

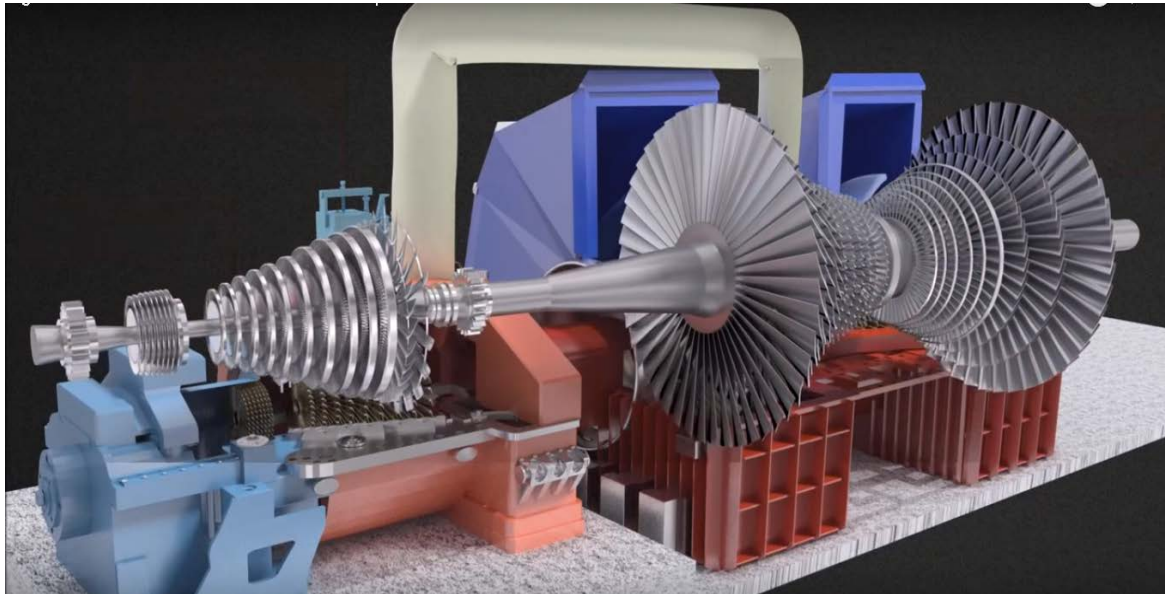
GURUTZPE
ETXETAR group

GURUTZPE Solutions for Power generation: Turbine rotor shaft machining



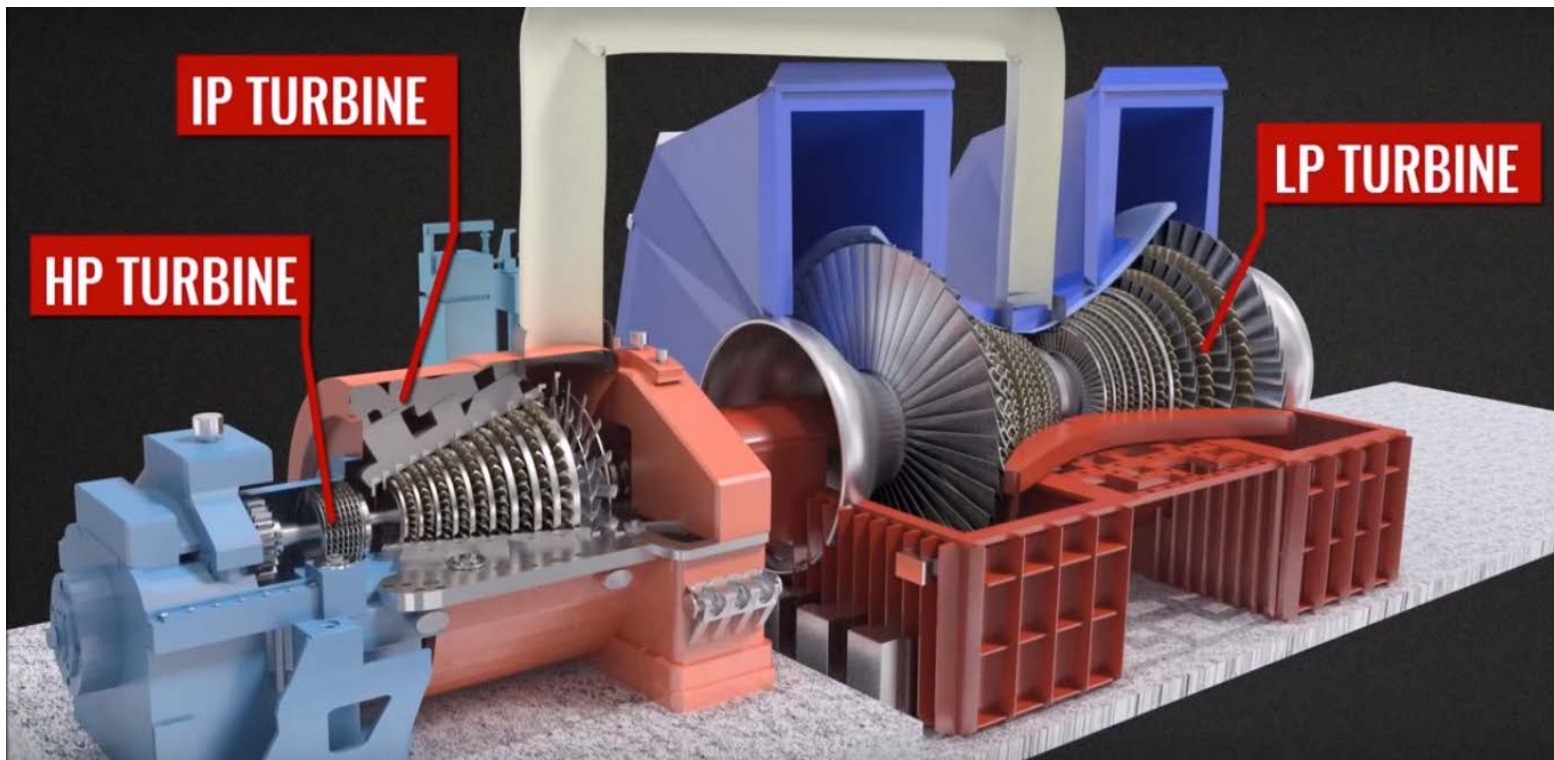
POWER GENERATION: TURBINE ROTOR SHAFT

- Two type of works:
 - New turbines from forge
 - Maintenance of turbines.



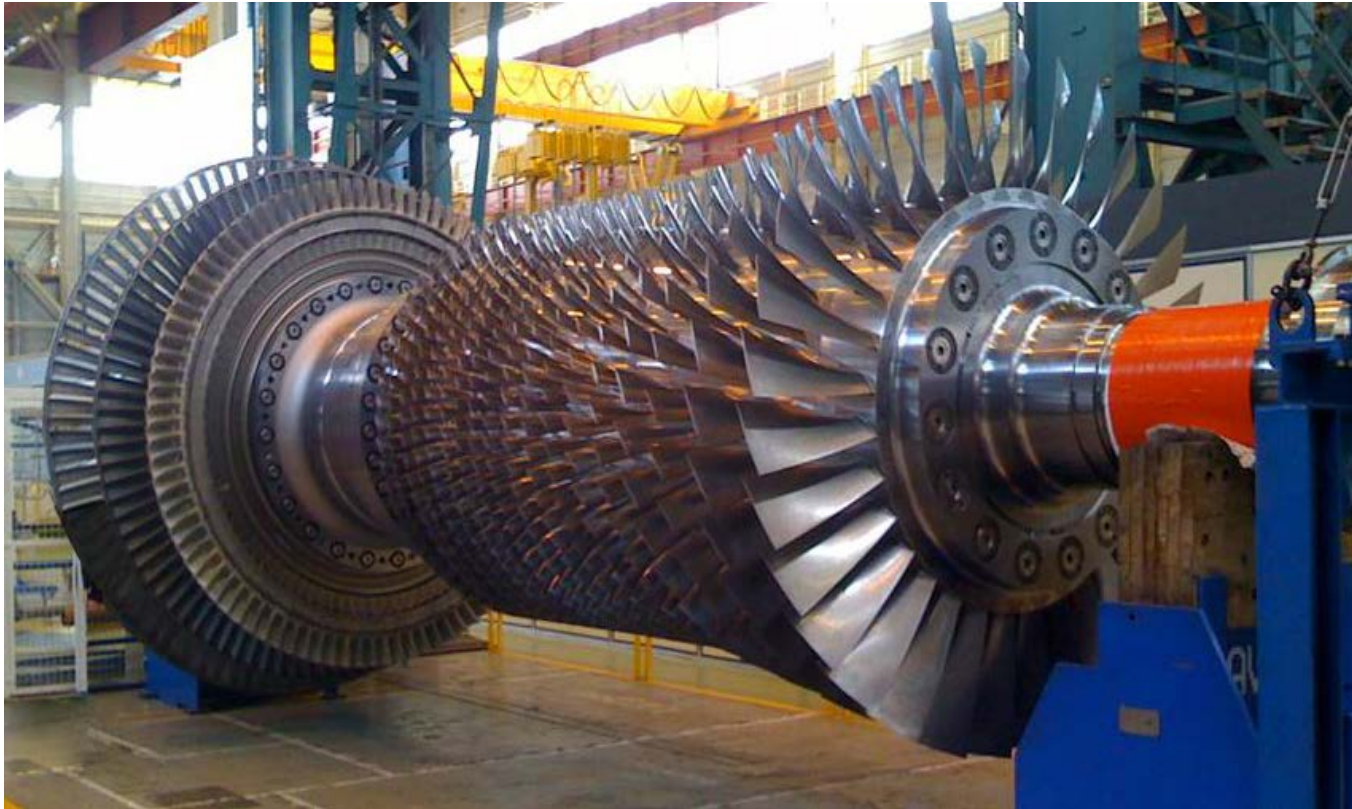
STEAM TURBINE ROTOR SHAFT

STEAM TURBINES INTERVENE IN GENERATING APROX THE 70% OF WORLD ELECTRICITY (either in thermal power plants, -coal, gas, biomass-combined-cycle plants and nuclear power plants)



GAS TURBINE ROTOR SHAFT

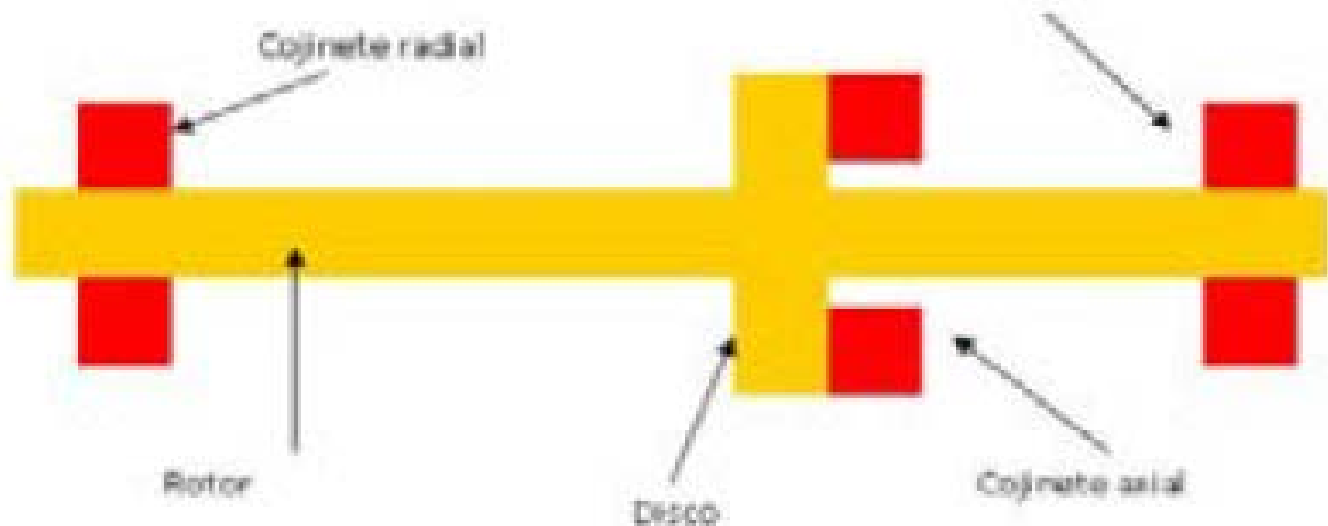
Although Gas turbines and Steam turbines have important working and performance differences, they do not differ much when it comes just to turning maintenance works.



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

Basic Works:

- TURNING AND GRINDING (BURNISHING) REPAIRED AREAS (WELDING, ETC..)
- MAINTENANCE OF THE BEARING SEATS:
 - THRUST BEARING SEAT
 - JOURNAL BEARING SEAT



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

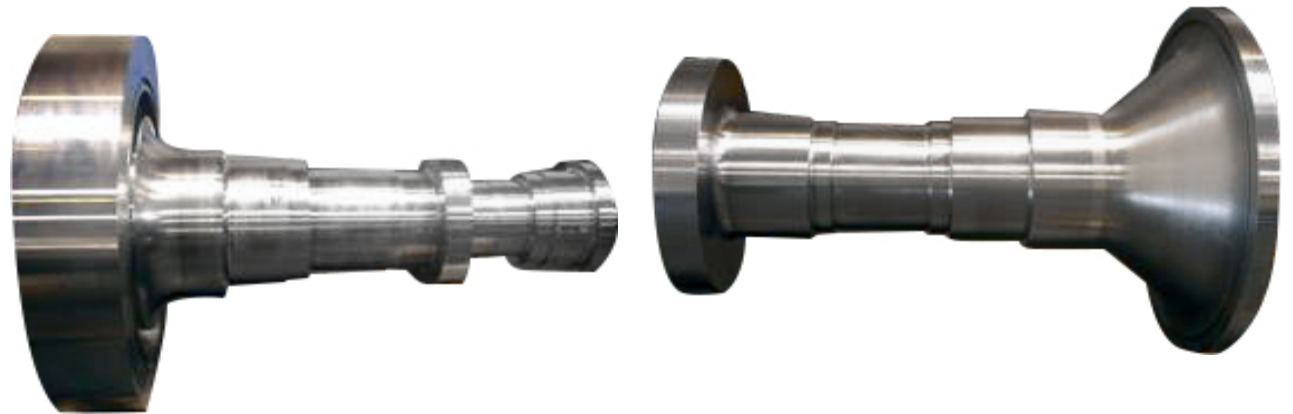
Basic Works 1 :

- TURNING AND GRINDING REPAIRED AREAS OF THE WHOLE SHAFT
 - Some of the repairing works to be performed in the main shafts (mainly in Gas Turbines) require the complete disassembly of the shafts and the disks for turning, facing and grinding, so it gets a new good measure in face and diameter: compressor front shaft , turbine rotor front and rear shafts, and all the disks-
 - Disks (all of them)
 - Shafts (Compressor front shaft , Turbine rotor front and rear shafts)
 - Final Grinding of the turning blades OD when they are assembled

MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

Basic Works 1 :

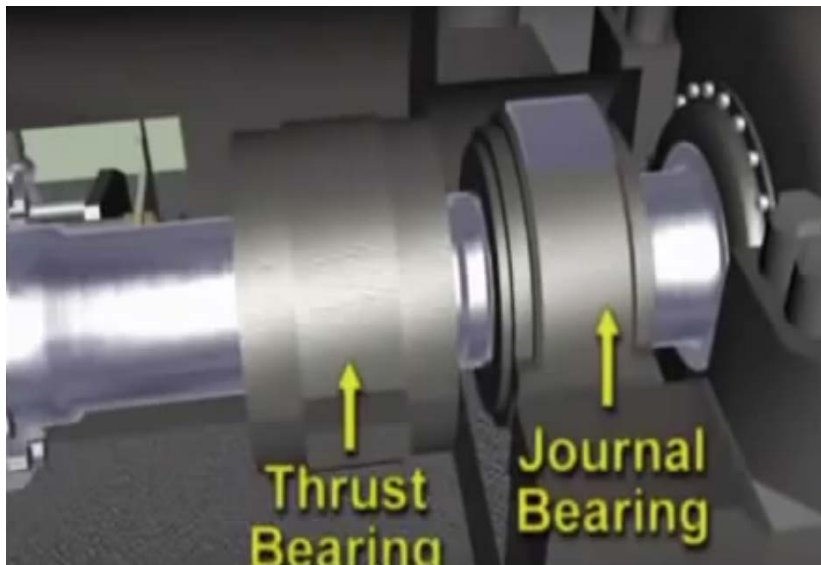
- TURNING AND GRINDING REPAIRED AREAS OF THE WHOLE SHAFTS



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

Basic Works 2 :

- MAINTENANCE OF BEARING SEATS
 - The Thrust bearing maintains the rotor shaft position axially. It avoids the rotary blades to touch the stationary blades of the rotor. The turning operation consists mainly on facing the axial face of the disc which supports the thrust bearing.



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

Basic Works 3 :

MAINTENANCE OF BEARING SEATS

- The Two Journal bearings. They carry the vertical weight of the rotor. The turning operation consists on turning (and grinding) the bearing seats which supports the Journal bearing.



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

COMPLEX WORK

Turbine machining is quite a complex work, and the HORIZONTAL LATHES needed for such a job must meet the following criteria:

- Proven **RIGIDITY** (for turning huge rotors of up to 120 t)
- Reliable **ACCURACY** (the needed surface quality and accuracy required are a must in this application)
- **FLEXIBILITY** (turning, milling, grinding,..)
- Great and high **CAPACITY**



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING

GURUTZPE **GLH** MODELS, with HYDROSTATIC GUIDEWAYS or FRICTION BOX GUIDEWAYS, MEET ALL THESE NECESSARY CHARACTERISTICS:

1. RIGIDITY

Main elements are made of stabilized casting Hrc 53-56

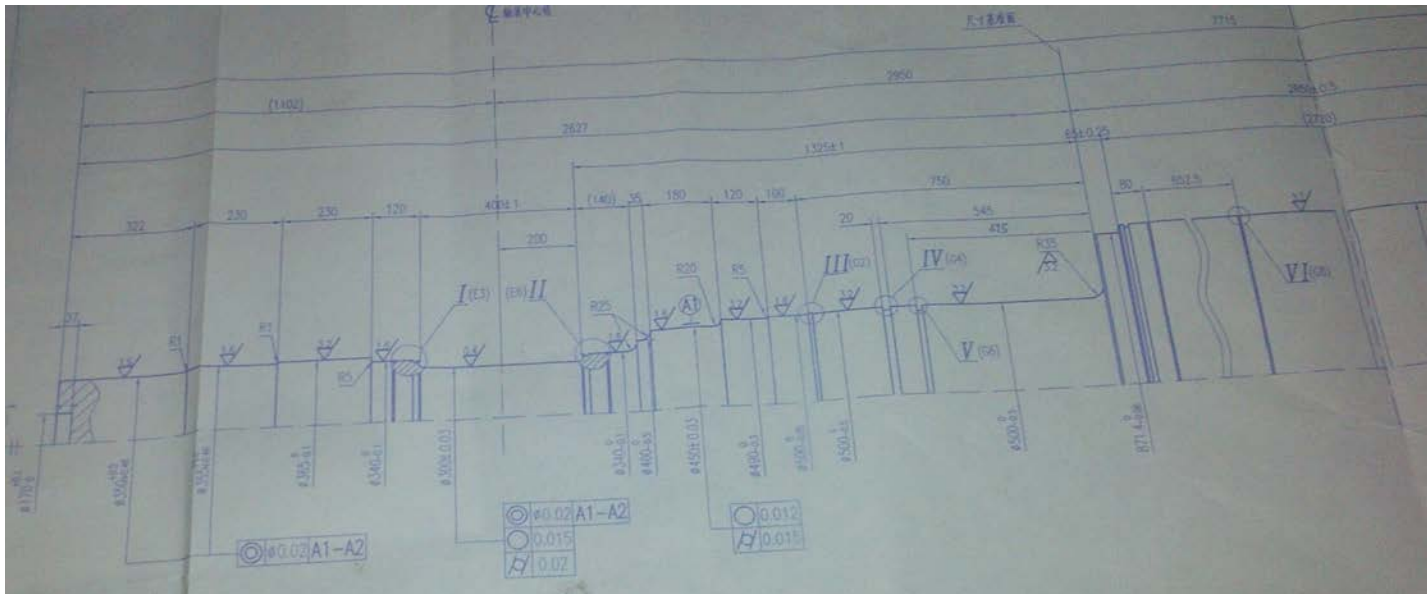


MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING

2. Reliable ACCURACY:

Gurutzpe GLH models meet perfectly the Turbine user requests, and reach with total guarantee accuracy parameters such as turning run out in the bearing seats of 0,008mm and turning finishing surface quality of Ra 0,8, reaching Ra 04 with our grinding or burnishing tooling.



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING

3. FLEXIBILITY:

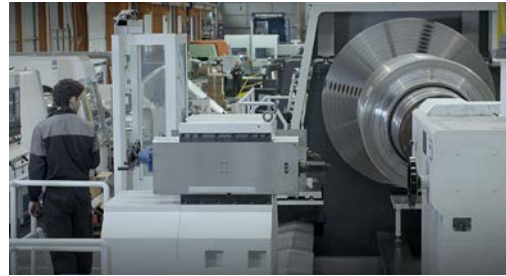
To be able to perform different works without moving the piece out of the machine brings an enormous advantage in terms of productivity, time saving and final workpiece accuracy.

Gurutzpe **FAMOC** system offers the possibility of performing works of turning, milling, grinding, etc., on the shaft all in one machine set up



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING: FAMOC SYSTEM

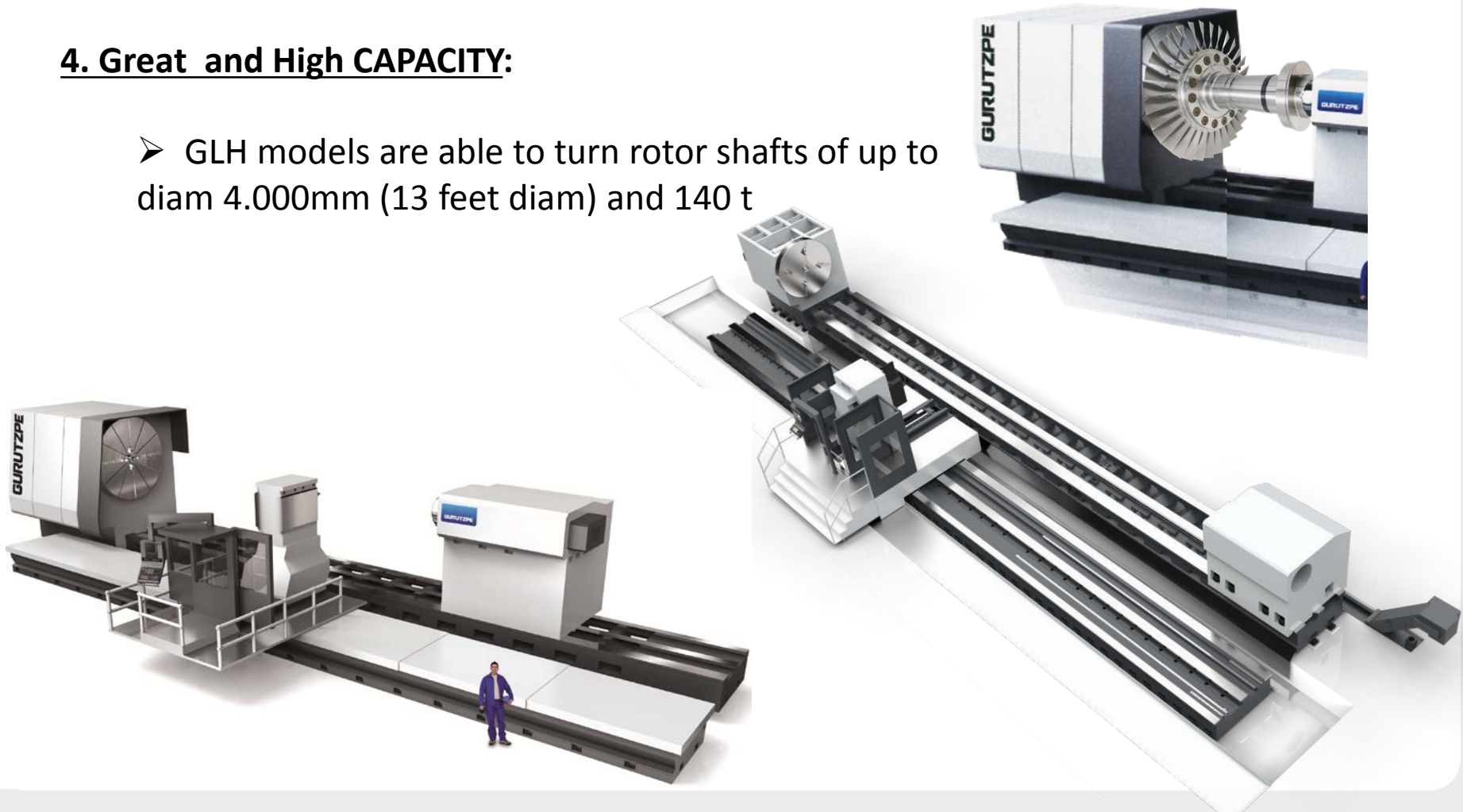


MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING

4. Great and High CAPACITY:

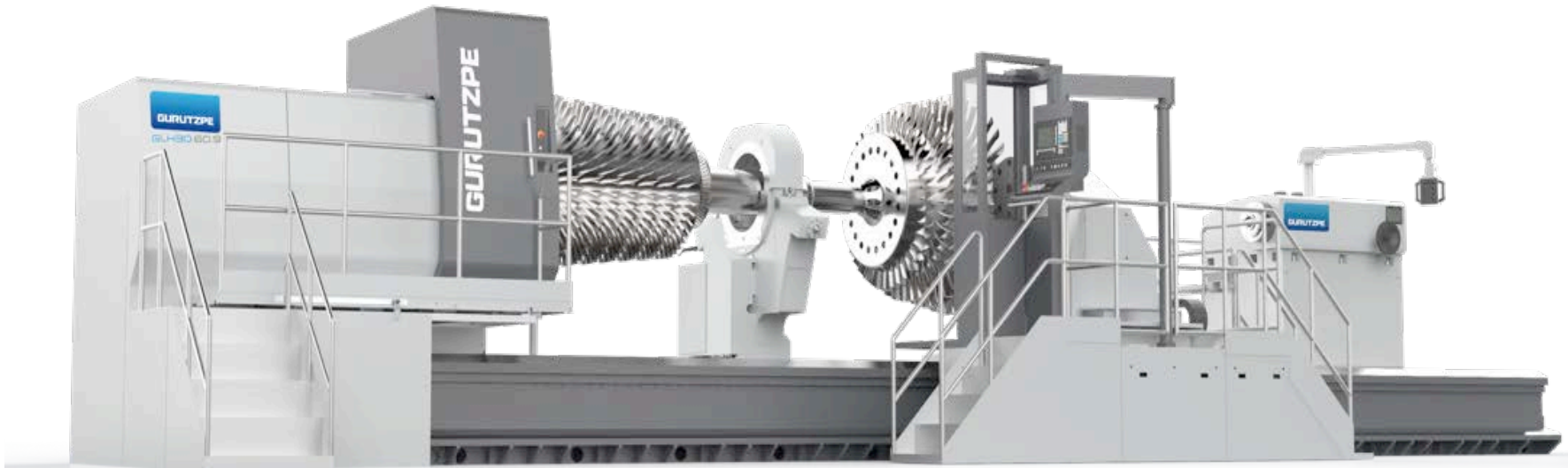
- GLH models are able to turn rotor shafts of up to diam 4.000mm (13 feet diam) and 140 t



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

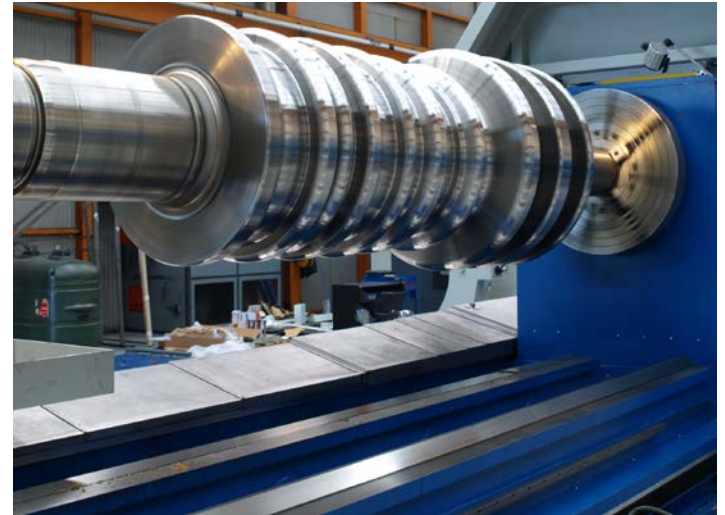
GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING

4. Great and High CAPACITY:



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

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MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING: ACCESSORIES

1. STEADY RESTS:

Gurutzpe offers the perfect steady for each rotor shaft to compensate shaft bending and guarantee an absolute precise machining:

- “C” Type steady rest with double roller quill supports
- White metal steady rests, with different pad sizes
- Hydrostatic steady rests , with different pad sizes



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING: ACCESSORIES

2. CARDAN system:

For high exigency accuracy requests, Gurutzpe offers also cardan type transmission system to avoid the chuck spindle nose bearing run out



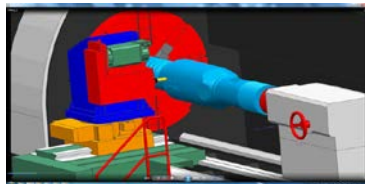
MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR TURBINE ROTOR SHAFT TURNING: ACCESSORIES

3. OTHER:

Gurutzpe offers a wide range of accessories to complete the right solution for every customer specific need:

- Fit tree milling cutters
- Roller burnishing
- Tool probes
- Piece probes
- Different blades and holders (Capto, KM lock, ..)
- CAD CAM simulation programs
- Time studies
- And other ...



MAINTENANCE WORKS ON TURBINE ROTOR SHAFTS

GURUTZPE SOLUTIONS FOR POWER GENERATION : REFERENCES

SIEMENS



voestalpine

Ingeteam



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