

Power Generation



For steam,
gas, water
and nuclear
power plants

FLENDER
GRAFFENSTADEN

Our Products

HIGH SPEED GEARBOXES

- parallel shaft gearboxes with horizontal offset single or multi-stage
- parallel shaft gearboxes with vertical offset
- planetary gearboxes with fixed or rotating planet carrier
- combigears multi-output shafts for geared turbines or compressors

HEAVY DUTY GEARS

- with high speed turbogears technology
- planetary gearboxes for vertical pumps

COUPLINGS

- dry coupling
- quillshafts
- gear couplings

SPECIAL GEAR DRIVES

- test benches
- traction gears (high-speed trains)
- nuclear power stations
- offshore rigs

R & D



Bearing test bench at full speed and full load

Development Bases

SPECIFICITY OF HIGH SPEED GEAR UNITS (TURBO DESIGN)

A NEW MARKET EVOLUTION

with:

- short delivery time
- continuous improvement programs to shorten further

EXPERIENCE from more than **7500 UNITS** in **OPERATION** over **50 years**

IMPROVED MATERIALS AND TECHNOLOGY

IMPROVED CALCULATION PROGRAM

- performances: - gear geometry
- stresses
- vibrations: - lateral
- torsional
- power losses: - gears
- bearings
- ventilation

DESIGN APPROACH

- close collaboration with customers and/or end users
- optimization of high speed shaft: shaft end, bearing design, toothing
- optimization of casing: welded design
- integration of environment (low noise, high efficiency...)
- close collaboration with the suppliers

Manufacturing

GEAR GRINDING

- external and internal up to dia. 2500 mm ISO grade 1-4 / AGMA 14

HEAT TREATMENT

- carburizing up to dia. 2 200 mm

NEW CNC MACHINE TOOLS

CNB GRINDING :

- high accuracy
- high performance

TESTING

- full speed test
- partial load test
- back-to-back locked torque test

References

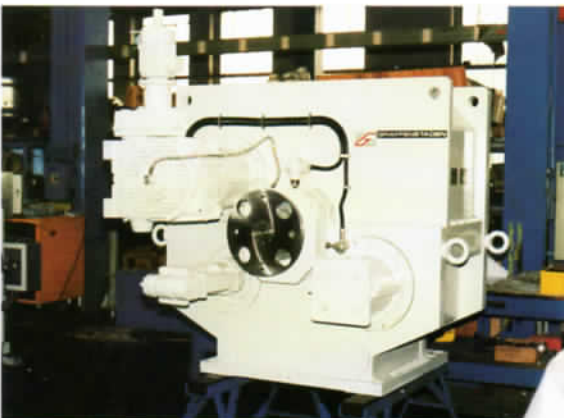
More than

- 7 500 high speed gearboxes in operation
- 3 000 load gearboxes for power generation
- 1 800 high performance gearboxes for compressors and pumps
- 550 units for integrally geared compressors and steam turbine drives
- 1 000 units for P>30 000 kW
- 600 units for P>50 000 kW
- over 300 000 000 operating hours

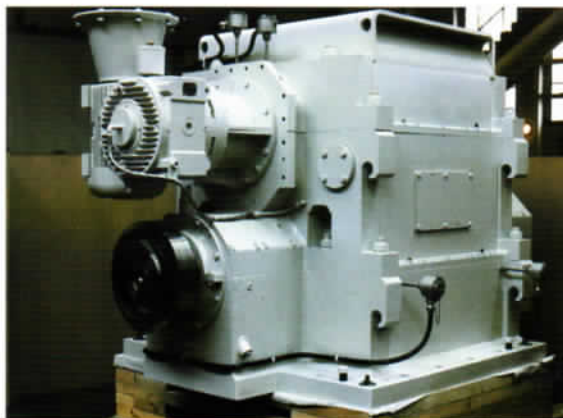
PITCHLINE VELOCITY

up to 200 m/s (in operation)

PF 100 D



TX61/1CV



TR



Load gearbox reference list for Gas Turbine/Generator application

Number of reference for
GT/GEN application >1600

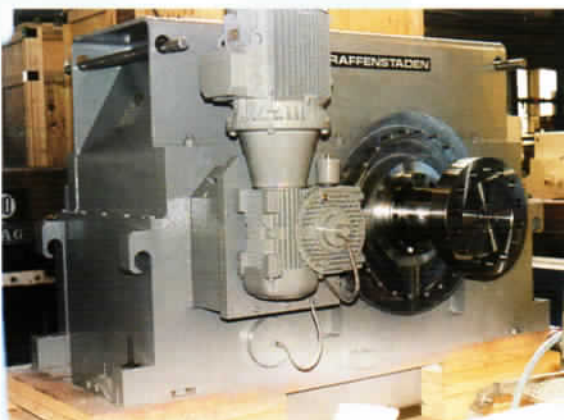
References available

Turbine type	Gear rated power (MW)	Turbine speed (rpm)	Generator			
			2 poles		4 poles	
			50 Hz	60 Hz	50 Hz	60 Hz
GE 5	7.5	16600			PF100D	
GE 10	15	11000			PF100D	PF100D
GT 35	22.5	3600			TX80/2C	TX 80/1C
PGT 25	24	6100				TX 71/3C
PGT 25	26	6500			TX 80/4CV	
GT 10	29	7700			TX 90/5C	TX 90/4C
LM 2500+	32	6213			TX 80/3C	TX 71/3C
RB 211	33	4850			TX71/3C	TX 71/2C
PGT 25+	34	6100			TX 80/4CV	
FRAME 5	35	5100	VF 63	VF 63	TX80/3C	TX 80/2C
FRAME 6B	54	5100	TRL 65CV	TRL 65CV		
LM 6000	55	3600	TX61/1CV		TX80/2CV	
GTX	55	6600			TX 112/4C	TX 100/3C
V64-3	75	5400	TX 80/1C			
V64-3A	85	5400	TX 80/1C			
FRAME 6F A	90	5200	TX 71/1C			

65CV



TX90/4C

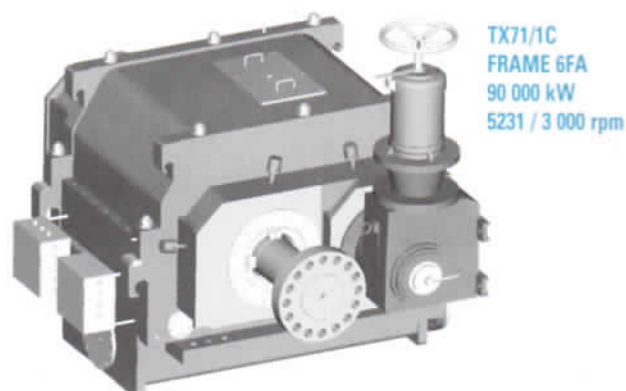
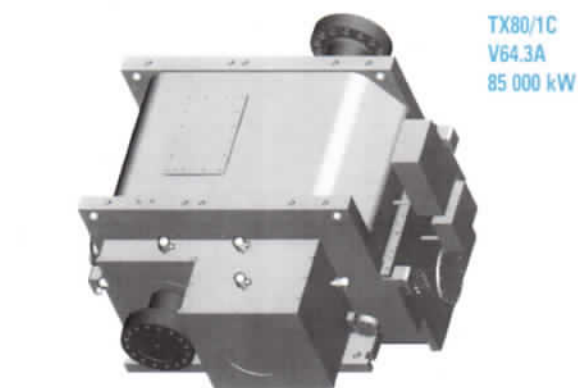
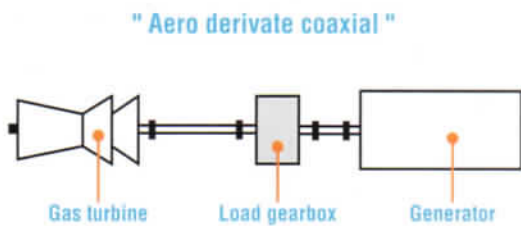
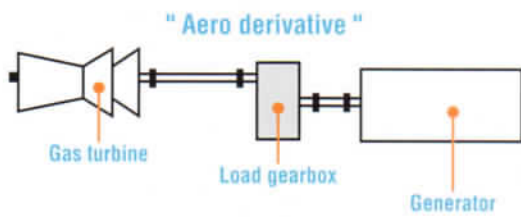
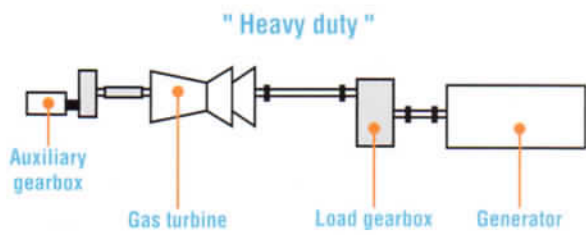


TX100/5

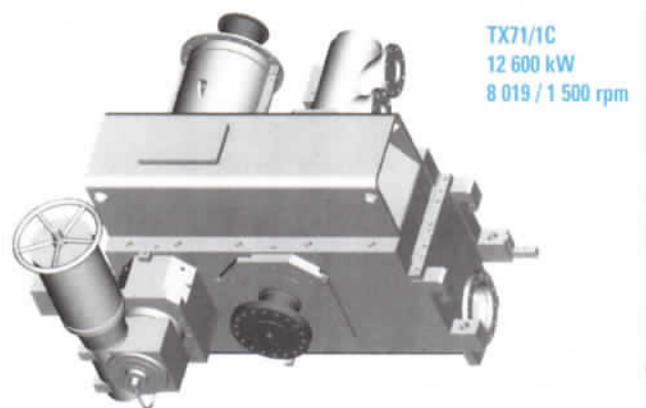
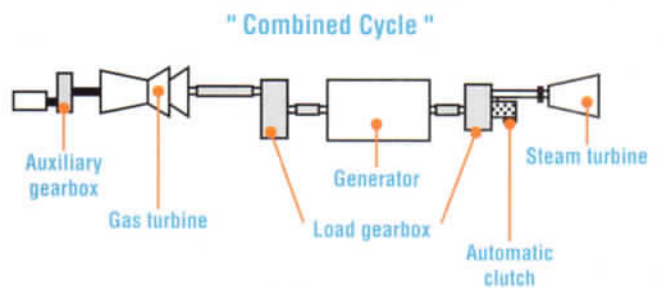
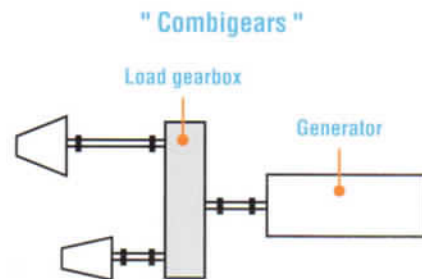
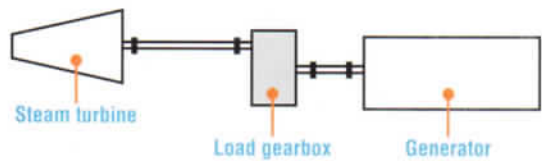


Examples of Realisations

Gas Turbine Drive



Steam Turbine Drive



High Speed Gearboxes

GEARING

bull gears and pinion shafts

- single helical or double helical gears
- pinions teeth are case hardened
- bull gear teeth are either
- case hardened, nitrated or through hardened
- high precision grinding
- pinion tooth flanks with lead and profil modifications

BEARINGS

- pressure lubricated 2 or 4 lobes / offset halves / tilting pads bearing
- Adjustable bearing for optimized tooth contact pattern

CASING

special rigid and stiff design cast iron or fabricated.

EFFICIENCY

- high efficiency due to optimized bearings and toothing
- low oil consumption
- vacuum technology available

Applications

driver

driven

Gas Turbine

Electric Generator

Steam Turbine

Electric Generator

Hydro Turbine

Electric Generator

USA, CANADA, MEXICO

R.T.S. Corporation
Dennis C. ROTUNNO

4 Daniels Farm Rd, Suite 301
TRUMBULL, CT 06611 USA

phone: +1 203 459 9835
fax: +1 203 459 0301
e-mail: mail@rtscorporation.com
web: www.rtscorporation.com

SOUTH-EAST ASIA

ENERGY CAPITAL

27 Tech Park
Singapore 638105 - SINGAPORE

phone: +65 68 65 39 51
fax: +65 68 63 24 41
e-mail: sales@energycapital.net
web: www.energycapital.net

MIDDLE-EAST

(Bahrain, U.A.E., Iran-Irak, Qatar, Oman,
Saudi Arabia)

CONSOLIDATED TURBINE SERVICES LLC
Namir NOSEIR

P.O. Box 8555 - DUBAI - U.A.E.

AL Quoze Industrial Area,
Plot N° B-69 Street N°323 Bld N°37 - DUBAI - U.A.E.

phone: +971 4347 22 11
fax: +971 4347 37 37
e-mail: ctsllc@emirates.net.ae

In the Strasbourg suburb of Illkirch-Graffenstaden, in France, FLENDER-GRAFFENSTADEN design and manufacture high-speed, high-performance gear-boxes for power stations, chemical and petrochemical plants, pipelines, etc...

Our products are based on state-of-the art technology. The people at FLENDER-GRAFFENSTADEN, proud of their work and their products, are continually striving for excellence.

Total customer satisfaction, commitment to the job, constant modernisation of machines and methods, permanent research and development along with total quality management are all of paramount importance.



FLENDER GRAFFENSTADEN

1, rue du Vieux-Moulin - 67400 ILLKIRCH-GRAFFENSTADEN
BP 84 - F-67402 ILLKIRCH Cedex
Tel. +33 (0)3 88 67 60 00 - Fax +33 (0)3 88 67 06 17
E-mail: flencomm@flender-graff.com
web: www.flender-graff.com