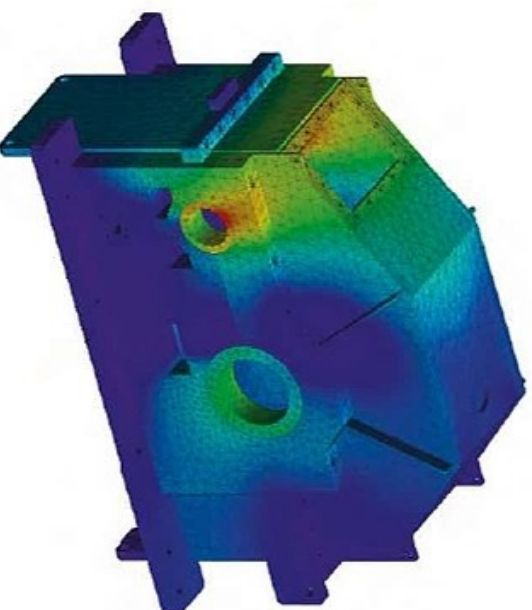


OUR KNOW HOW FOR YOUR APPLICATION

Our engineering team incorporates years of experience. Combined with state of the art calculation and engineering tools, we optimize turbogears and their components tailored to your application.

Our core competencies:

- Tooling design according established standards (API, AGMA, ISO, DIN, etc.)
- Profile and lead modifications optimized to the given load conditions
- Calculation and optimization of hydrodynamic and hydrostatic sleeve and tilting pad bearings
- Bending and torsional rotordynamic analysis for the gear set as well as for a complete train – also according API requirements
- Structural analysis for complex parts using FEA (stability, deformation, temperature distribution, etc.)



Structural analysis using the finite element method (FEM)

P

POWER TRANSMISSION TO DEPEND ON

Units in service for many years, operating around the clock without standstill and maintenance stops, available anytime, require highest dependability for all components.

Therefore, our parallel shaft gears are built with hydrodynamic sleeve bearings and carburized gears, calculated for fatigue endurance and manufactured with highest precision. These measures minimize wear and extend the lifetime of the unit. Compliance to international standards like API 613, longtime experience of our design and calculation experts as well as inhouse manufacturing and quality control guarantee highest quality and reliability of our gear boxes.

Your advantage:

- Customized design, tailored to your application
- Simple setup for easy maintenance
- High efficiencies up to 99,2 %
- Optimized friction bearings for lower oil consumption
- Highest manufacturing quality with our state of the art machine tools
- Low vibration levels through highest balance quality for rotating parts
- Long lifecycles through fatigue endurable calculation and design for all parts



Applications and industries

Power generation: Generators driven by industrial gas or steam turbines for power generation

Oil & gas: Compressors and pumps driven by electric motors or turbines for natural gas and crude oil production

(Petro-)Chemical: Compressors driven by electric motors or turbines for processing of various gases

Steel mills: Compressor and blower drives, energy recovery using expansion turbines

Technical data

Power: up to 60 MW
Speeds up to 60.000 rpm
Efficiency up to 99,2 %
Ratio up to $i = 10$ (one state design)
Gears Carburized single helical or double helical toothing
Bearings Hydrodynamic sleeve bearings and tilting pad bearings
Casings Fabricated casing with horizontal or vertical shaft offset
Designs According ISO 6536, AGMA 6011 or API 613

WE BUILD WHAT YOU NEED

Integrally geared compressors and expanders for various gases need to operate reliable at challenging conditions and high speeds. Therefore, we design each integral gear unit tailor made to the requirements of our customer and their application.

We pay special attention to the impeller and casing interfaces as well as the thrust requirements and solutions for each unit in close collaboration with our customer.

Using automated data exchange with our customers (like shaft and bearing data for rotor dynamics) we increase efficiency of the design process – for you and for us.

Your advantage

- Customer specific concerted interfaces
- Applicable for compressor drives, expansion turbines and combined cycles.
- Driven by electric motor, gas and steam turbines, integrated expansion turbines and combinations
- Impeller connection with Hirth toothing or acc. customer requirements
- Increased efficient with our thrust collar design available for many applications
- Individual speeds for each stage realised with multi-shaft-design
- Detailed rotor dynamic analysis and improvement by our calculations specialists

Applications and industries

Power generation:

Generator driven by expansion turbines for power generation (waste heat, geothermal, etc.)

Oil & gas:

Compressors driven by electric motor or steam turbine for gas compression or liquefaction

(Petro-)Chemical:

Compressors driven by electric motor for processing of various gases

Air separation:

Air compression to separate Nitrogen and Oxygen

Technical data

Power

up to 40 MW

Speeds

up to 70,000 rpm

Ratio

up to $i = 25$

Shaft arrangement

up to 4 pinions with up to 8 stages, driven via bull gear or turbine shaft

Impeller connection

With Hirth toothing or acc. Customer requirements

Gears

Nitrided or carburized single helical toothing

Bearings

Radial: hydrodynamic sleeve bearings for bull gear and turbine shaft, tilting pad bearings for pinion shafts

Axial: Bull gear with thrust bearings, pinions with thrust collar or thrust bearings

According ISO 6336, AGMA 6011, API 617 or API 672

Designs



RELIABILITY AND PERFORMANCE AT ITS BEST

TGSK epicyclic gears with their high grade of reliability and vibration performance are made for applications, demanding high speeds without vibration issues or toothing wear.

Beside our standard spur gear design, we provide double helical gearing for increased requirements towards running, vibration and noise performance. Multiple teeth in mesh at a time guarantee increased performance.

Your advantage

- Compact design, small footprint
- High power density and efficiency
- Low weight
- Coaxial shaft arrangement
- Integrated flexible connection coupling on high speed side
- Optimal power distribution through the whole gear set (sun – planets – annulus)
- Project specific design for your application

Applications and industries

Power generation:

Generators driven by gas, steam, water or expansion

Oil & gas:

turbines for power generation
Energy recovery using expansion turbines

(Petro-)Chemical:

Compressors and pumps driven by electric motors

Test stands:

For compressor / turbine or motor development, balancing machines, aerospace applications

Technical data

Power

Speeds

Efficiency

Ratio

Design

up to 20 MW

up to 45,000 rpm

up to 99,3 %

up to $i = 12$ (one state design)

With fixed or rotating planet carrier, self centering sun

wheel and thin, flexible annulus for optimized power

distribution

Spur gear or double helical

toothing

Fabricated casing, foot

mounted, split line mounted,

or flange design for direct

connection with motor / generator

generator

Epicyclic gears



KEEP YOUR TRAIN IN MOTION

Our turning gears are the optimal solution for direct integration within your train – either on a free shaft end with overrunning clutch, or on top of the rotor with swivel pinion and gear rim.

For the swivel pinion solution the turning gear is installed on top of the rotor, so the pinion can drop down, engage with the gear rim and keep your rotor turning.

Including the suitable control unit we provide a tailor made solution for your train.

Applications and industries

Power generation: Start-up and coast down for gas or steam turbines, for industrial turbines up to 125 MW and power plant turbines up to 1400 MW

Oil & gas: Start-up and coast down for turbine driven compressor trains, Alignment and breakaway for trains with big electric motors

Your advantage

- Project specific design according your requirements
- Reliable start-up and coast down for your turbine drive train
- Easy integration in the drive train
- Mechanical solution with overrunning clutch
- Automatic engagement and disengagement of the swivel pinion for start-up and coast down
- Low maintenance combined with high durability

Technical data

Power up to 75 kW
Speeds 1 to 300 rpm
Breakaway torque up to 200.000 Nm
Design For installation on a free shaft end with overrunning clutch
For integration in the train with swivel pinion and gear rim

Turning gears





SAFETY FOR YOUR DRIVE TRAIN

Flexible and ductile diaphragm with special inner shape for equal load distribution
Reliable coupling design/to compensate high shaft misalignments acc. API 671 made
from one -piece of material.

Applications and industries

Power generation:

Oil & gas:

Diaphragm couplings



Technical data

Torque:	up to 500 kNm
Speeds:	up to 50.000 rpm
Power:	up to 30 MW

Your advantage

- Project specific design according your requirement
- High balancing grade, low weight and low mass moment of inertia
- Nonwearing parts on the coupling, long-life design, maintenance-free
- Extra low wintage losses due to compact design and flat surfaces on the diaphragm





Invest in the
future successfully
realized

Assembly and testing facility

Technical data:

- 200 m² office space
- 1800 m² production and assembly area
- 50 t crane capacity
- Test stand with 1.4 MW driver power
- Hall height of 14 m
- Maximum motor speed of 4,400 RPM
- Maximum drive speed of 42,300 RPM



ITEM	DESCRIPTION	QTY	UNIT
REPLACEMENT (1:1 DROP-IN SOLUTION) FOR FORMER GEARBOX TYPE: RTP25F SERIAL NO: 501 786			
1	<p>EPICYCLIC GEAR UNIT GEAR UNIT TYPE: EC3-50D1B-CM-P APPLICATION: TURBINE/GENERATOR RATED POWER: 1500KW SPEED: 25912 / 3013 RPM DESIGN: NEW DESIGN ACC. TO TGSK STANDARD FOR 1:1 DROP-IN SOLUTION THE ORIGINAL. OUTLINE DRAWING IS MANDATORY. TOOTHING: ACC. TO ISO 6336, APPLICATION FACTOR 1.35 OVERLOAD 6X NOMINALTORQUE AT 10³ LOAD CYCLES ON THE LOW-SPEED SHAFT(LSS). CASING: CAST CASING; FOR 1:1 DROP-IN SOLUTION ORIGINAL OUTLINE DRAWING OR ORIGINAL CASING DRAWING IS MANDATORY. INCL. PRESSURE TEST (PLEASE SPECIFY NECESSARY PRESSURES). GEAR SET: DOUBLE HELICAL GEARING SUN AND PLANETS NITRIDED, ANNULUS THROUGH HARDENED 3 PLANETS FIXED, ANNULUS ROTATING, OPPOSITE DIRECTION OF ROTATION OF INPUT AND OUTPUT SHAFTS. BEARINGS: UNSUPPORTED SUN, PLANETS WITH PLANET SPINDLES, JOURNAL BEARINGS AT LSS. LUBE OIL PUMP: 1X SCREW PUMP. PLEASE SPECIFY NECESSARY OIL CAPACITY, OIL PRESSURES (INLET AND DISCHARGE), ETC. COUPLINGS: INCL. COUPLING HUB ON HIGH-SPEED SIDE (HSS) IF ALL NECESSARY INTERFACE DATA ARE AVAILABLE EXCL. COUPLING ON LSS. HAZERDOUS AREA: NONE INSTRUMENTATION: WITHOUT (COULD BE OFFERED AS OPTION) TEST RUN: 2H FULL SPEED/ NO LOAD ACC. TO TGSK STANDARD</p>	1	NO

- Manufacture: **TGSK / GERMANY**