



# **GUHRING**

## **Wind power**

**Tooling solutions for all components and all materials from one source**

- **application specific tool materials and coatings**
- **innovative geometries for highest accuracy and quality**
- **intelligent special solutions for special requirements**
- **standard tools for numerous tasks**

# High-tech at the service of the environment

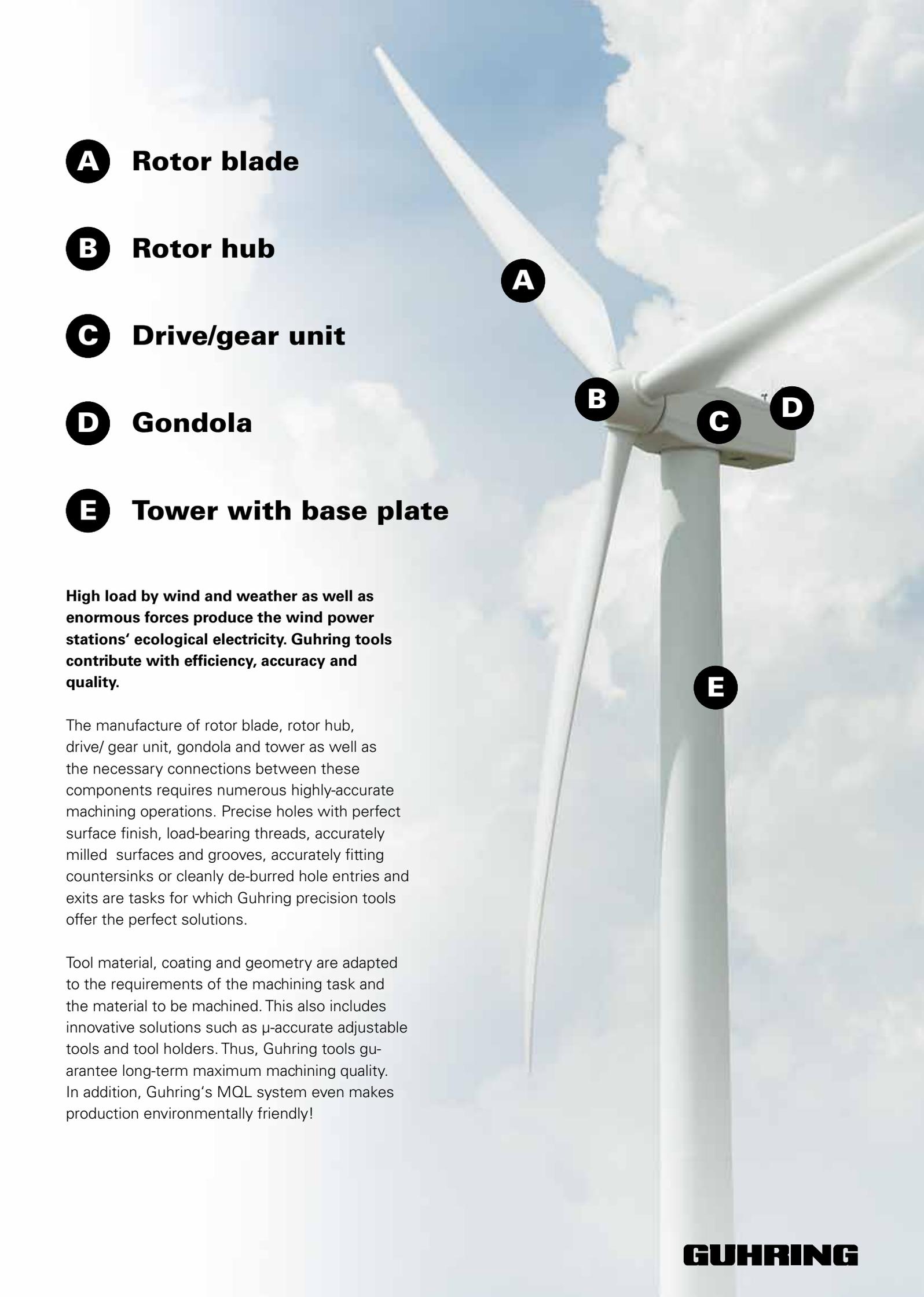
**Wind power is growing - in every sense. Not only is the number of farms rising steadily but wind power stations are ever increasing in size and can now also be found in the sea. All this is only possible with high-tech materials capable of withstanding the enormous stresses. The machining requires a know-how that Guhring has on offer:**

- high-strength steels, cast materials and GRP are the demanding materials used for manufacturing the up to 135 m high towers, the gondola, the inner workings as well as the up to 63 m long rotor blades - typical materials suitable for machining with Guhring tools. World-wide Guhring tooling solutions are applied for these materials, i.e. in the automotive industry, the mechanical engineering industry, the aerospace industry and in power plant construction.
- highest accuracy is necessary for wind power stations to generate power safely and in to the future.  $\mu$ -precise holes, perfect surface finishes and accurate threads are the domain of Guhring precision tools. For decades they have ensured that, for example, high-performance engines, turbines and machines, literally run like clockwork.

- quality of the highest standard is not only the target of the manufacturers of wind power stations and the requirement of the authorities for the approval of such stations but with Guhring the quality of the products is first priority. This is confirmed by numerous certifications and audits by recognised, independent institutes or renowned customers and by the comprehensive quality assurance measures within our tool production from the analysis of raw materials to process monitoring and final inspection of the finished tools.
- for manufacturers of highly specialised products such as wind power stations advice and service is an absolute precondition for the optimisation of their production and products. Guhring is the competent partner for this with all tooling expertise from one source. From tool material and geometries to coatings and application advice, Guhring has at its disposal a unique know-how of tool and process optimisation thanks to its own R&D and manufacturing capabilities as well as experienced application engineers. In addition, Guhring services can relieve our customers of tool procurement and management.



*Complex technology in gigantic dimensions make wind power stations into powerful, modern, environmentally friendly energy suppliers. Guhring supplies the high quality and highly accurate tools for the manufacture of these demanding stations. A comprehensive service from the development and application advice up to the tool procurement and management makes Guhring a strong partner in the wind power industry.*

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- A Rotor blade**
  - B Rotor hub**
  - C Drive/gear unit**
  - D Gondola**
  - E Tower with base plate**

**High load by wind and weather as well as enormous forces produce the wind power stations' ecological electricity. Guhring tools contribute with efficiency, accuracy and quality.**

The manufacture of rotor blade, rotor hub, drive/ gear unit, gondola and tower as well as the necessary connections between these components requires numerous highly-accurate machining operations. Precise holes with perfect surface finish, load-bearing threads, accurately milled surfaces and grooves, accurately fitting countersinks or cleanly de-burred hole entries and exits are tasks for which Guhring precision tools offer the perfect solutions.

Tool material, coating and geometry are adapted to the requirements of the machining task and the material to be machined. This also includes innovative solutions such as  $\mu$ -accurate adjustable tools and tool holders. Thus, Guhring tools guarantee long-term maximum machining quality. In addition, Guhring's MQL system even makes production environmentally friendly!



## **A Rotor blade**

**The attachment of the rotor blades to the rotor hub is one of the highly stressed areas of wind power stations. It requires accurate holes and load-bearing threads for the rotor blade and mounting bolts.**

For the large holes to hold the mounting bolts in the rotor blade made of GRP a powerful solution is available with Guhring's T800 interchangeable insert drilling system for holes up to maximum 100 mm diameter. With a PCD corner-tipped solid carbide drill the holes are produced for the passage of the threaded rods with which the rotor blade is anchored to the hub.

For machining the high-tensile steel mounting bolts, solid carbide drills from Guhring's comprehensive standard range are applied as well as solid carbide special step drills. The production of threads in the bolts is carried out with standard fluteless taps for the small as well as special taps for the large threads.

*For every task the right solution:  
Whether in GRP or high-tensile steel.  
For small or large hole or thread  
diameters - Guhring already holds a  
multitude of solutions in the standard  
range and develops made-to-measure  
special tools for the machining of  
rotors.*





## **B** Rotor hub

**The rotor hub including ring and flange are exposed to extreme mechanical loads. Primarily high-tensile steels and cast materials are applied which Guhring offers special tooling solutions for the machining of.**

The interchangeable insert drilling system HT 800 WP is available as a standard tool for holes up to 25.99 mm and as a special solution for holes up to 39 mm diameter. Special interchangeable inserts for the machining of steel or cast iron adapt the HT 800 WP system perfectly to the material to be machined.

As a specialist for the machining of cast iron, Guhring provides the Ratio drill RT 100 R with patented radius geometry. It is applied as a standard tool but also as a special tool, i.e. for very deep holes.

Guhring RF 100 U and RF 100 SF high-performance end mills with unequal helix are the ideal solution for the milling operations on the rotor hub, ring and flange. Their special geometry allows maximum machining performance together with highest surface quality.

*Innovative tooling solutions for optimal results:  
Guhring's specialists for the drilling and milling operations offer special advantages for the machining of steel and cast iron thanks to unique, patented geometries.*



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## **C** Drive/gear unit

## **D** Gondola

## **E** Tower with base plate

**The machining of steel and cast materials like the drive, gear unit, gondola and tower are the ideal tasks for Guhring tooling solutions.**

Steel and cast machining are the classic domain for Guhring tools. In the standard range you will find intelligent and innovative solutions such as the HT 800 WP interchangeable insert drilling system, cast iron specialist RT 100 R with patented radius geometry, the spiral-fluted deep hole drill RT 100 T for drilling depths up to 40xD, RF 100 high-performance end mills, HR 500 high-performance reamer or taps, fluteless taps and thread milling cutters for a multitude of thread types and sizes.

*From standard to special: Guhring tooling solutions offer highest quality and accuracy for demanding machining tasks.*



Together with our customers we develop application specific tools for drilling, reaming, countersinking and milling operations as well as for thread production. Complex combination tools reduce tool set-up and manufacturing costs by intelligently combining several operations into one tool. Highest quality and accuracy ensure innovative solutions for fine tool adjustments.



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## Guhring services with know-how

Guhring is one of the world's leading manufacturers and suppliers of rotary cutting tools. In excess of 100 years of know-how in tool manufacture as well as our own competence centres for tool development, tool materials and coatings enable us to continually develop outstanding tooling innovations. At the centre of these activities is always the customer and his request for efficient, economical and practice-oriented tools.

As we see ourselves as a complete supplier for all machining matters, we also offer our customers up-to-date and market-oriented services relating to the application of tools. Our service division provides services from re-grinding and re-coating to complete Tool Management concepts:

Only professional re-grinding and re-coating guarantees a consistently good performance of the tool for its entire tool life. With the current high-tech tools this requires as much know-how as with the tool manufacture. In our service centres we offer our customers a highly qualified re-grind and re-coating service. This service is complemented by a collection and a delivery service.

Our Tool Management Service begins with practice-oriented advice and support to optimise your Tool Management and via the required hardware (automated tool dispensing systems, GISS shrink fit systems) as well as software (Guhring Tool Management software) results in part or complete ownership of your Tool Management.

### Guhring oHG

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