

# Solutions & Systems for the Wind Power Industry

## Industrial Tools



## Bolting Solutions



## Integrated Solutions



## ***The Natural Choice.***

### **Enerpac is the natural choice for providing tools, solutions and systems to the wind power industry**

ENERPAC has a long history across many industries for providing cost-effective, premium quality, high-force tools to solve many manufacturing, installation and maintenance issues. Local availability is backed by worldwide after-sales service.

#### **Products and Solutions**

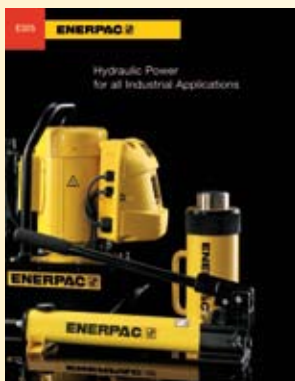
Always at the leading edge of technology, Enerpac has developed a range of products and solutions for the wind power industry. Turbine and component manufacturers, installation companies and maintenance service providers can rely on Enerpac to provide the solutions they need. Because of our history in the oil and gas market,

Enerpac also has the capability to provide suitable solutions for the demanding needs of offshore wind farms.

It is our goal to offer versatile technology solutions that improve productivity and increase safety.

#### **Core Technologies:**

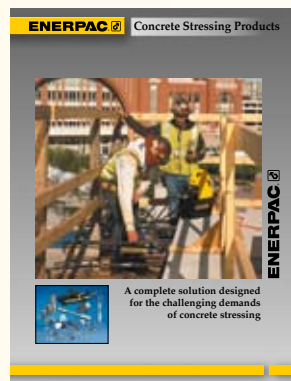
- High-force industrial tools
- Bolting solutions
- Integrated positioning systems



High-force tools catalogues  
E325e



Bolting solutions E410e



Concrete stressing products

# High force industrial tools

## Industrial Tool Solutions for the Wind Power Industry

In the processes of manufacturing, installation and maintenance of wind turbines, there are many applications that require high-force lifting, pulling, wedging, spreading, aligning or cutting.

Enerpac's broad global experience has led to the development of a wide selection of industrial tools suitable for many applications in the wind power industry. High pressure hydraulics (10,000 psi/700 bar) enable us to design tools with reduced weight and size but still provide power and flexibility. This is important when working with heavy objects in confined spaces as in wind turbines.



## Common Applications:

- Lifting and positioning of gearbox
- Wedging and spreading of rotor shaft flange
- Alignment of generator
- Cutting of high-voltage cables
- Positioning tower segments

RC-Series Cylinder and P-Series Hand Pump ▼



WHC-Series, Cable Cutters ▼



CLP-Series, Pancake Lock Nut Cylinders ▼



## **Bolting Solutions for the Wind Power Industry**

Ensuring joint integrity is key for today's sophisticated wind turbines. High forces acting on the turbine's components demand that a consistent and accurate preload is applied to every bolt. Enerpac's controlled bolting solutions reduce costly failures and dangerous situations.

### **Versatility**

In each turbine, hundreds of multiple sized fasteners need to be tightened efficiently and in a controlled manner. Speed, flexibility and reliability is required and is delivered by Enerpac products. Combined with our renowned quality and world wide availability, it is clear why Enerpac is the natural choice for wind power tools and solutions.

### **Our Product Range**

For many different bolting applications in the wind turbine industry, Enerpac has a wide selection of bolting solutions — hydraulic torque wrenches, hydraulic tensioners, nut cutters, torque multipliers and a wide range of high-pressure pumps for all different application environments.

### **Common Applications:**

- Tubular tower segments
- Rotor blades
- Pitch controls
- Gearbox and azimuth drives
- Tower ball race to the nacelle
- Tower base bolts



▲ Tightening tower segments.



▲ GT-Series tensioner for tightening blade bolts.



▲ S3000 used to connect wind tower segments



# BOLTING TOOLS OVERVIEW

## Bolting tools overview

### Torque Wrenches

- Professional series steel wrenches
- Hexagon, square, and Allen key drives
- Up to 25,000 Ft-lbs / 34,000 Nm

### Torque Wrench Pumps

- ZU and ZE-Series electric pumps
- ZA and PTA-Series pneumatic pumps
- Pump options include digital read out LCD, Auto Cycle feature, 4- wrench manifold and roll cages

### Bolt Tensioners

- GT-Series bolt tensioners for repetitive highly accurate pre-loading of joint fasteners. Various sizes available and suitable for usage of multiple tensioners.

### Tensioner Pumps

- ATP-Series air driven and HPT manual pumps, for up to 21,755 psi/1500 bar hydraulic pressure. These ultra-high pressure pumps are ideally suited for bolt tensioning applications.

### Hydraulic Nut Cutters

- Safe and efficient removal of stubborn or corroded nuts. Ranging from M6 to M105 and 5/8" to 3 3/4".

### Manual Torque Multipliers

- Accurate and high torque, perfect for bolt verification.

### Parallel Wedge Spreaders

- Separation of stubborn joints made easy with FSH and FSM-Series parallel wedges.

S & W professional series steel wrenches ▼



ZU & ZA-Series, torque wrench pumps ▼



GT-Series, bolt tensioners ▼



### **Enerpac's Integrated Solutions for Wind Turbine Applications**

Positioning extremely heavy structures such as turbine blades, towers or complete wind turbine assemblies requires absolute accuracy, regardless of load distribution. For the most complex jobs, Enerpac's Integrated Solutions (I-S) team can offer turnkey systems to get even the most demanding jobs done. Enerpac's I-S teams are located around the globe to support your project, wherever it may be. Main offices in Spain, the United States, Singapore and China support Enerpac customers anywhere in the world.

#### **Synchronous Positioning Systems**

When absolute accuracy is required in synchronised positioning, the best solution is an electronically monitored control system. This type of system, through the use of a PLC, sensors and valves, controls

the position and movement of the load. It analyses the data and makes immediate corrections to the movement of the cylinders to maintain the required accuracy.

For on-shore and off-shore wind turbine installations, synchronous positioning systems are used to exactly level the turbine tower as it is placed on its foundation. Also for repair of damaged turbine foundations, Enerpac's synchronous positioning is the perfect tool for the job.



▲ Precisely leveling and positioning of off-shore wind turbine foundations. This 430-ton tri-pile foundation was levelled with three hydraulic cylinders mounted in each pile and using the PLC-controlled synchronous system. Precision to 1,00 mm (0.04 inch) can be obtained.

# Advanced positioning systems

## SyncHoist – High Precision Load Positioning

For high precision load manoeuvring, vertically and horizontally, while using one crane, the SyncHoist system provides you with very precise control and safety. In the installation of a turbine nacelle and rotor, the system can be controlled manually, semi-PLC-controlled or completely PLC-controlled.

## Post Tensioning

For concrete turbine foundations and masts, Enerpac has a range of post-tensioning equipment in order to provide maximum security and reliability in the stressing of concrete foundations or tower segments.

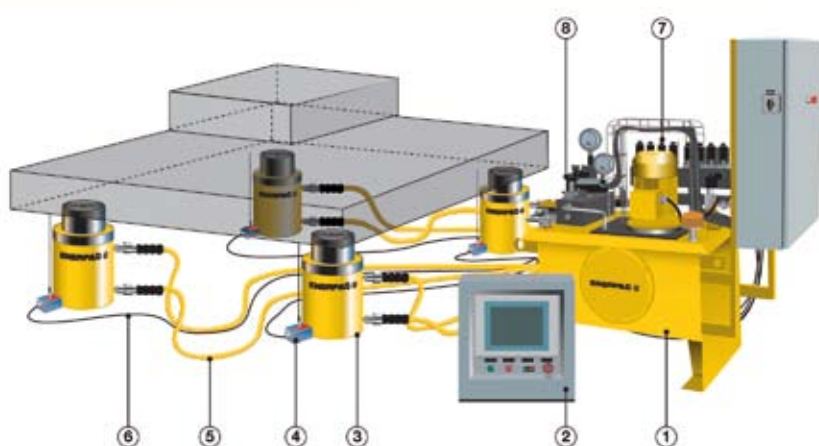
## Strand Jacks

For heavy lifting, Enerpac offers a variety of precisely engineered hydraulic Strand Jack systems. These systems are designed and manufactured in-house.

## Permanent hydraulics

For hydraulic systems on specialised wind turbine installation vessels and/or cranes, Enerpac offers a wide range of permanent hydraulic installations and know-how. Examples are: rotor locking systems, jack up and sea-fastening systems.

▼ Typical layout for a 4 points synchronous positioning system.



- |                                 |                           |
|---------------------------------|---------------------------|
| ① Hydraulic pump                | ⑤ Hydraulic hoses         |
| ② PLC-control with touch screen | ⑥ Sensor cables           |
| ③ Hydraulic cylinders           | ⑦ Solenoid control valves |
| ④ Stroke sensor                 | ⑧ Pressure transducer     |

Realigning turbine foundation ▼



PLC-controlled positioning ▼



SyncHoist ▼





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