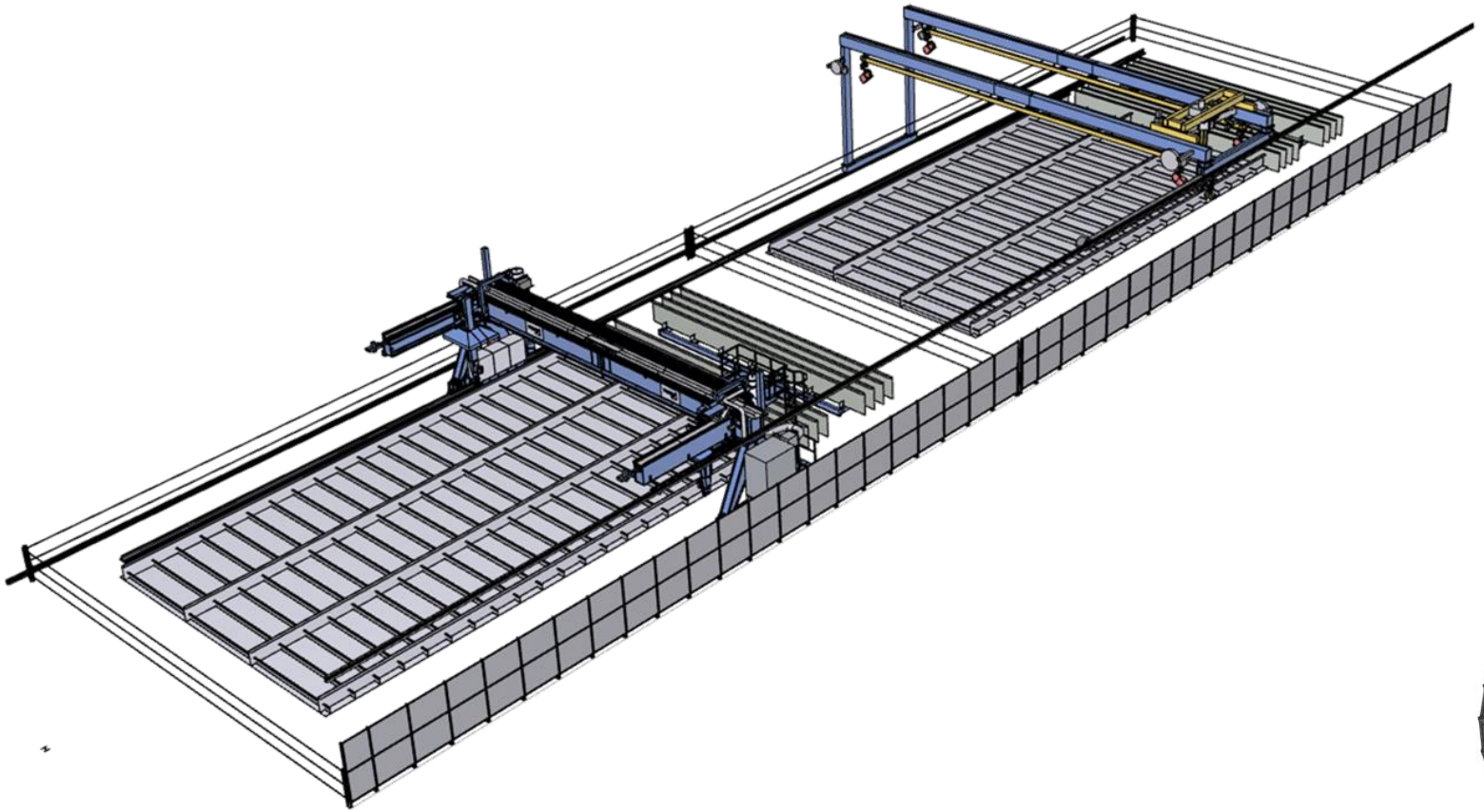
3. Vertical/Horizontal Tubular Fabrication

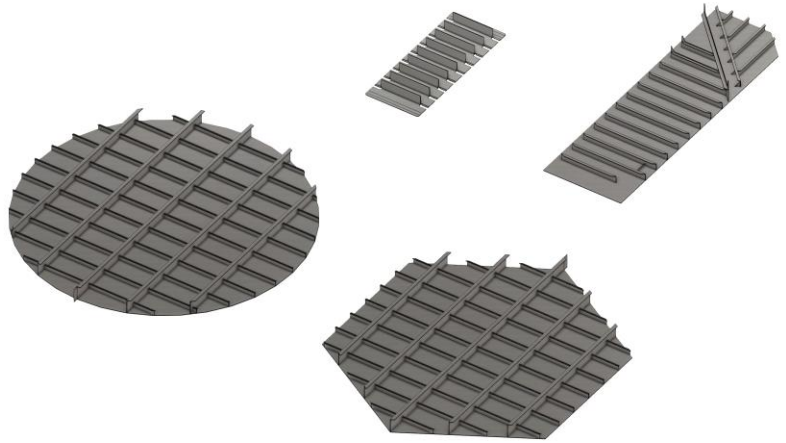


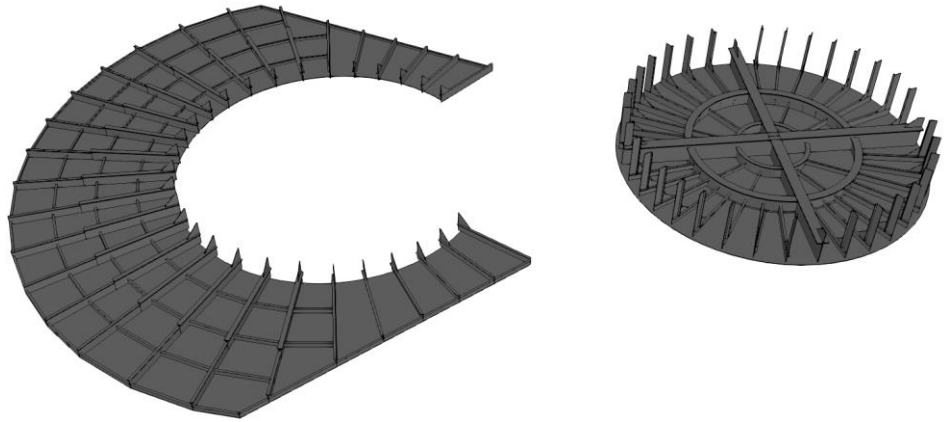
4. Horizontal Tubular Fabrication



Flats, bulkheads, webs

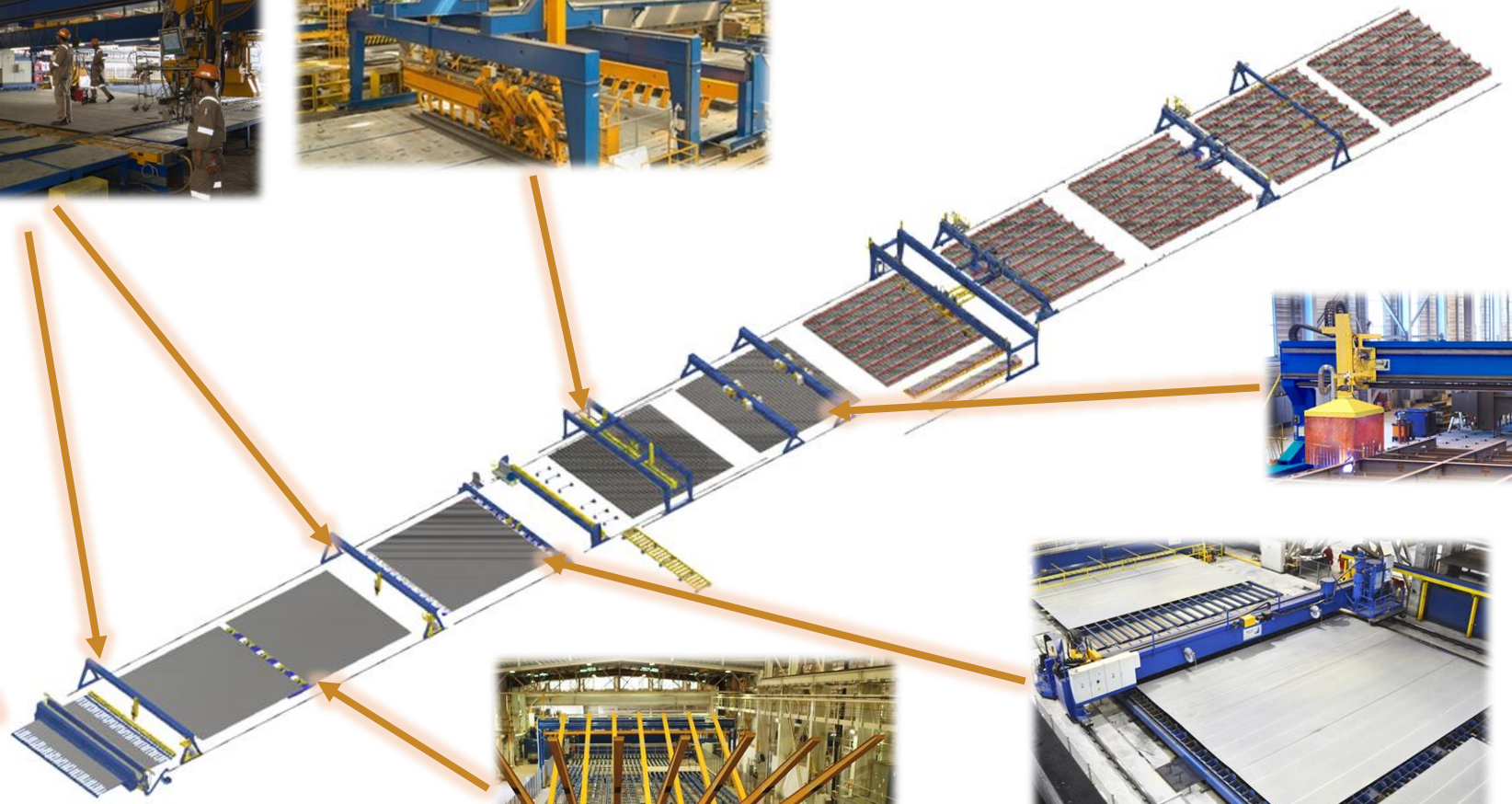




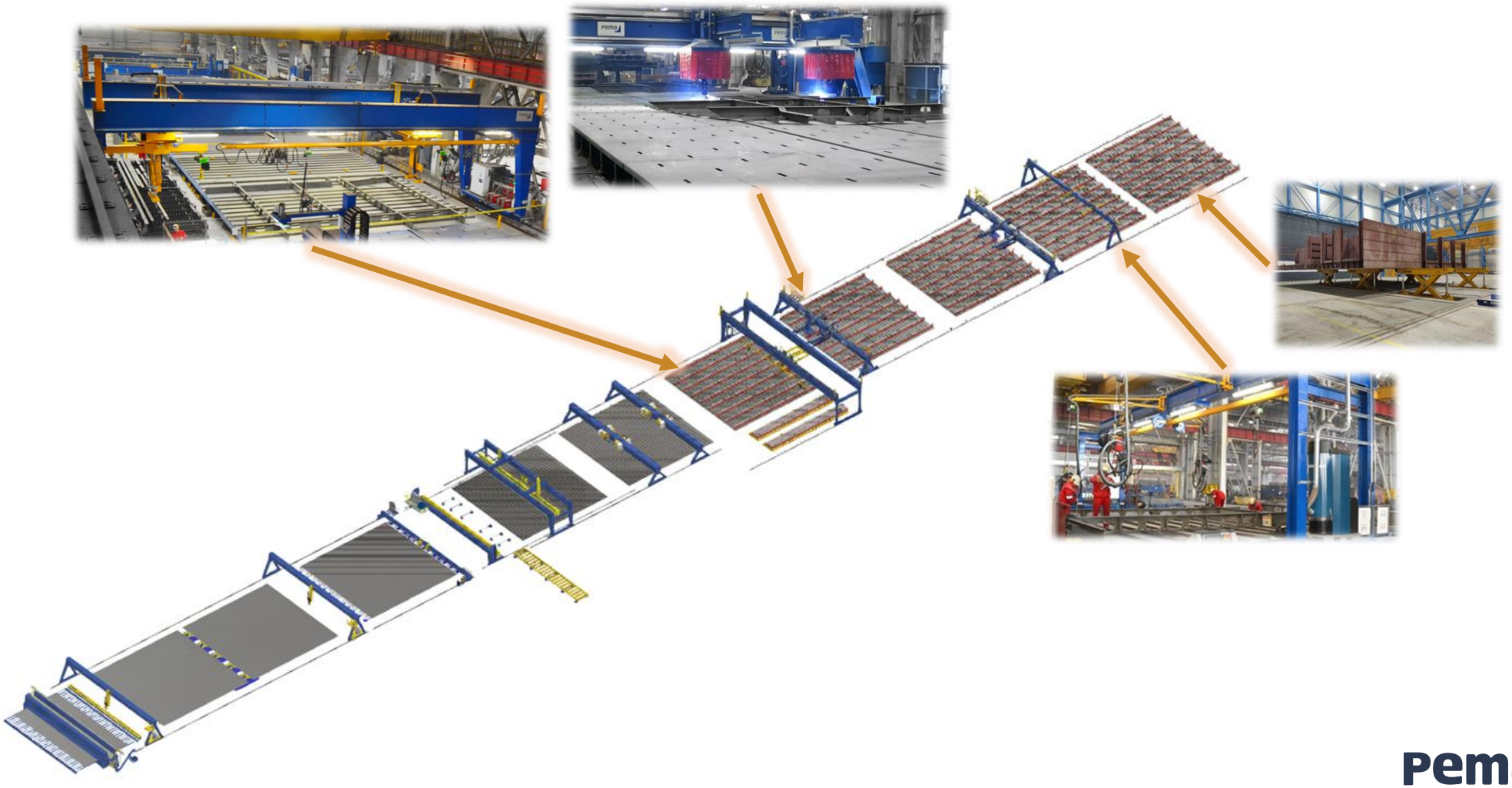


Panel fabrication for gravity bending, example machinery

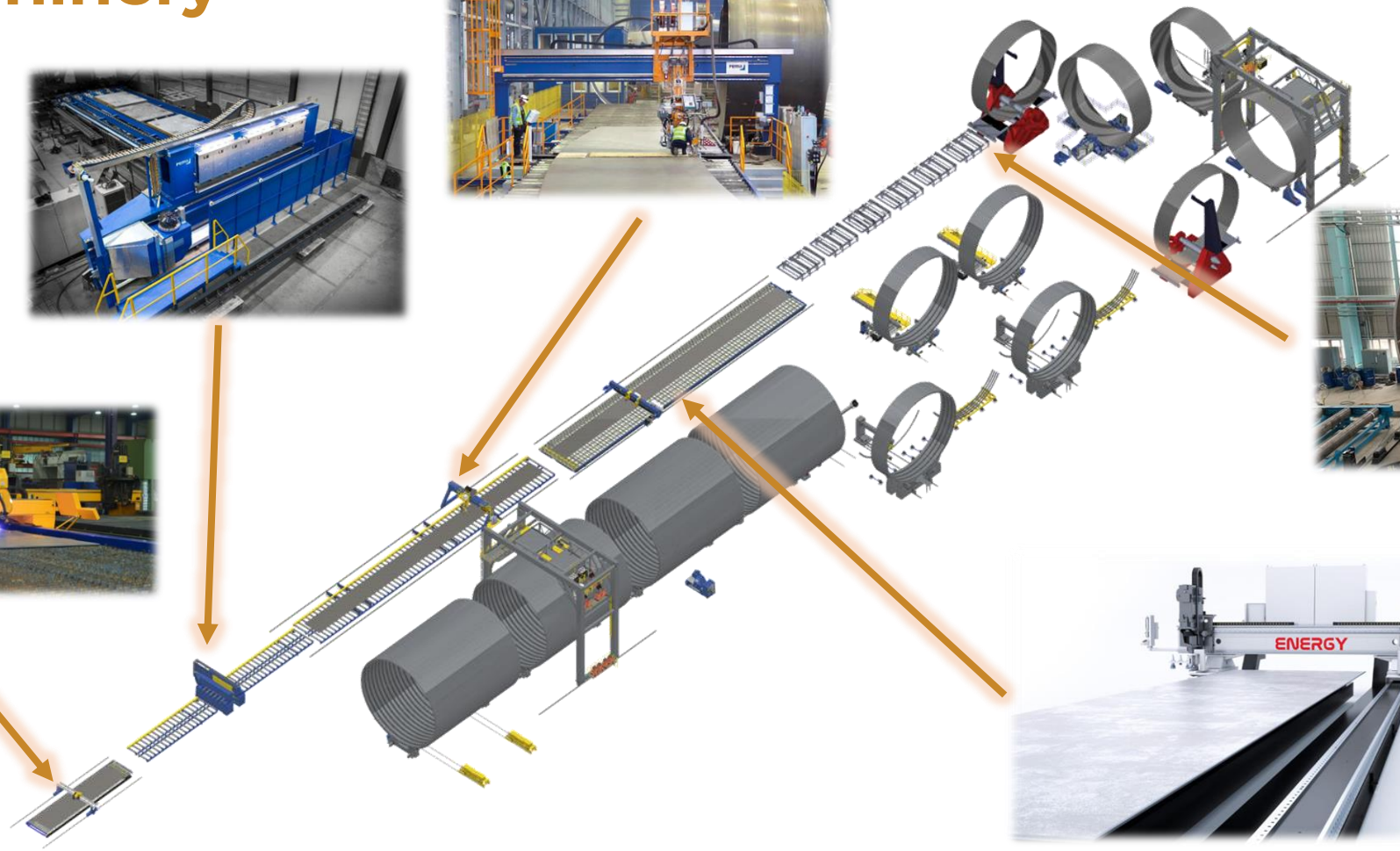
Panel fabrication for hexagonals, example machinery

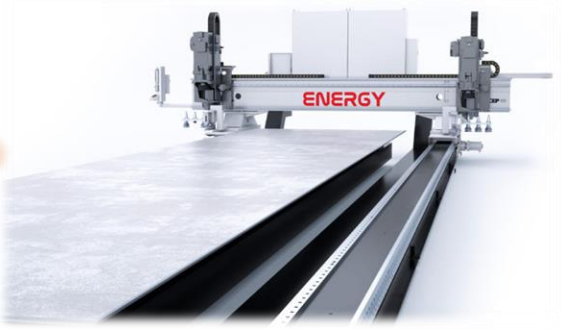


Panel fabrication for hexagonals, example machinery

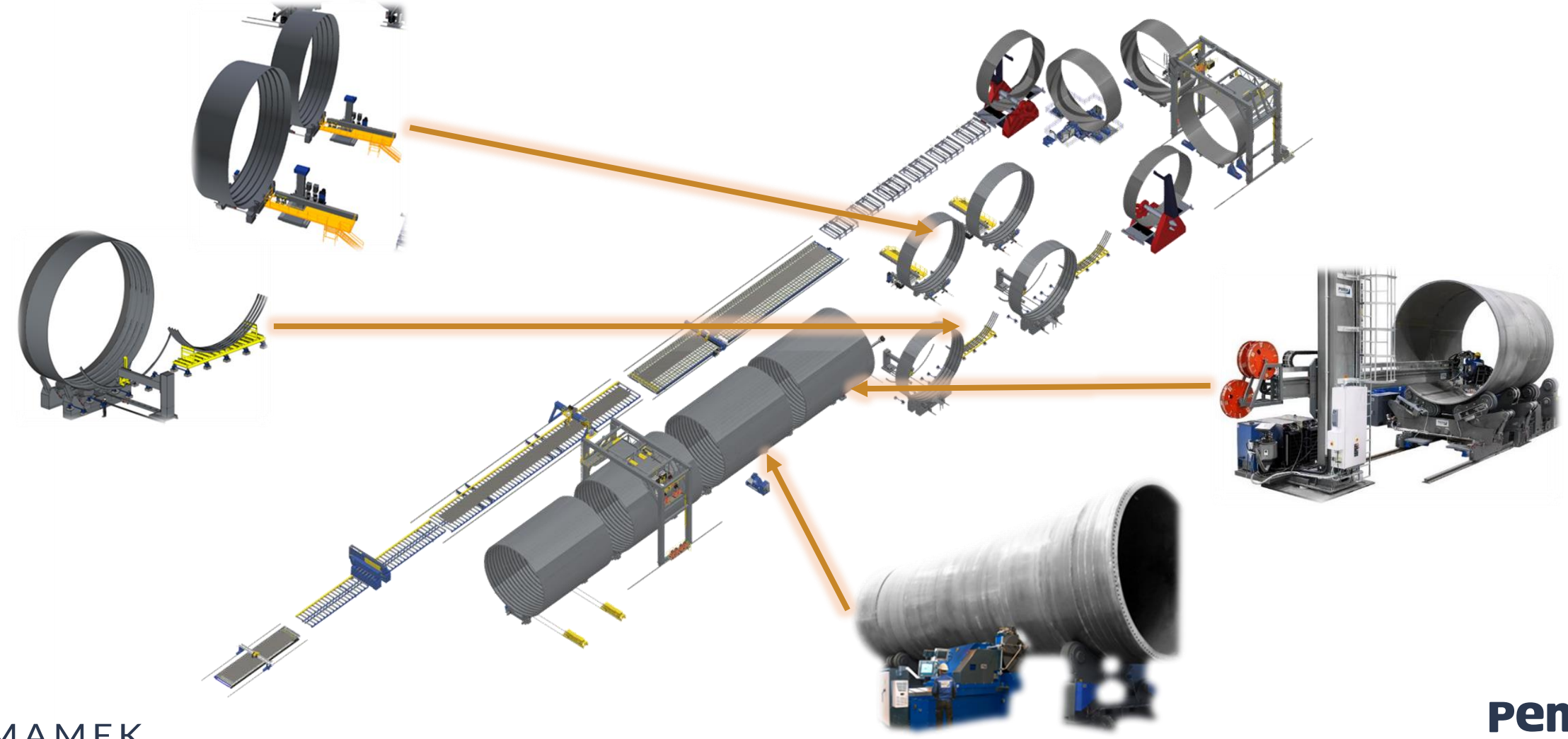


Tubular fabrication (horizontal), example machinery

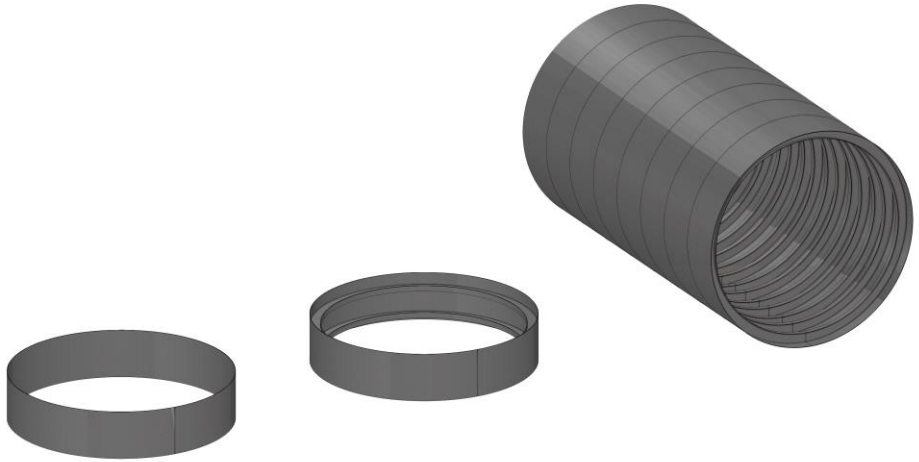




Tubular fabrication (horizontal), example machinery

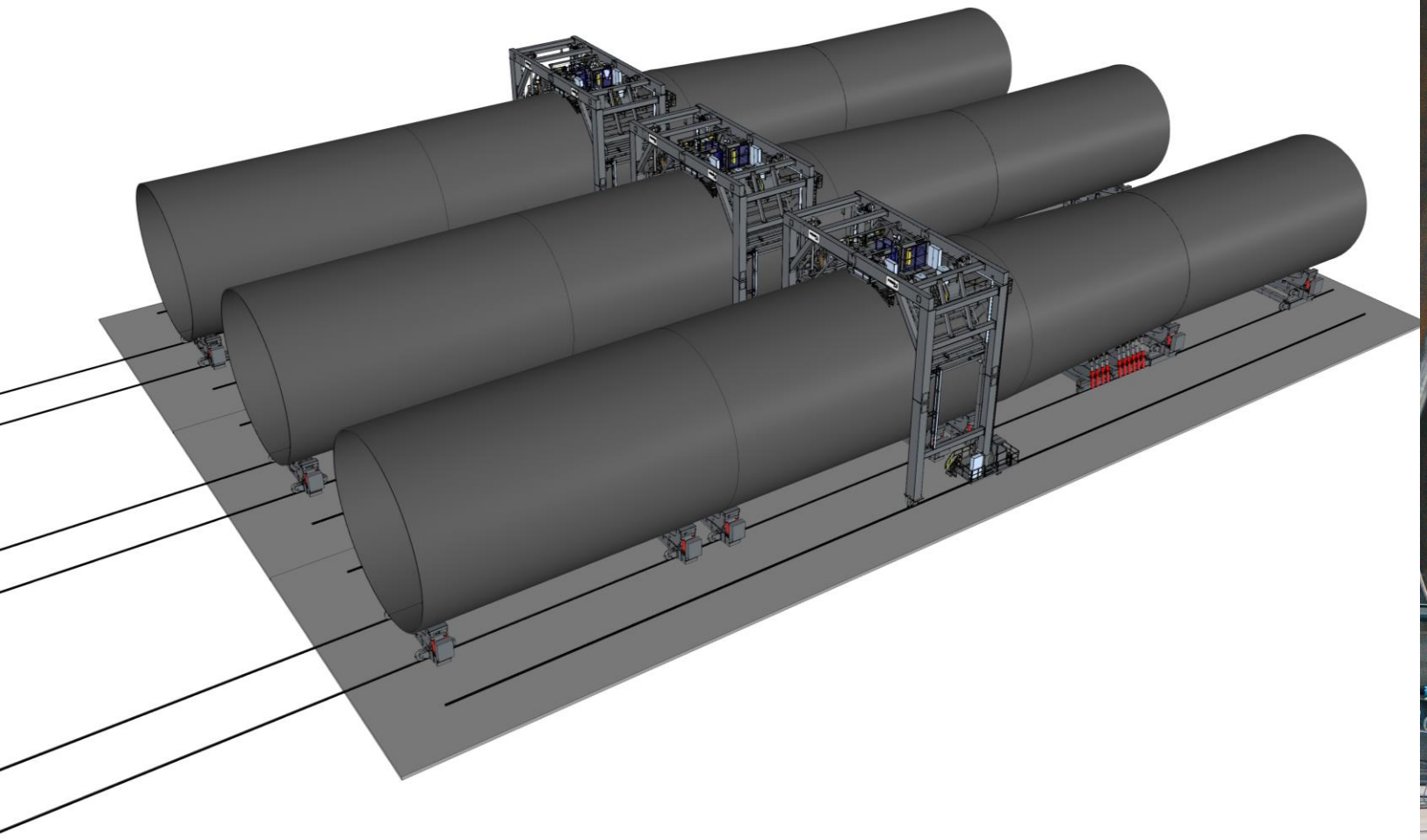


Tubular fabrication (vertical)



4XL Monopile production

PEMA Solutions for Floating Wind Structures



Welding of monopiles

Circumferential seam welding

- Maximum diameter = **15** meters
- Welding process = **Long stick-out** (LE)
- High-efficiency welding, up to **50 kg/h** in filling passes

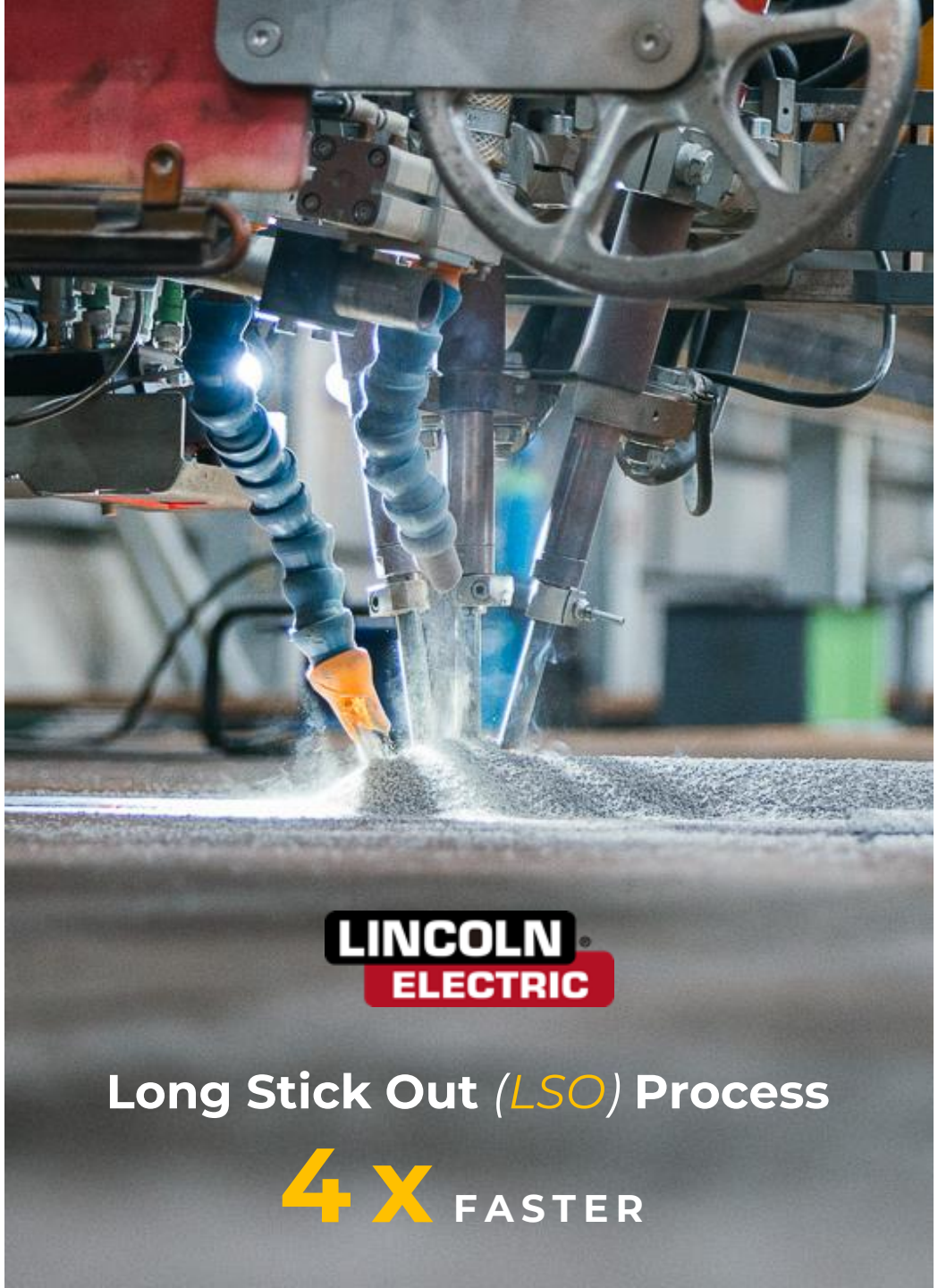
Longitudinal seam welding

- Maximum diameter = **15** meters
- Welding process = **Long stick-out** (LE)
- High-efficiency welding, up to **50 kg/h** in filling passes

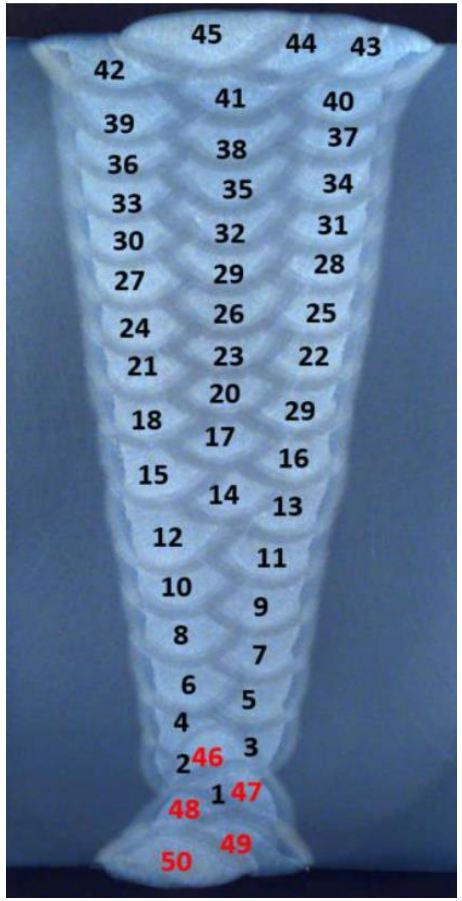
Long Stick Out (LSO) process with triple arc

- Significant **productivity** leap
- Reduced **arc time**, higher **productivity**, and **efficiency**
- Accurate **wire positioning**
- Welding is **automated** - Operator becomes a **supervisor**

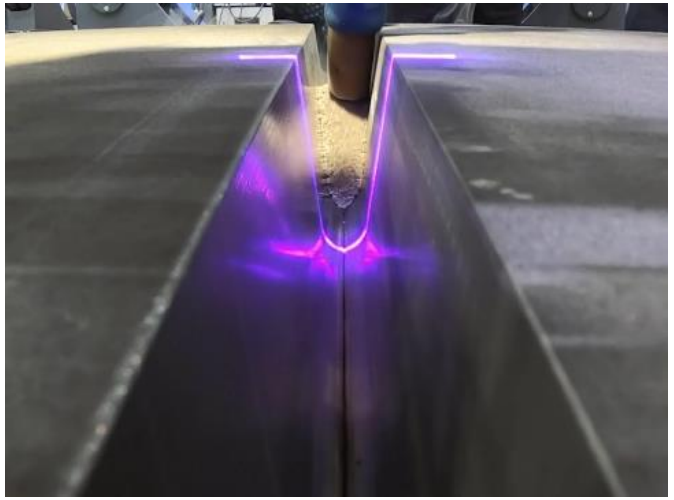
GLOBAL WIND ENERGY

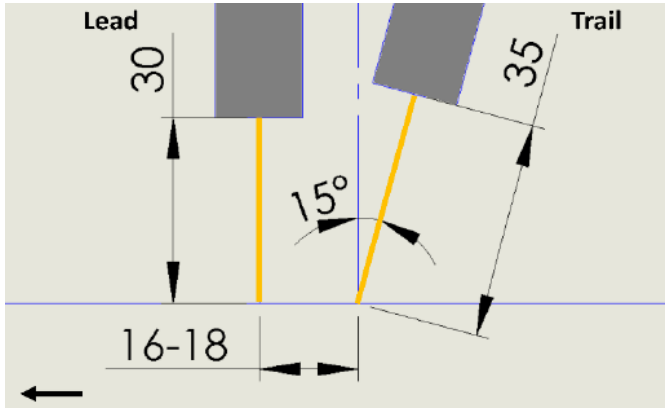


Example weld pass pattern for 128mm, plate



- Lincoln Electric Tandem **LSO** process with Pemamek **tilting** welding head
- **Two 4mm L-50M wires** together with Oerlikon OP 128 TT flux were used.
- Plate-to-plate connection
- 2 deg pre-bending for plate
- **45 passes** welded outside to 16deg bevel
- Bevel angle 18deg in the first passes due to pre-bending. After the bottom passes plates will fall to 16deg bevel.
- After 45 inside passes, the root is milled open from the backside with an R8 bottom milling tool
- The milled bevel is filled with 5 passes
- **WeldControl 500 controls** the position for each pass automatically.
- Welding parameters, wire side wall offset, and wire angle changes between passes.





Preferred tandem torch setup.

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