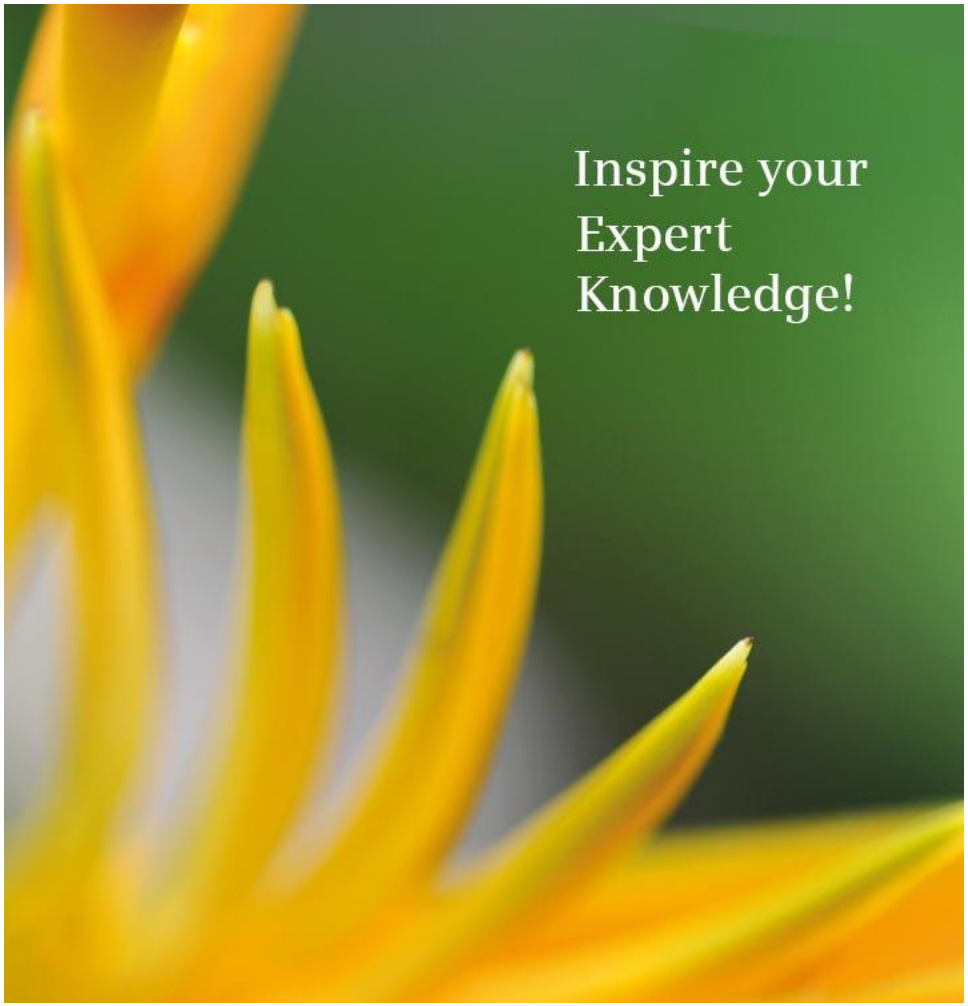
Ken Pujats & Manuel de Lama Santos PD MD

Flender Gearboxes & Couplings

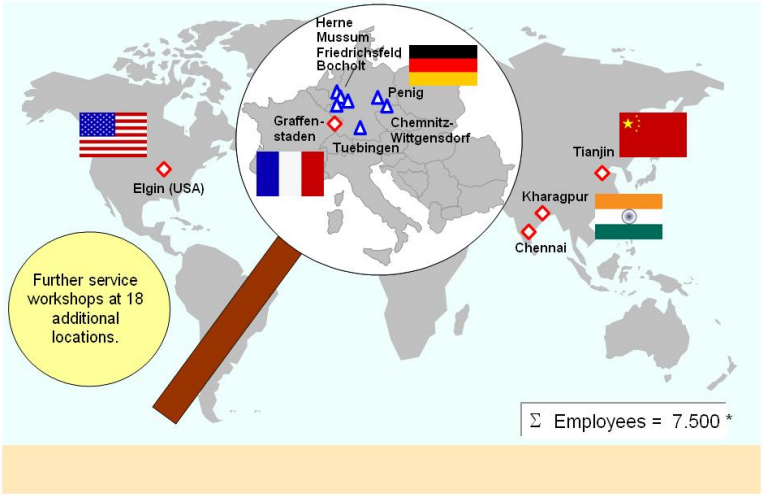
Content



- **MD history & overview**
- Drive train
- Gear units ,Geared motors and Couplings
- Useful information and links Marketing and Tools

MD as Business Unit
Organization, production facilities and history


Firmengründer Dr. A. Friedrich Flender (1876-1939)



1899
Foundation of Alfred Friedrich FLENDER & Co. in Düsseldorf-Reisholz (production and sales of wooden pulleys)

1910
Production of cast iron pulleys in Bocholt

1927
Start of the manufacturing of complete gear units in Bocholt

1982
Take over of the geared motors factory “Himmelwerke” in Tübingen

1990 – 1992
Take over of the gear units factory in Penig, the motors factory LOHER in Ruhsdorf and the casting factory Harlass-Guss GmbH in Wittgensdorf.

2010
Five years after taking over by Siemens AG, FLENDER AG is fully integrated as Business Unit Mechanical Drives.

Company's history

2005

Siemens AG takes over FLENDER AG as new division of Siemens A&D. Start of the worldwide integration.

2010

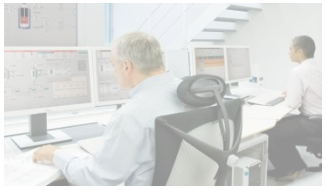
Finalization of full integration of FLENDER AG into Siemens AG as business unit MD. .

Siemens organisation structur

Siemens Divisions

Power and Gas (PG)	Wind Power and Renewables (WP)	Power Generation Services (PS)	Energy Management (EM)	Building Techno-logies (BT)	Mobility (MO)	Digital Factory (DF)	Process and Industry Drives (PD)	Healthcare (HC)[1)]

PD Business Units

Large Drives (LD)	Process Automation (PA)	Oil & Gas and Marine (OM)	Mechanical Drives (MD)
			

- Gearboxes
- Couplings

[1)] Separately managed business

Business Unit Mechanical Drives

SIEMENS

Business Unit MD

Customer Service

	Applications	Winergy	Production	Mechanical Drives
Products				
Applications (examples)	Gearboxes Couplings	Gearboxes for Wind Turbines up to 6.5 MW	Geared Parts	Condition Monitoring Assembly
				

Manufacturing in America 2016

Flender Standard Gear Units

FLENDER Standard Gear Units
Type of gear units "torque overview"

SIEMENS

PLANUREX 3 up to 5 450 000 Nm

PLANUREX 2 up to 2 600 000 Nm

SIP up to 80 000 Nm

FZG/FSG up to 1 400 000 Nm

SIMOGEAR up to 20 000 Nm

SIP = Standard Industry planetary gear unit
FZG/FSG= FLENDER standard gear unit

Torque range of the FLENDER standard gear units

0

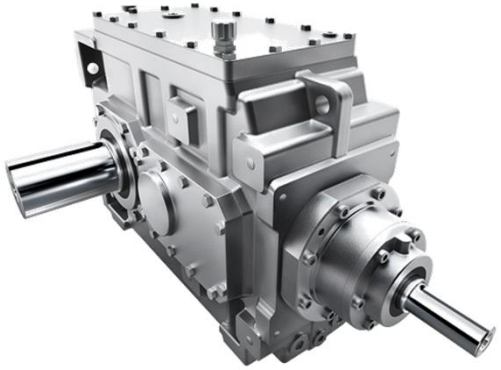
5 450 000 T [Nm]

FLENDER Standard Gear Units
Technical basics and definitions

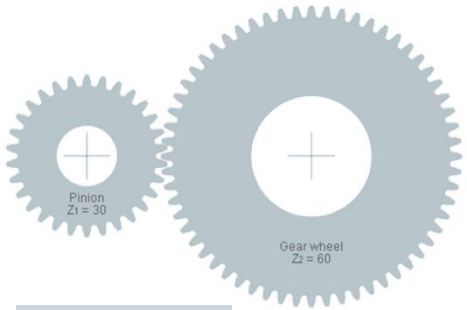
SIEMENS

Gear units consist of at least 3 components

- Input
- Output
- Housing



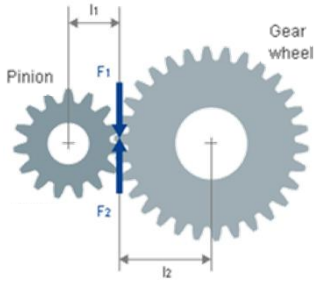
Transmission ratio



$$\frac{Z_2}{Z_1} = \frac{60}{30} = i = 2$$

- Transformation of speeds and torques of prime movers
- Adaptation to the requirements of the working machine

Torque

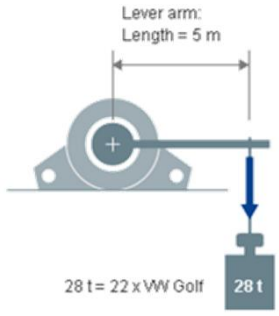


T [Nm] = F x l

Torque calculation

$$T = \frac{P \times 9550}{n}$$

T = Torque in Nm
P = Power in kW
n = Speed in rpm



Torque
= 1,400,000 Nm =
Nominal output torque of a FLENDER gear unit, size 28

Efficiency and power loss

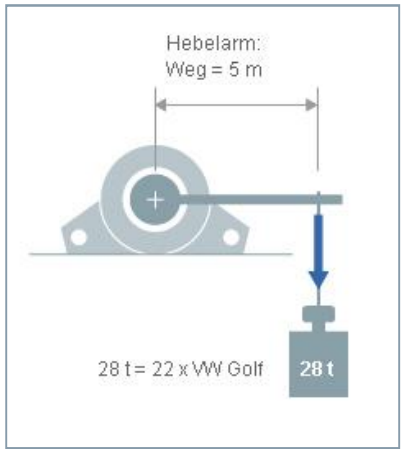
- Efficiency

$$\eta = P_{out} / P_{in}$$

- Power

$$P_{loss} = P_{in} - P_{out}$$

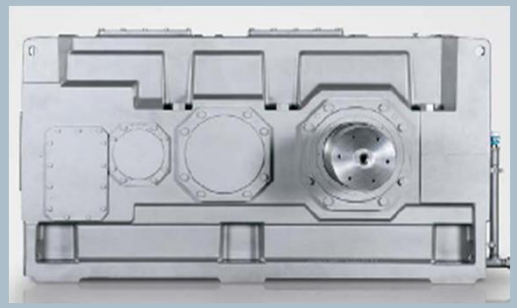
What is torque..



=> T_{2N} **FZG Gr.28** = 1.400.000 Nm
T = F x l
(1.400.000 Nm = 280.000 N x 5 m) = ca. 22 VW Golf

=> T_{2N} **PLANUREX 3** = 5.450.000 Nm
T = F x l
(5.450.000 Nm = 10 900 000 N x 5 m) = ca. 85 VW Golf

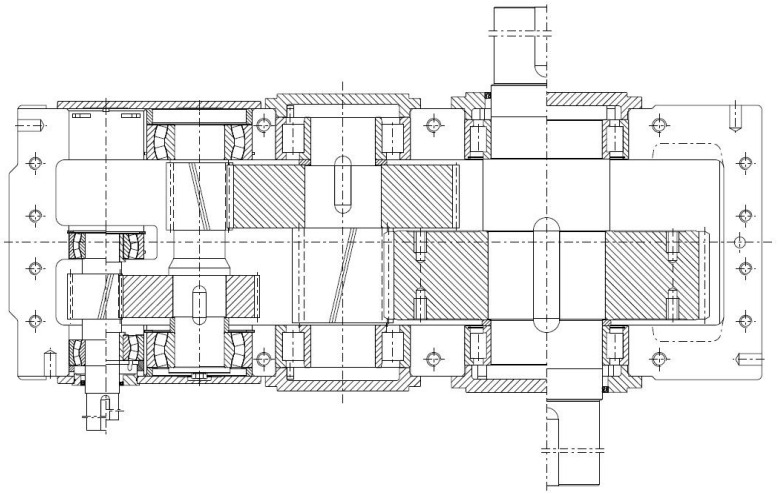
FLENDER Standard Gear Units – FZG



Fields of application

- Chemical and environment
- Crane technology
- Materials handling
- Cement industry
- Power generating industry
- Paper machines
- Sugar industry

Types	Helical and bevel-helical gear units
Sizes	28
Gear stages	1- to 4-stage
Power ratings	up to 4,500 kW
Transmission ratios	i = 1 … 450
Nominal torques	up to 1,400,000 Nm

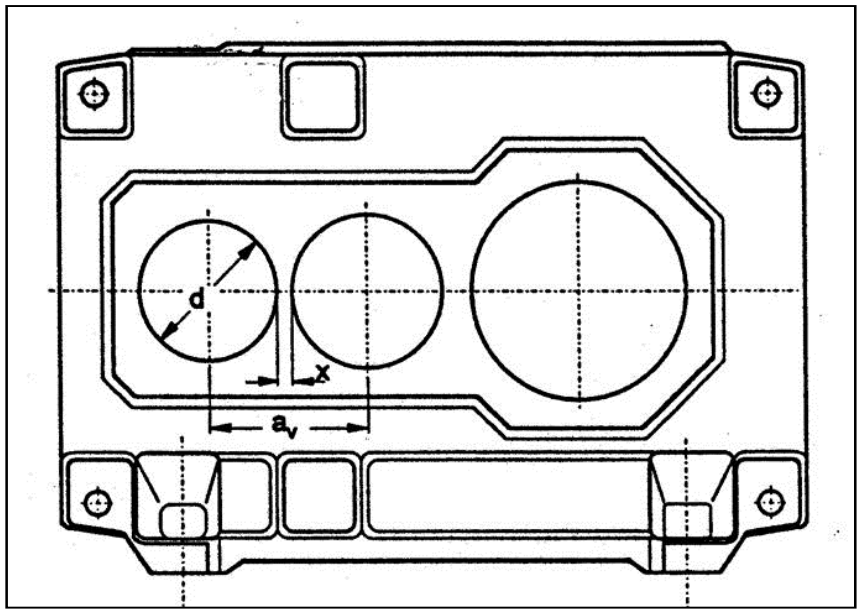


FLENDER gear units
Housings

SIEMENS

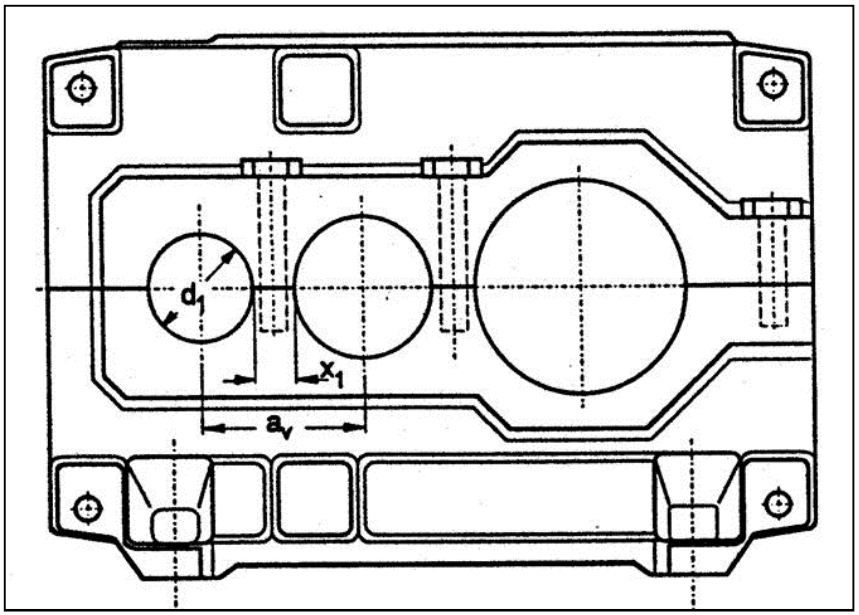
solid housing

(H2,H3,H4 and B2,B3,B4 up to size 12)



split housing

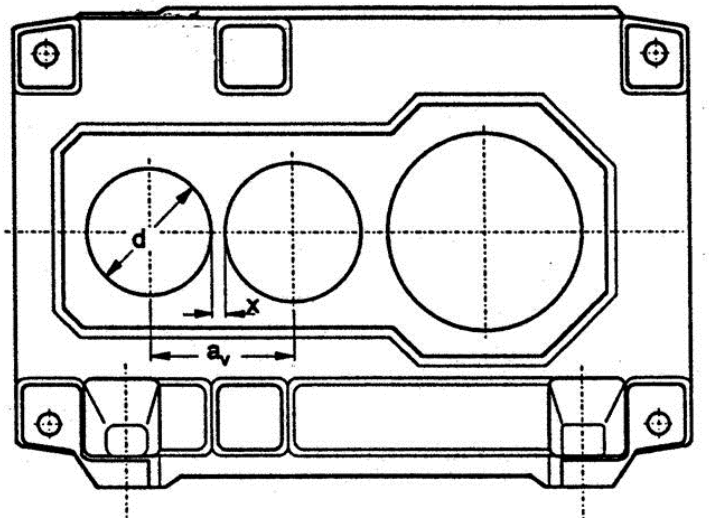
(all H1 and H2,H3,H4,B2,B3 and B4 for size 13 and above)



FLENDER gear units
Advantages of solid housings

SIEMENS

- Less machining of housing parts
  - ➔ Pricewise more favorable
- Higher stiffness, because no bolting of upper and bottom part
- Higher transversal forces, because no bolting of upper and bottom part
- Larger antifriction bearings, because no space restriction caused by bolting.
  - ➔ Higher lifetime of bearings
  - ➔ Higher permittable additional forces on shafts
- Better fan cooling, because better guidance of air stream
- Better noise behavior, because gearing and housing specifically designed for this purpose
- Less sealings

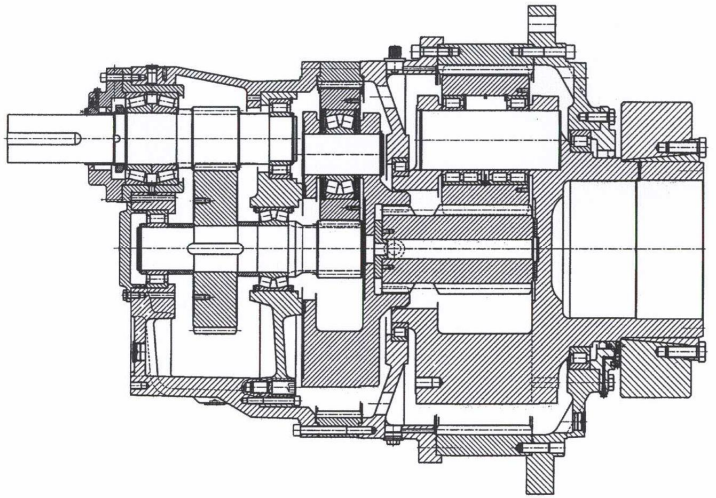


Planetary Gear Units - PLANUREX 2

Fields of application

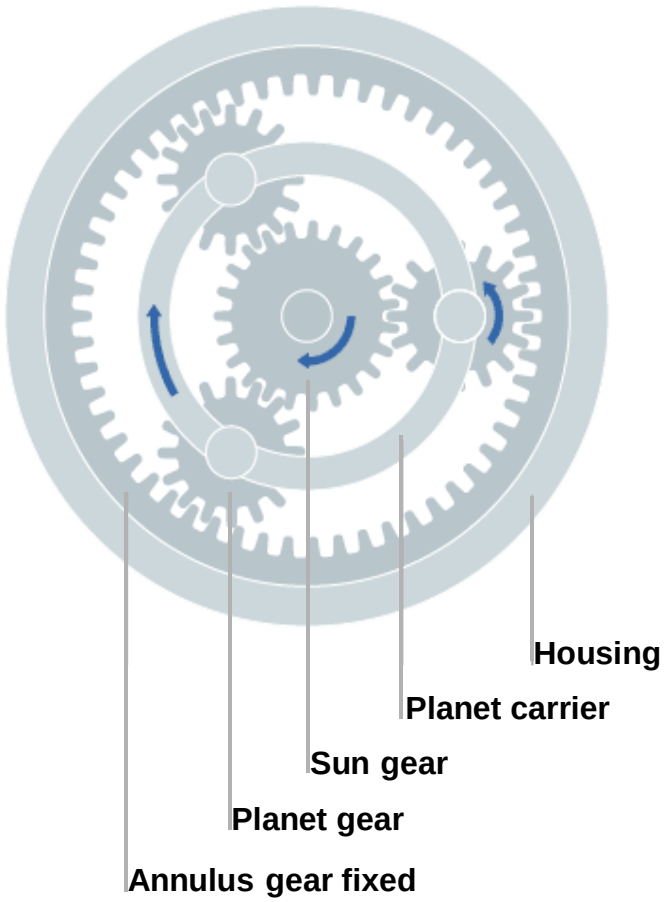
- Crane technology
- Cement industry
- Mining industry
- Oil & gas
- Materials handling

Sizes	27
Gear stages	2- and 3-stage and gear unit combinations
Power ratings	13,000 kW
Transmission ratios	up to i = 4,000
Nominal torques	up to 2,600,000 Nm



FLENDER Standard Gear Units
Planetary gear units – Load sharing

SIEMENS



Load sharing in the planetary gear unit makes
the design more compact, thus the size of each component can be reduced.

3-way load sharing planetary gear unit

- Sun gear distributes 1/3 of the input power
  to each of the three planet gears
- Planet gears rotate in the annulus gear
- The planet carrier absorbs proportional input from all components and provides output in total.
- Planet carrier is used as the output

FLENDER PLANUREX
Variety and designation of types

SIEMENS

Variety of PLANUREX 2 gear units

4 basic types

- Pure planetary gear units (2- or 3-stage)
- Planetary gear units (2- or 3-stage) with primary helical gear unit
- Planetary gear units (2-stage) with primary bevel gear unit
- Planetary gear units (2- or 3-stage) with primary bevel-helical gear unit

27 gear units sizes

- Standard range features 27 sizes for a torque range up to 2,600,000 Nm

2 output shaft types

- Solid shaft
- Hollow shaft

P	2	N	A	1	2

P = Planetary gear unit

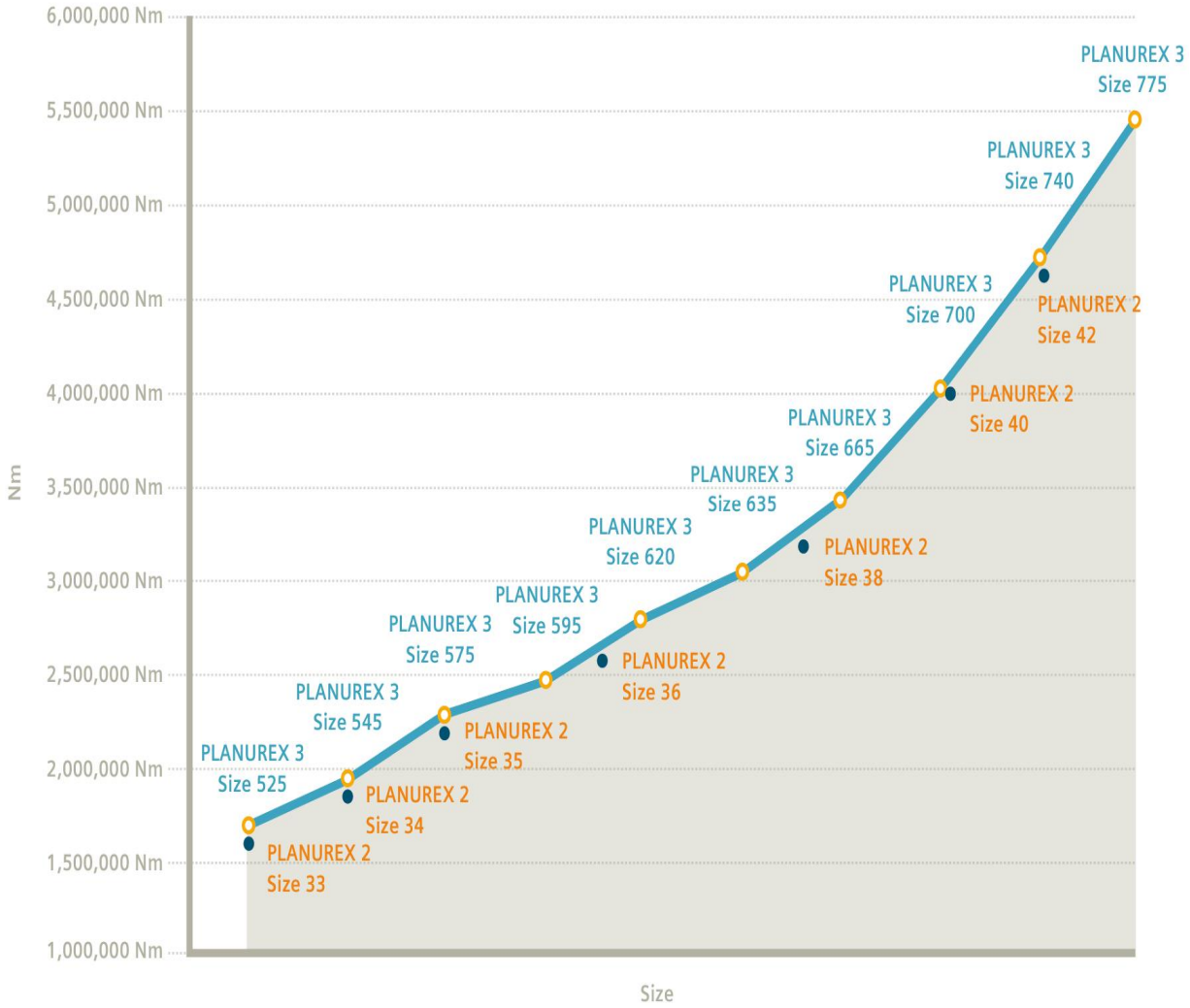
2 = Number of planetary gear stages

N = Standard (coaxial)
S = Helical gear stage
L = Bevel gear stage
K = Bevel-helical gear stage

A = Hollow shaft for shrink disk or involute splines
B = Solid shaft with parallel key or involute splines

… = Size of the gear unit (9…36)

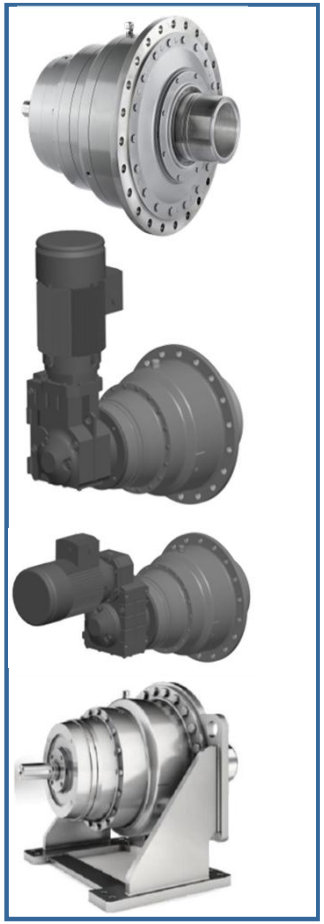
Coordinated size increments PLANUREX 2 / 3



- Deutsch

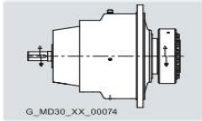
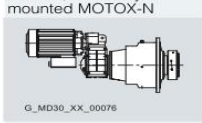
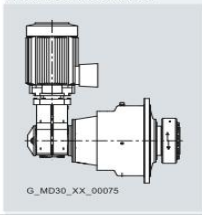
FLENDER Standard Industrial Planetary gear unit - SIP

Characteristics



Type	Planetary gear
No. of sizes	8
No. of gear stages	2 stage plus combination with geared motor
Nominal power	up to 500 kW
Ratios	i = 25; 27; 30; 33,5; 38; 45
Nominal torque	10.000 to 80.000 Nm
Output side	Hollow shaft with shrink disc or splines acc. to DIN 5480 Solid shaft with keyway or splines acc. to DIN 5480 or flange
Accessories	Taconite sealing Torque arm Motor adapter
Mounting position	Horizontal

Type designation

Type		O	2	R	C	50	D	33.5
Series of planetary gear units	OmniDrive	O						
Number of stages for SIP	2		2					
Gear unit designation	Round			R				
Shaft arrangement d_1 to d_2	Coaxial				C			
								
	Parallel, externally mounted MOTOX-N				P			
								
	Orthogonal, externally mounted MOTOX-N				R			
								
Gear unit size	30 ... 60					50		
Output shaft design	Hollow shaft for shrink disk						D	
	Hollow shaft with splines						K	
	Cylindrical shaft end with parallel key						S	
	Cylindrical shaft end with splines in accordance with DIN 5480						A	
	Flanged shaft						F	
Nominal ratio for SIP	25 ... 45							33.5

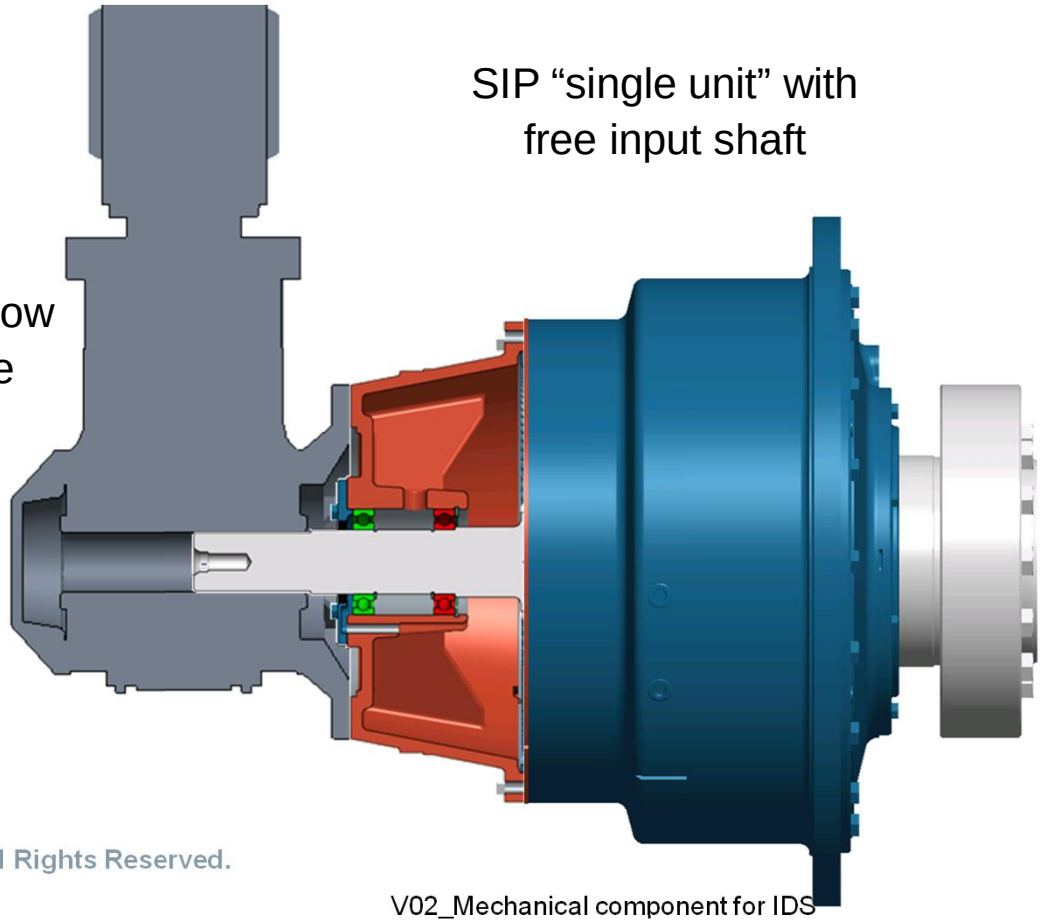
SIEMENS

What's new? Review SIP-Motox-N connection

Direct mounting of gear motor to SIP input shaft

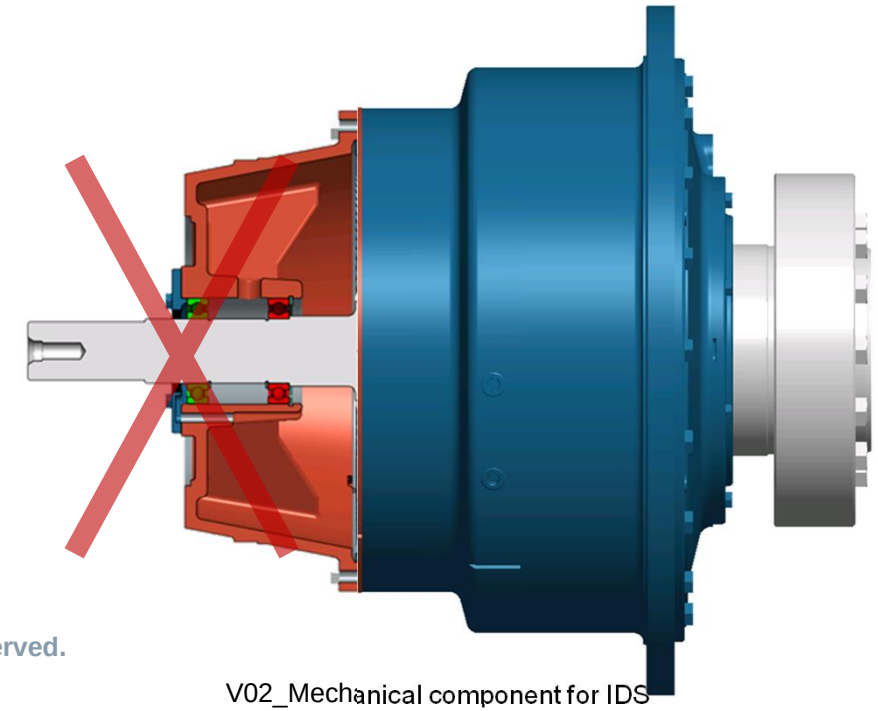
SIP "single unit" with free input shaft

Motox-N with hollow shaft and flange



What's new? SIP Simogear – highly-integrated connection hub

Elimination of bell housing, bearings and input shaft



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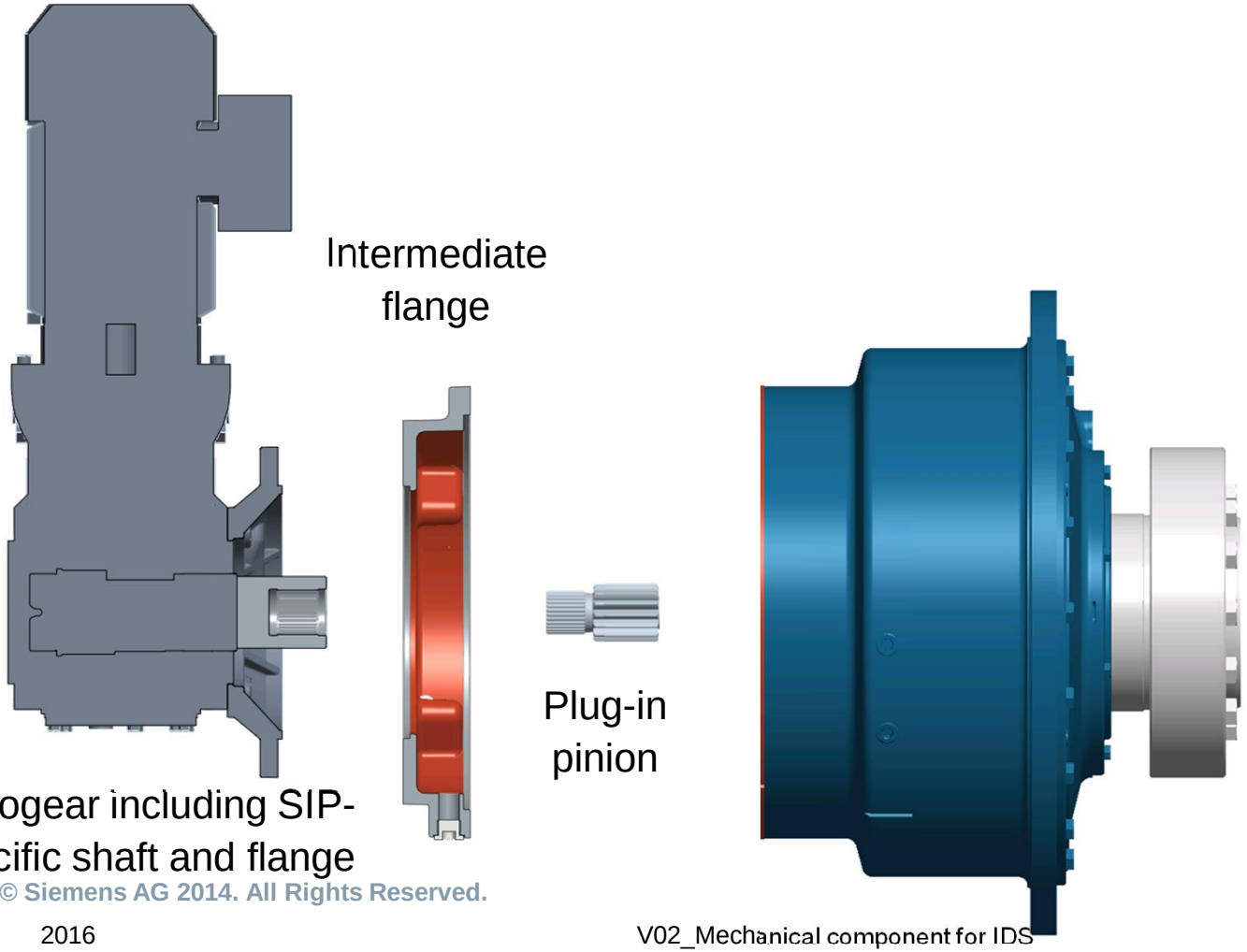
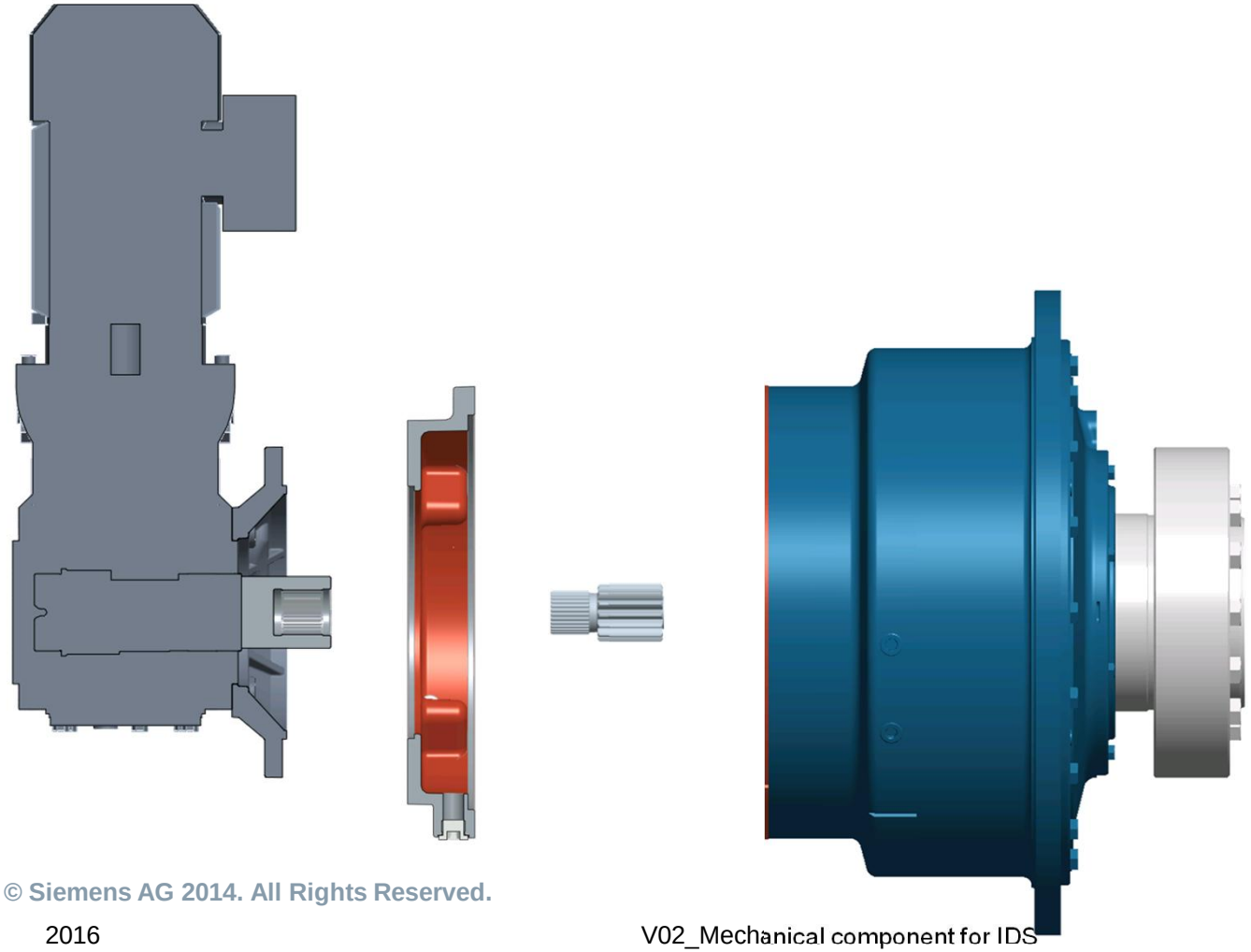


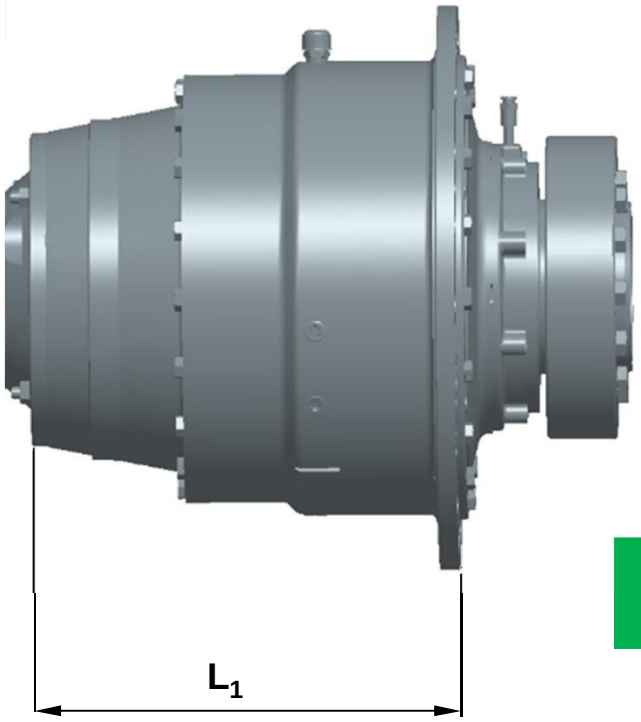
What's new? SIP Simogear – highly-integrated connection hub



What's new? Installation space

Current solution

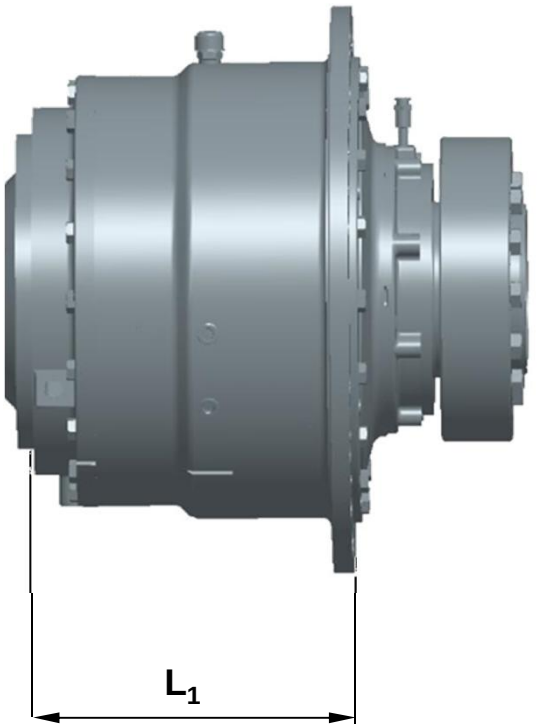
MOTOX-N



-22%

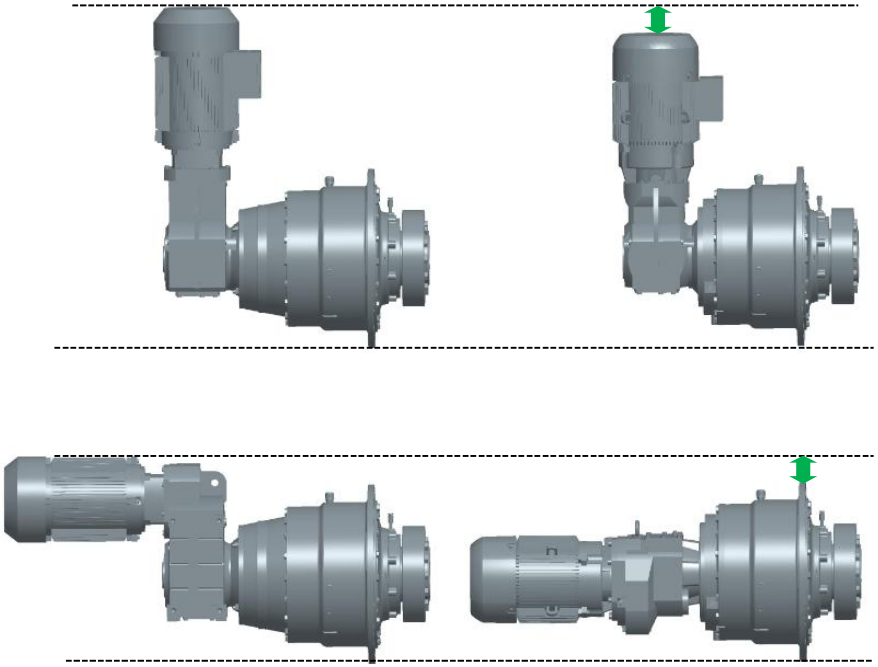
Highly-integrated solution

SIMOGEAR

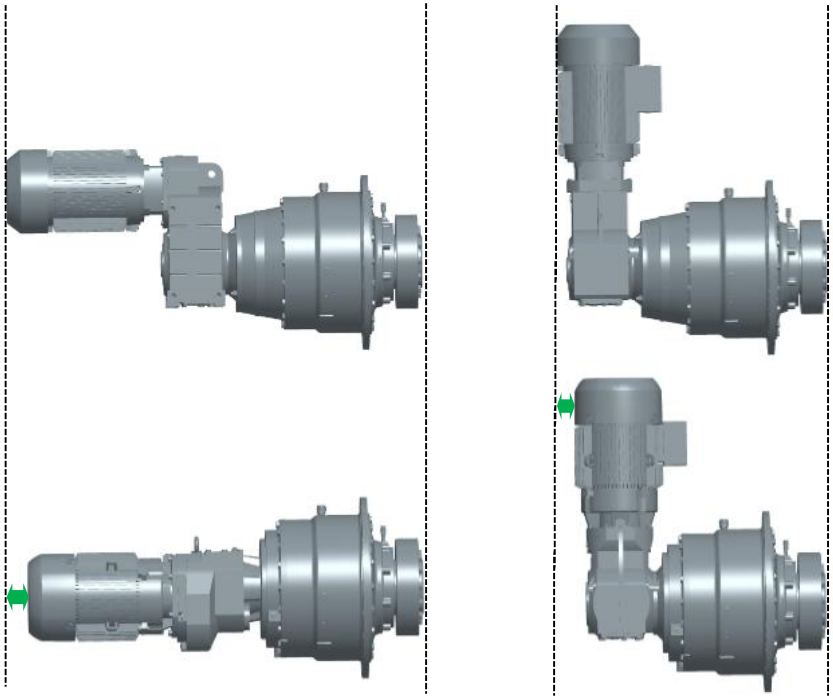


What's new? Construction space scale models

Height:



Length:



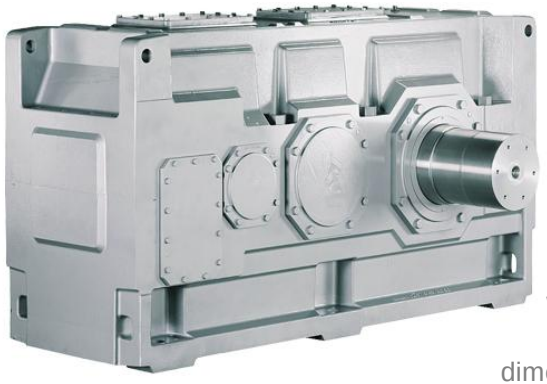
The integrated interface means shorter and lower installation space.

FLENDER Standard Gear Units
Planetary gear units – Comparison

SIEMENS

Planetary gear unit

weight:
10.7t
dimension:
2,333x 1,665x 1,665 mm



weight:
25 t
dimension:
3,410x 1,760x 1,880 mm

Helical gear unit

Advantages of planetary gear units

- Maximum torque in minimum size
  (reduced weight and lower costs)
- Higher transmission ratio per stage possible
- Reduced sound pressure level
- Reduced roller and sliding velocities
- Available for very high torques

Disadvantages of planetary gear units

- Smaller cooling surface
  (additional cooling is usually required)
- No or small inspection openings, so monitoring and checking of the planetary gear stages is more difficult
- Not that much possiblities to perform repair actions on site

FLENDER SIP Comparison to classical gear unit

Comparison planetary gear versus bevel-helical gear

Example: Cable machine company Queins:

Input power	13,2 kW (60Hz)
Total ratio	315
Required torque	14.000 Nm
Machine [rpm]	5,5 min^{-1}
Safety factor	1,5

Gear type	Bevel - helical B4DH07	**SIP** planetary O2RR 40 (combination KAF 69)	**SIP** planetary O2RR 37 (combination KAF 69)	**PLANUREX 2** planetary P2KA09
Nominal torque	20.500 Nm	25.000 Nm ↑ 22%	20.000 Nm	22.000 Nm ↑ 7%
Ratio	315	315	315	320
Safety factor	1,46	1,79 ↑ 30%	1,43	1,57 ↑ 7%
Weight incl. Motor	657 kg	310 kg ↓ 52%	286 kg ↓ 56%	350 kg ↓ 47%
Price incl. Motor	17.327 € LP	10.580 € LP ↓ 40%	9.505 € LP ↓ 45%	18.500 € LP

Application-specific gear units

Standard FLENDER Gear Units

Sophisticated and proven gear units and planetary gear units in a unique range of variants for universal use in many applications

Application-specific FLENDER Gear Units

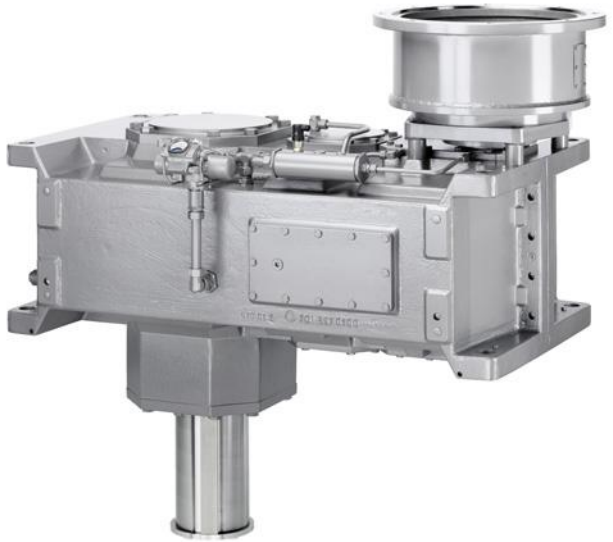
Rapidly available standardized solutions with special application-specific add-on parts

(Daughter program)

Products – Daughter program

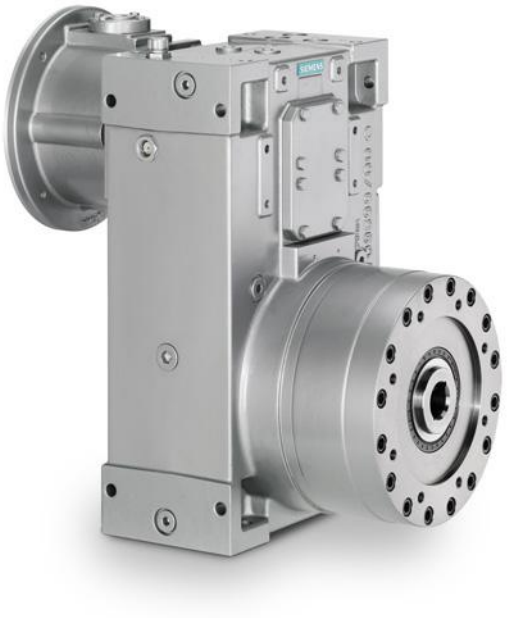
Belt conveyor drive

Aerator gear unit



Products – Daughter program

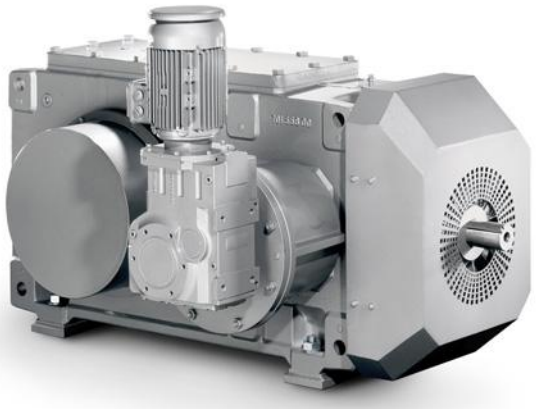
Single screw extruder gear units



Hoist drive gear units

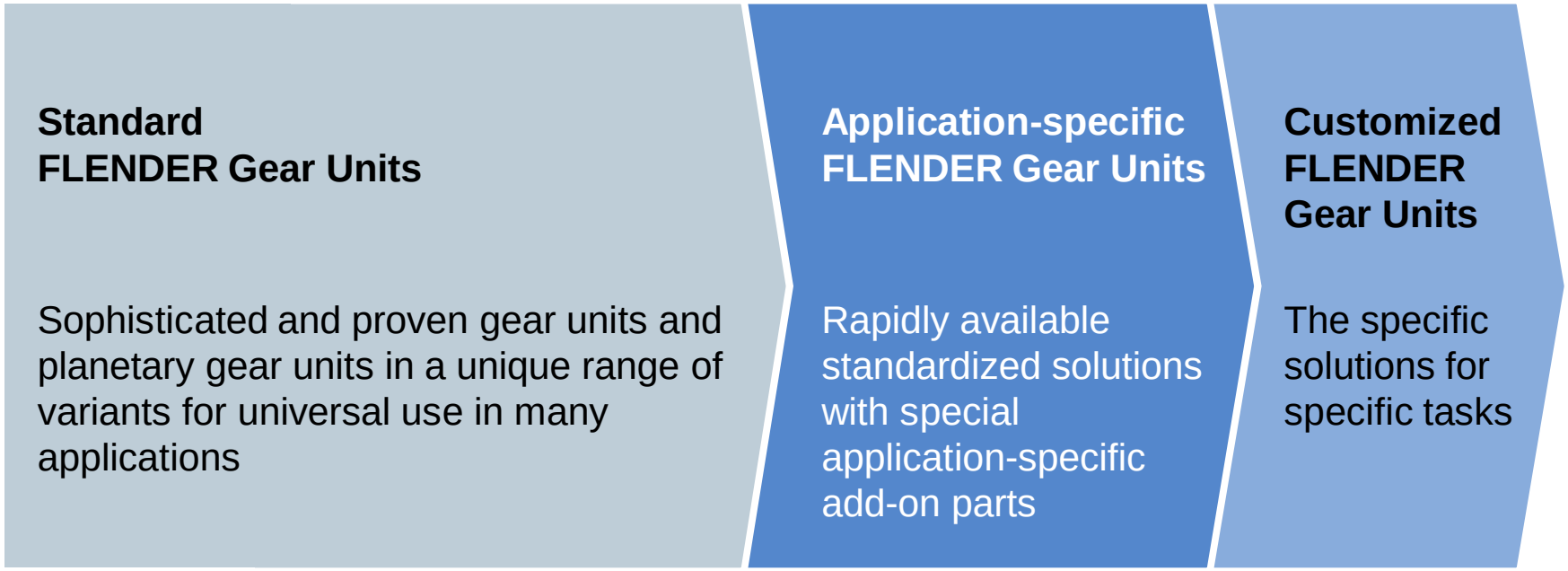
Products – Daughter program

Bucket elevator gear units



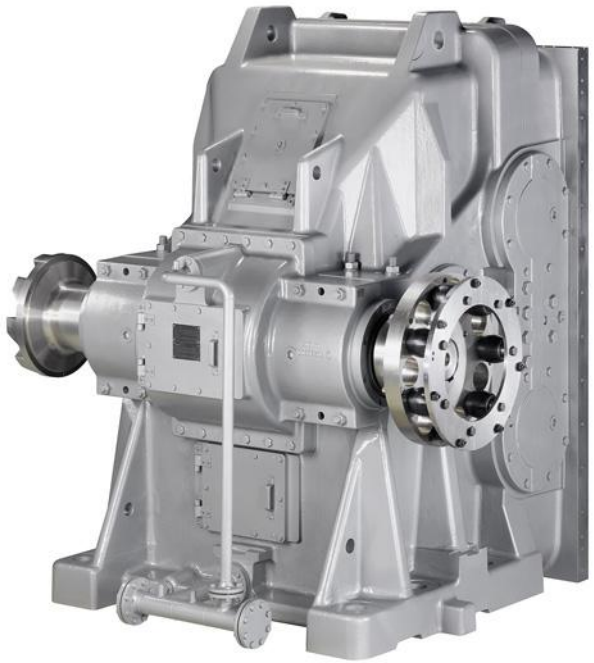
Cooling tower gear units

Customer-specific SIEMENS gear units

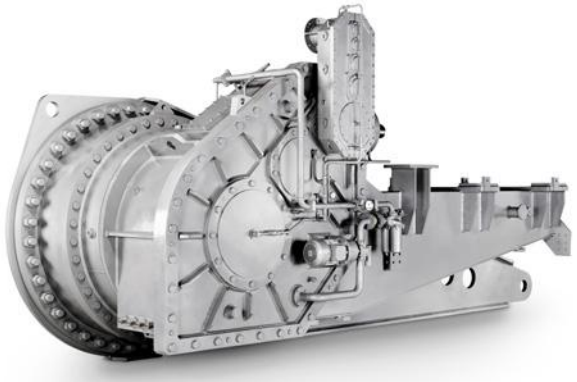


Products – Standard in branches

Girth gear units

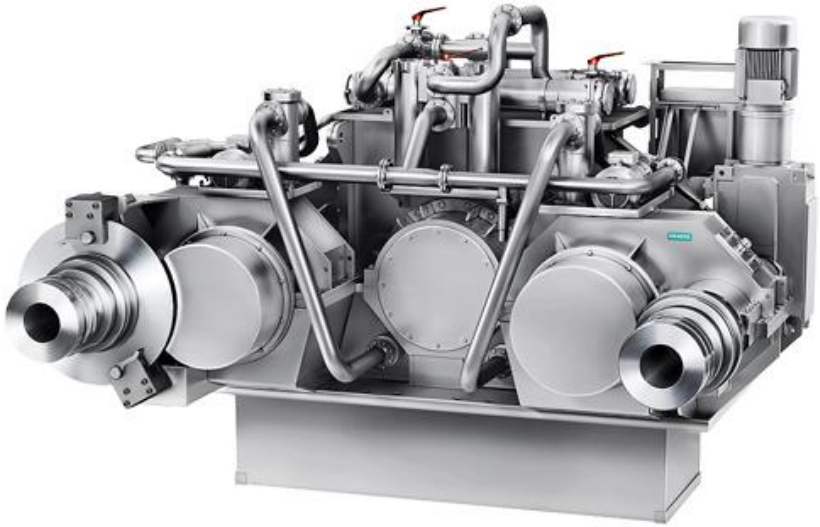


Bucket wheel gear units

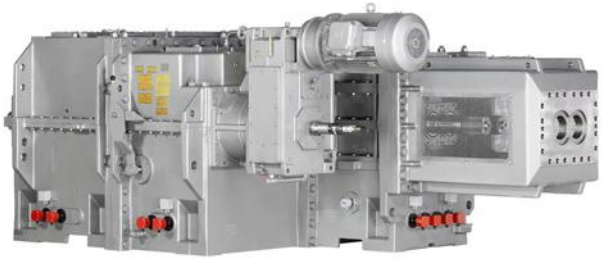


Products – Standard in branches

Marine gear boxes



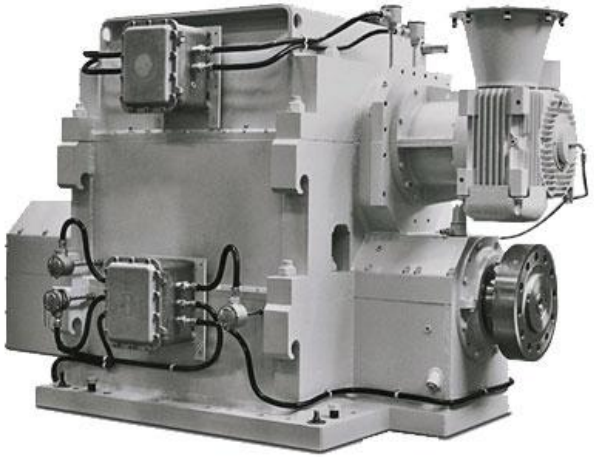
Double screw extruder gear units



Products – Daughter program

Railway drives

Turbo gear units



Products – Standard in branches

Load sharing helical gear units (DUORED)

Vertical mill drive gear units

Summary gear unit portfolio

Standard FLENDER Gear Units	Application-specific FLENDER Gear Units	Customized FLENDER Gear Units
Sophisticated and proven gear units and planetary gear units in a unique range of variants for universal use in many applications	Rapidly available standardized solutions with special application-specific add-on parts	The specific solutions for specific tasks

We have the right gear unit for each drive.

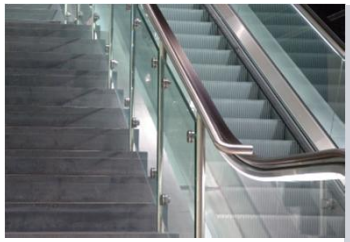
Most of them can already be assembled from the universal standard program – fast, proven and cost reducing.

Even for a number of specific requirements we offer standardized gear units and we are the correct point of contact for customized solutions.

Manufacturing in America 2016

Applications

Many industries, hundreds of applications



Elevators and Escalators

Chemistry and Environment

Energy

Material Handling

Coal and Ore

Crane technology

Plastics and rubber

Oil and Gas

Pulp and Paper

Rail Cars

Marine technology

Rolling Mill technology

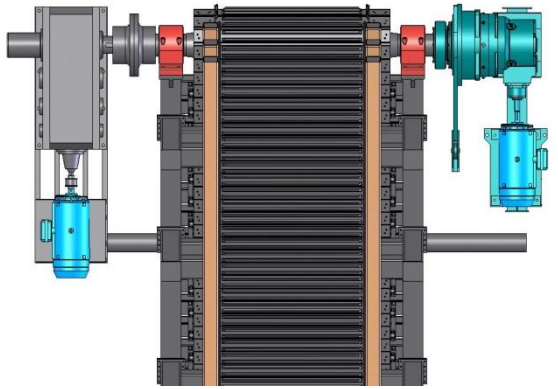
Wind

Cement Industry

Sugar Industry

Conveyor Belt Drive

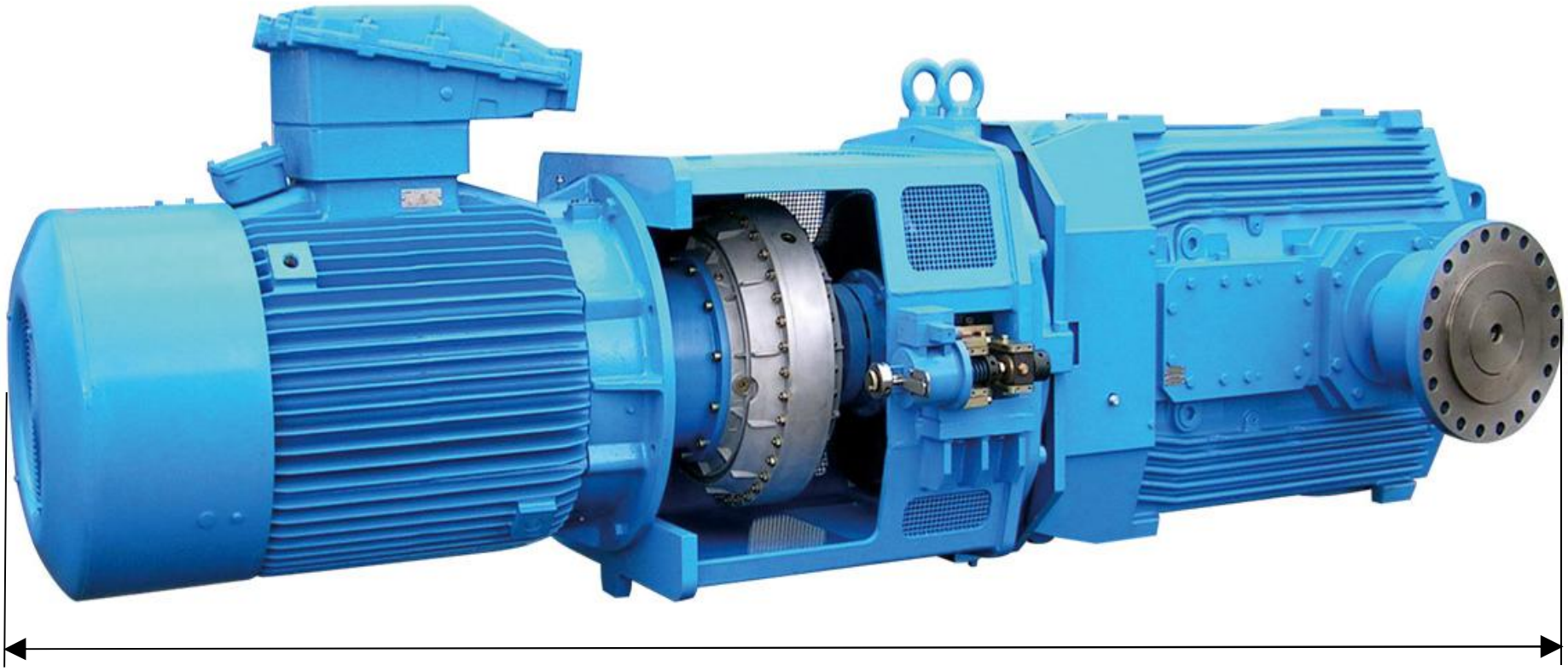
Design	Bevel Gear Unit
Sizes	8
Gear stages	3-stages
Power ratings	Up to 1176 kW
Transmission ratios	i = 12,5 … 40
Nominal torques	Up to 113 kNm
Design	horizontal



Overland belt conveyor

Overland belt conveyor

Alignment free drive



SIEMENS motor + coupling + gearbox + flange coupling

Example: Vattenfall Mining
Project reference with measurable customer benefit

SIEMENS

Customer
Vattenfall Europe Mining AG
Reichwalde, Lausitz region, Germany

Order
Construction of a 13- km-long belt conveyor system with a coal output capacity of 6,000 t/h

Solution
- Complete engineering, manufacture, delivery, and assembly of the drive stations and installation of the conveyor system
- Drive systems with SINAMICS S120 converters in six stations
- Construction of a control center with SIMATIC WinCC
- SIMATIC S7-400 controls

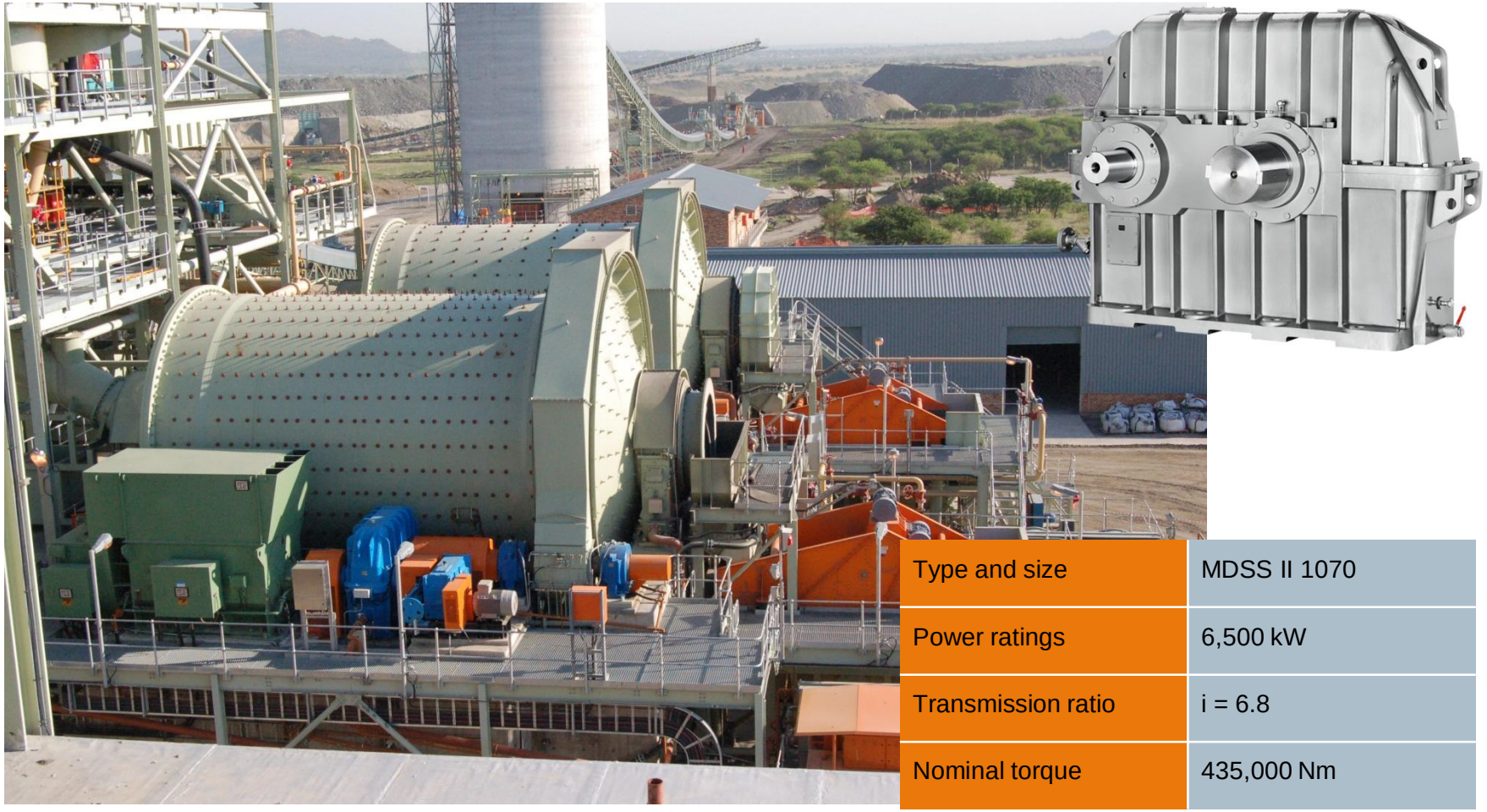
Customer benefit
- 98% availability
- Energy savings of up to 15%
- Maintenance cost savings of up to 15%

Best practice SIP :
SIP is clearly positioned as Integrated Drive System

Picture	SIP best practice example 1-3	Picture	SIP best practice example 4-6
	**Apron feeder in cement plant** **Jura Zement (CH)** ▪ SIMOGEAR; SIP; RUPEX ▪ Substitution of old drive components ▪ Optimized drive solution		**High precision torque device** **Trenkle (GER- BAY)** ▪ SIMOGEAR; SIP; 1FK7; SINAMICS S120; installation
	**High performance press for PVC** **Sandvik / Coperion (GER-SDW)** ▪ SIP; SIMOGEAR; SIMOTICS 1 FK7; SINAMICS S120 ▪ Reduction of mechanical components and optimization of synchronization		**Tipping through drive** **TMT Siegen (GER – Region West)** ▪ SIP; FZG; BIPEX ▪ Higher efficiency → less power required; half of weight to 700kg
	**Pressure slew filter** **BHS Sonthofen (GER – Region Bayern)** ▪ SIMOGEAR; SIP; SIMOTICS EX Motor ▪ Higher efficiency ▪ Optimized price performance ratio		**Sprinkler pipe machine** **Schultze Anlagentechnik Hamburg (Region Nord)** ▪ SIMOGEAR; SIP ▪ Service order with substitution of competitive components ▪ No reverse engineering required

Girth Gear Unit DMG2

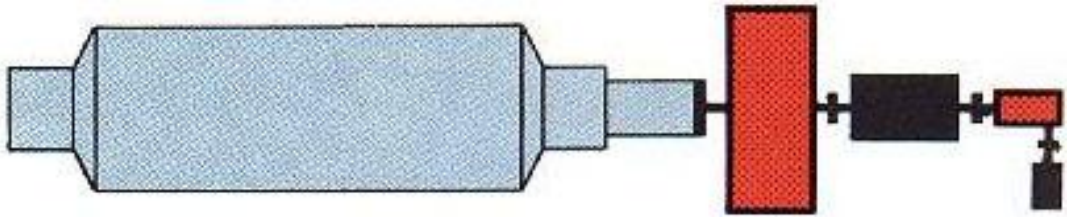
MDSS for Tube Mill

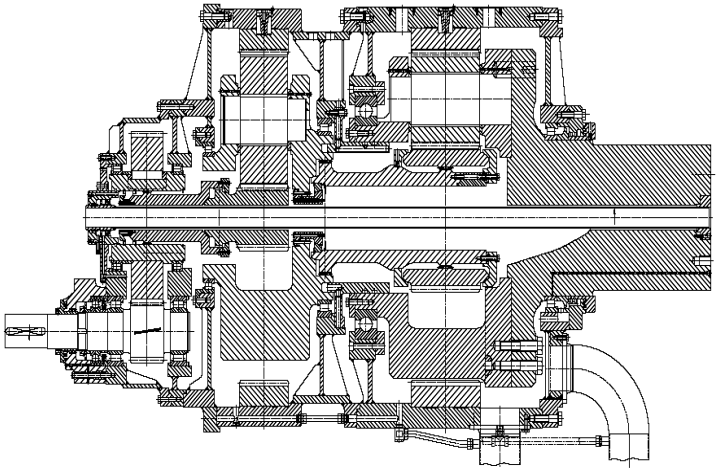


Type and size	MDSS II 1070
Power ratings	6,500 kW
Transmission ratio	i = 6.8
Nominal torque	435,000 Nm

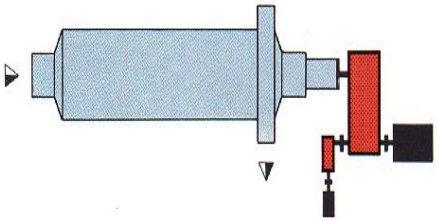
Planetary Gear Unit for Central Drive

Type and size	HCPP 751
Power ratings	3,800 kW
Transmission ratio	i =64
Nominal torque	2,350,000 Nm



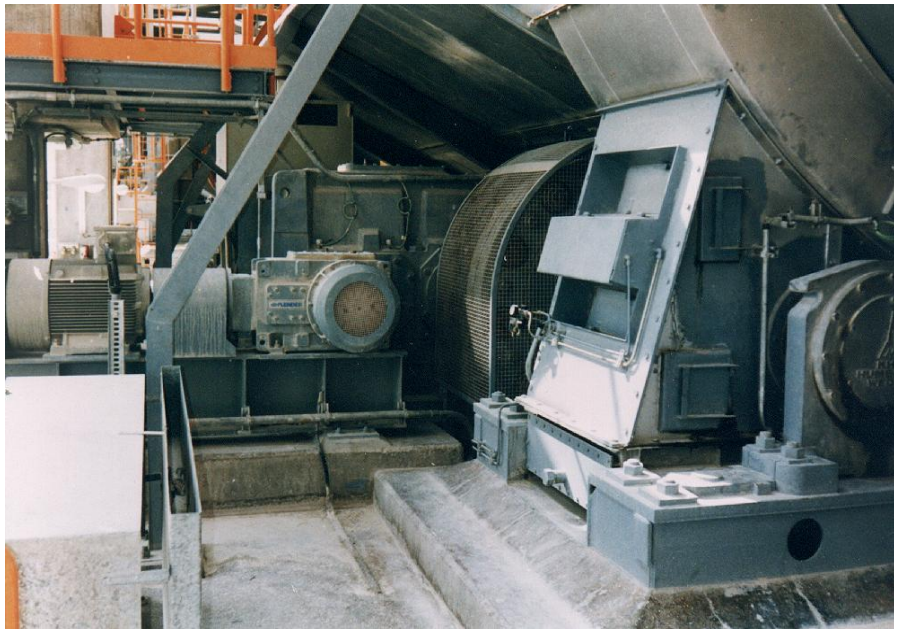


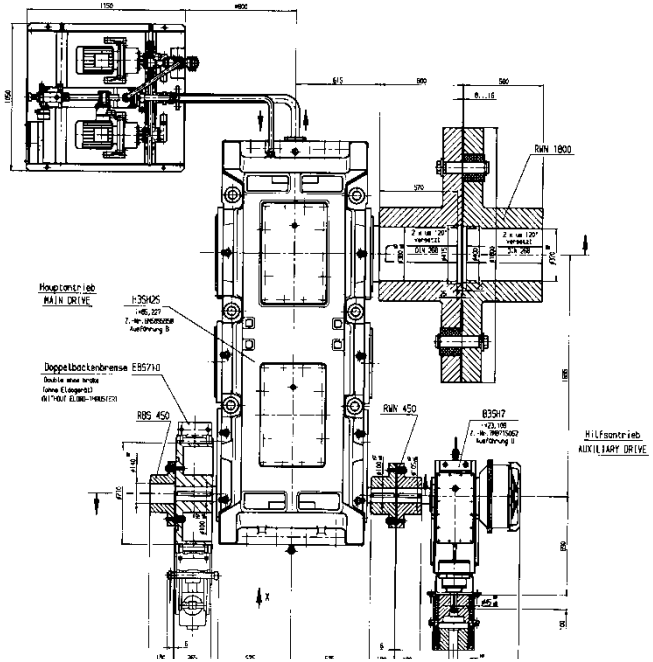
DUORED as Central Drive for Tube Mill



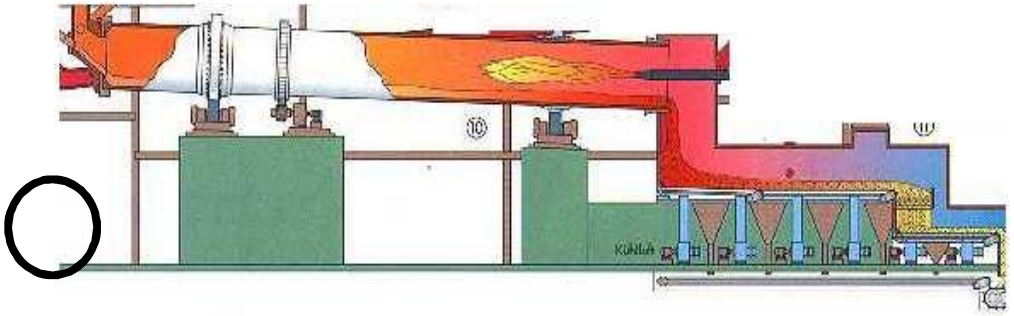
Type and size	SVNL 850
Power ratings	1,600 kW
Transmission ratio	i = 54.608
Nominal torque	800,000 Nm

In group grinding : Kiln Drives with FZG gears





Kiln main drive: H3SH 25
P = 520 kW
n1 = 1 500 - 250 1/min
n2 = 17 - 3 1/min



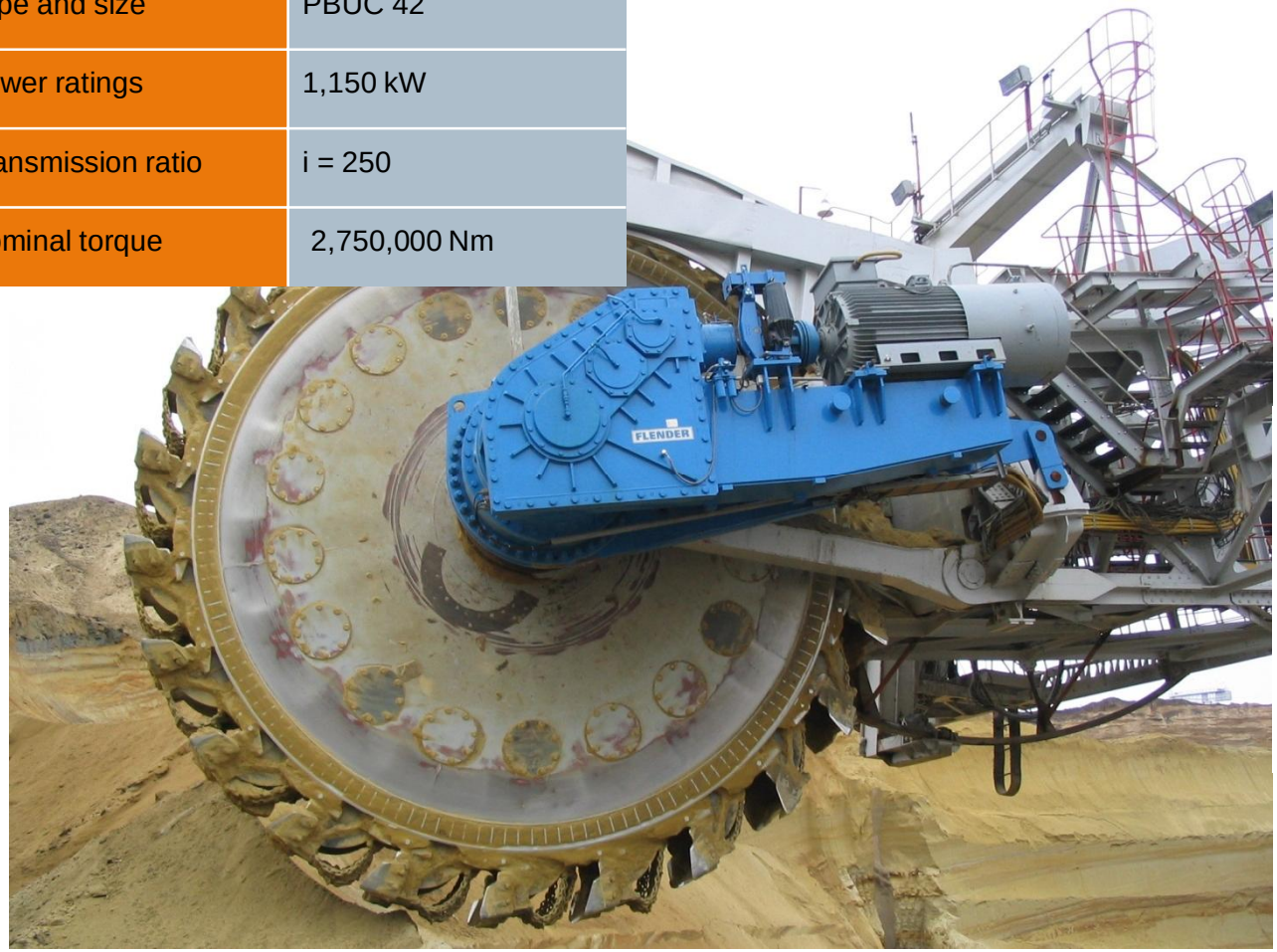
In group grinding : Kiln Drives with Planetary gears

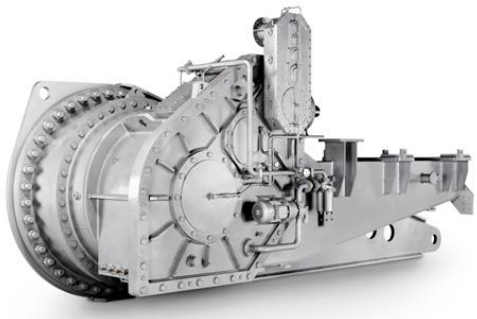
SIEMENS

Type and size	P2DA 38
Power ratings	500 kW
Transmission ratio	i = 80
Nominal torque	3.00,000 Nm

Bucket Wheel Drive

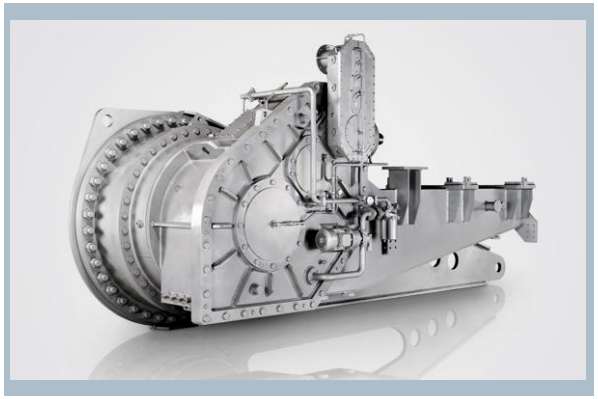
Type and size	PBUC 42
Power ratings	1,150 kW
Transmission ratio	i = 250
Nominal torque	2,750,000 Nm





Based on Planetary Gear Units - Bucket Wheel Drive

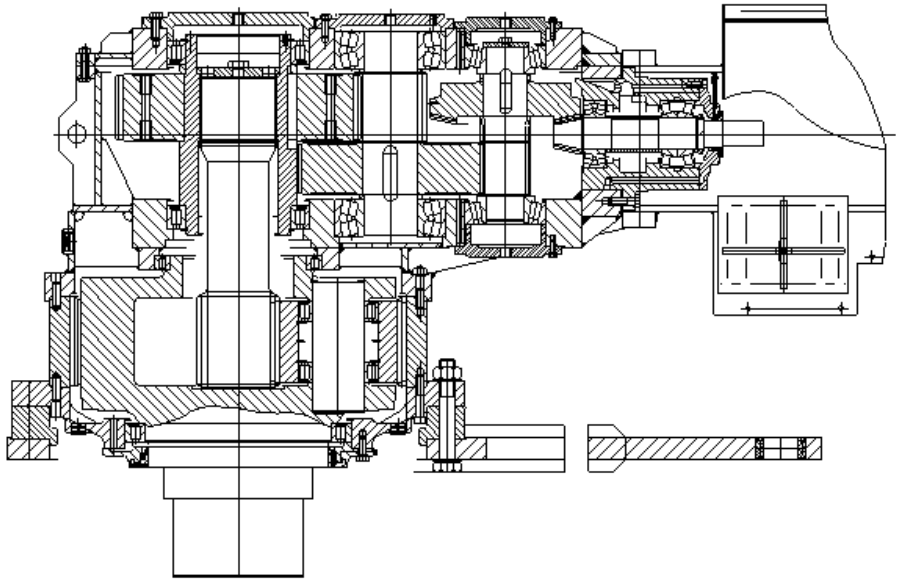
SIEMENS



Type	Planetary Gear Units
Sizes	16
Gear stages	2- and 3- planetary stages and gear unit combinations
Power ratings	Up to 13,000 kW
Transmission ratios	up to i = 450
Nominal torques	up to 2,600,000 Nm

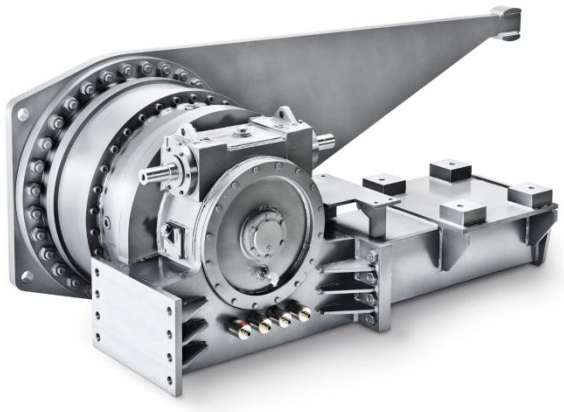
Fields of application

- Bucket Wheel Excavators in Open-cast Mining



Based on Planetary Gear Units - Travelling Gear Drives

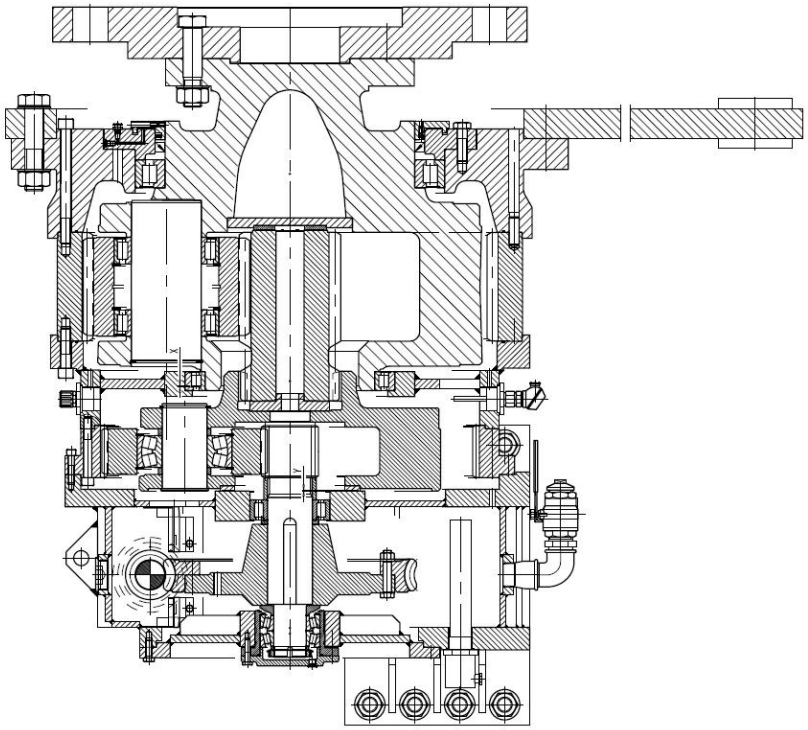
SIEMENS



Type	Planetary Gear Units
Sizes	18
Gear stages	2 planetary stages and 1 worm gear stage
Power ratings	Up to 13,000 kW
Transmission ratios	up to i = 930
Nominal torques	up to 1,920,000 Nm

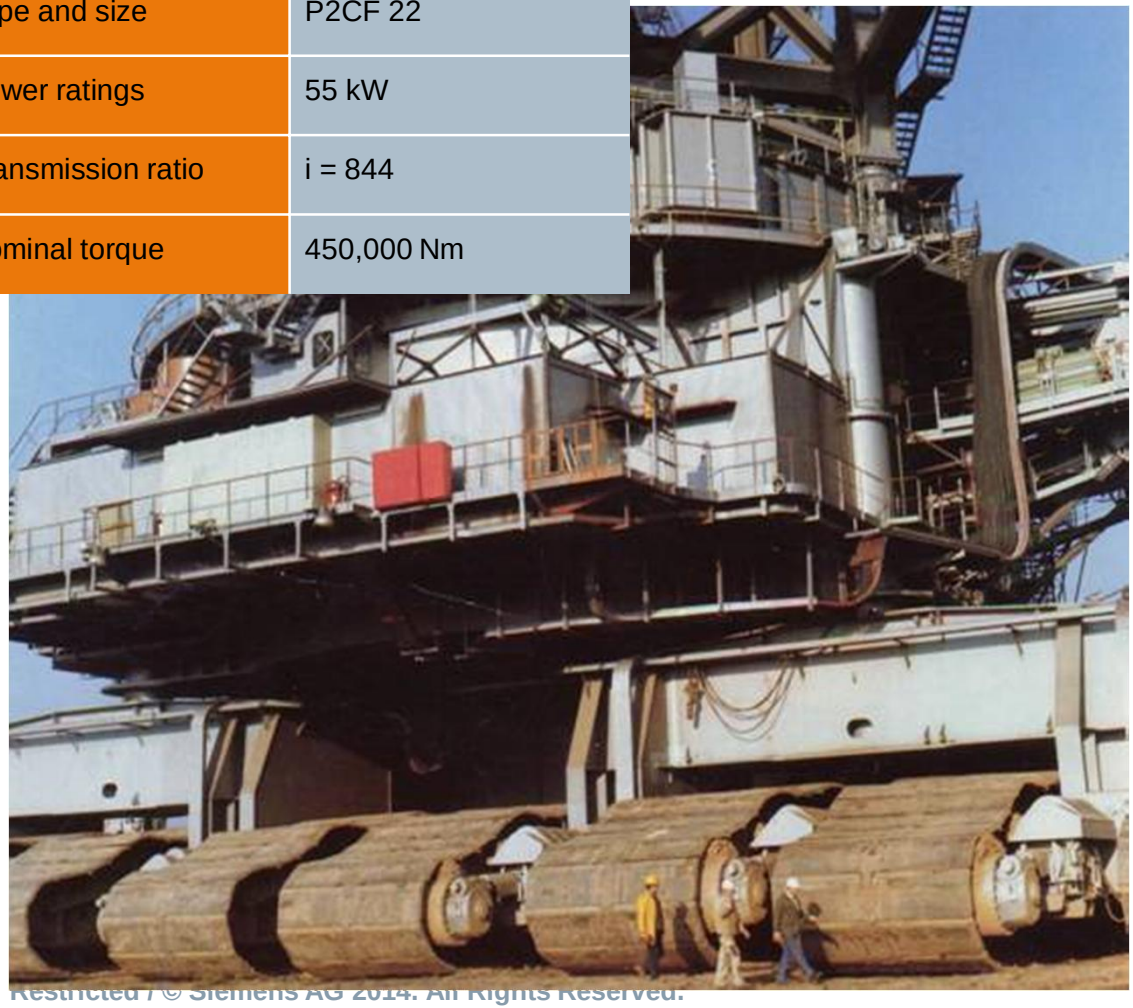
Fields of application

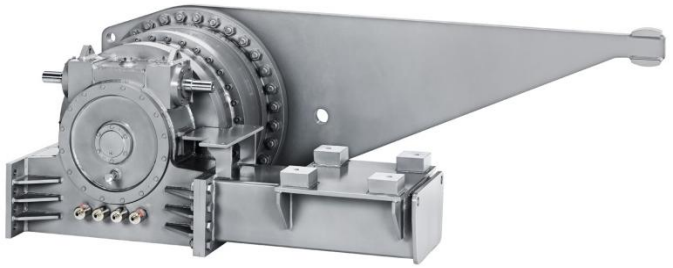
- Excavators in Open-cast Mining



Travelling Gear Drives

Type and size	P2CF 22
Power ratings	55 kW
Transmission ratio	i = 844
Nominal torque	450,000 Nm





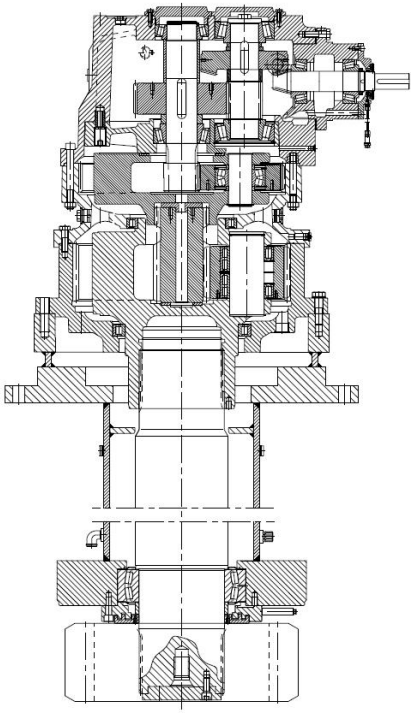
Based on Planetary Gear Units
- Slewing Gear Drive

SIEMENS

Type	Planetary Gear Units
Sizes	8
Gear stages	2- and 3-stages excl. Gear units combination
Power ratings	Up to 498 kW
Transmission ratios	up to i = 280
Nominal torques	up to 354,000 Nm

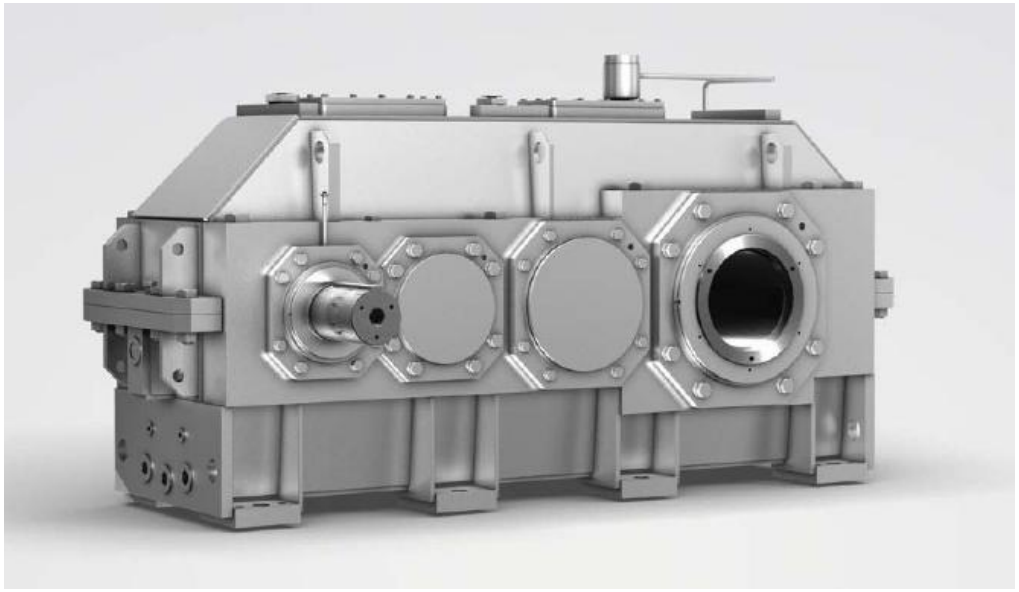
Fields of application

- Cranes
- Excavators
- Drilling platforms



Crane Drives

Hoisting with Extended Center Distance

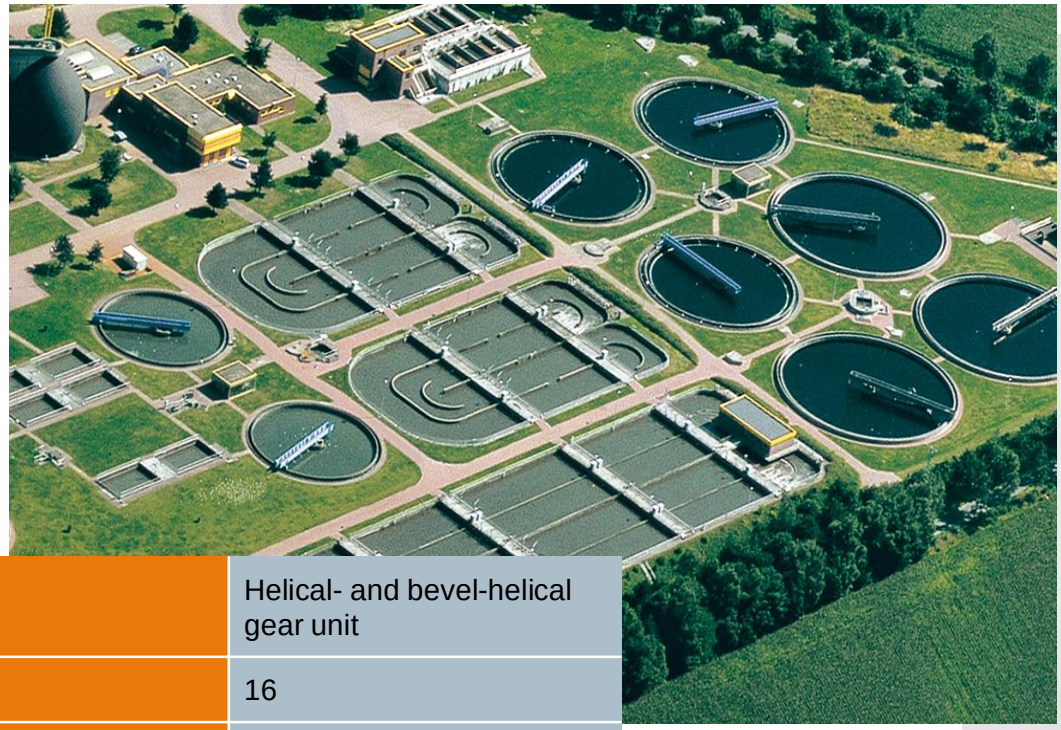


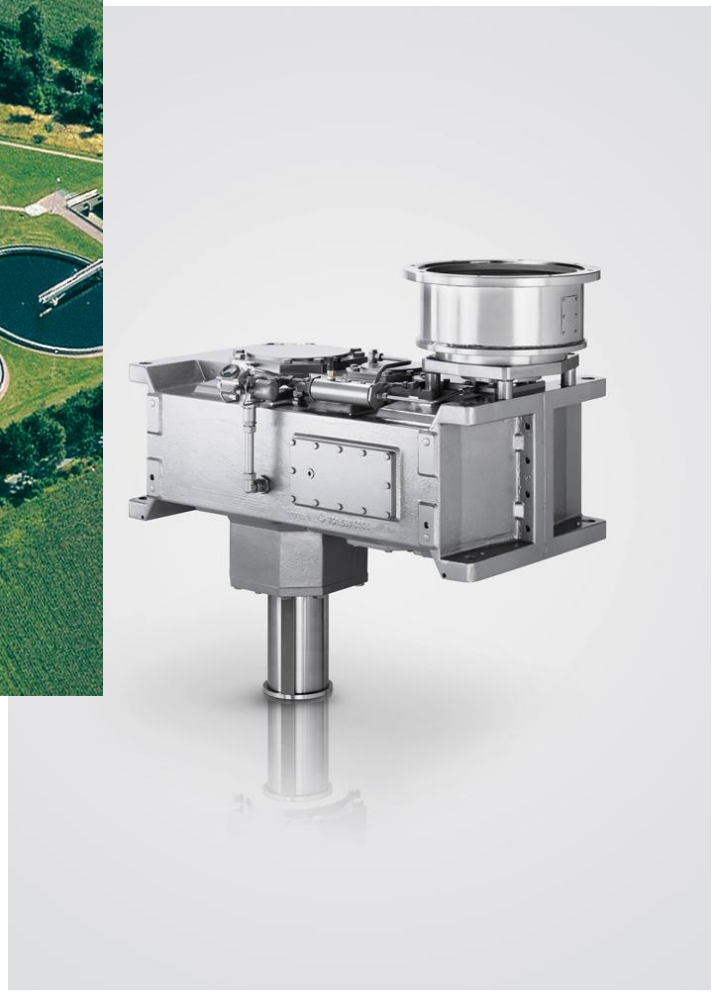
Variable center distances adapted to the requirements in crane installation

Product range and performance data:

Design	Helical gear units
Sizes	8
Gear stages	3- and 4-stage
Power ratings	up to 4,500 kW
Transmission ratios	i = 16 …140 (250)
Nominal torques	up to 470,000 Nm
Mounting positions	horizontal

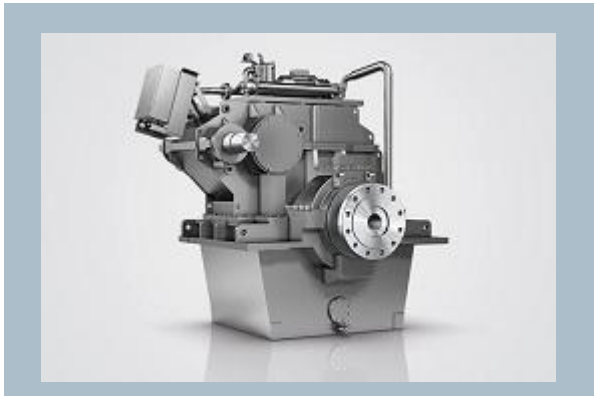
Aerator Gear Units





Type	Helical- and bevel-helical gear unit
Size	16
Gear stages	2- and 3-stages
Power ratings	Up to 4.500 kW
Transmission ratio	i = 6,3 … 112
Nominal torque	10.500 … 173.000 Nm
Design	vertical

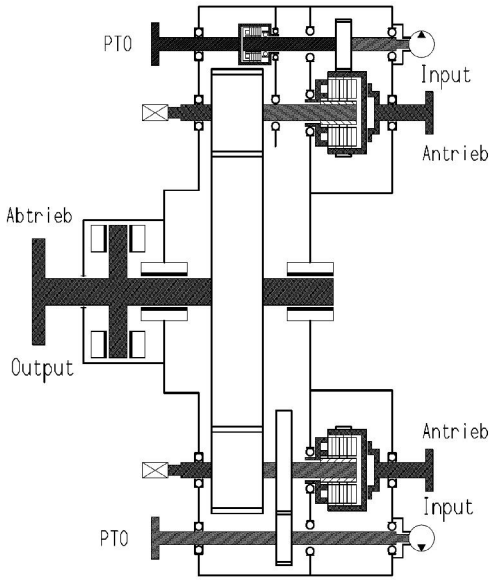
Marine Gear Units

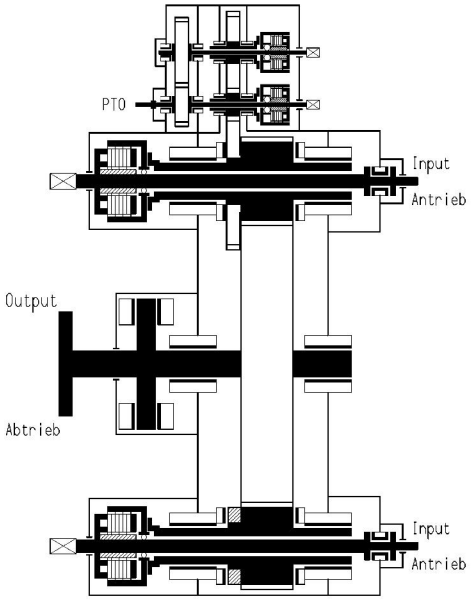


Types	Helical gear units
Power ratings	up to 30,000 kW
Transmission ratios	Up to i = 12.1
Nominal torques	up to 600,000 Nm
PTO	Primary oder secondary

Fields of application

- Single-engine vessels
- Double-engine vessels
- Dredgers





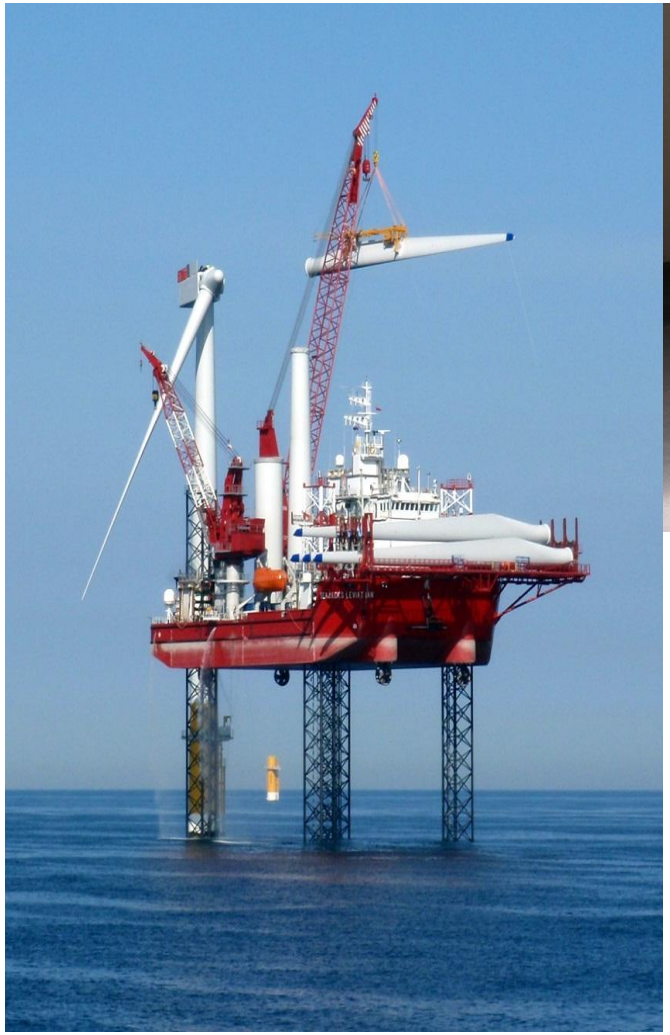
Single Engine Gearbox for Container Carrier

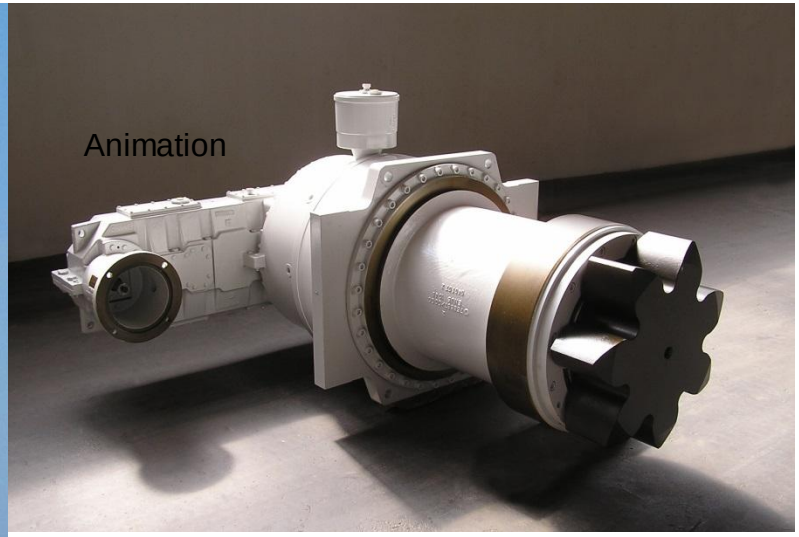
US Container Carriers: „Galveston Bay“; „Sea-Land Value“

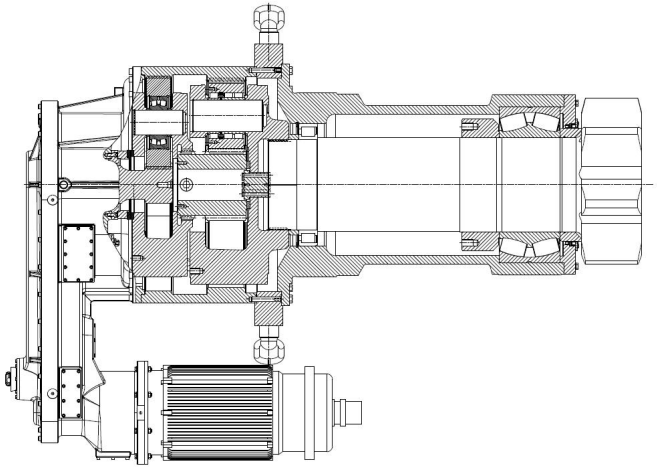
Capacity: 3.652 TEU
Length: 261 m
Breadth: 32,2 m
Engine rating: 24.410 kW
Speed: 21 kn

Gearbox: 1 x NAVILUS® GUG 118/180
Hollow-shaft gear unit, 3.822 kW booster

Jack Up Gear Unit







More than 50% of geared wind turbines world wide are driven with WINERGY gearboxes

SIEMENS

- Pioneered today's design concept for wind turbine gearboxes
- Global market leader for drive train components in wind turbines
- More than 100 GW delivered
- Gearbox rating up to 6.5 MW

Flender Couplings

FLENDER Couplings
General overview

SIEMENS

Overall torque range: 10 … 10.000.000 Nm

Standard size range: 48 … 2800 mm

fluid couplings

constantly filled fluid couplings FLUDEX

torsionally rigid couplings

all-steel disc coupling ARPEX

gear coupling ZAPEX

backlash SIPEX & BIPEX-S

elastomeric couplings

semi-elastomeric couplings

N-EUPEX

N- BIPEX

RUPEX

high elastomeric couplings

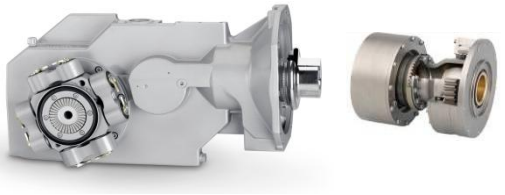
ELPEX

ELPEX-B

ELPEX-S

special couplings

railway couplings

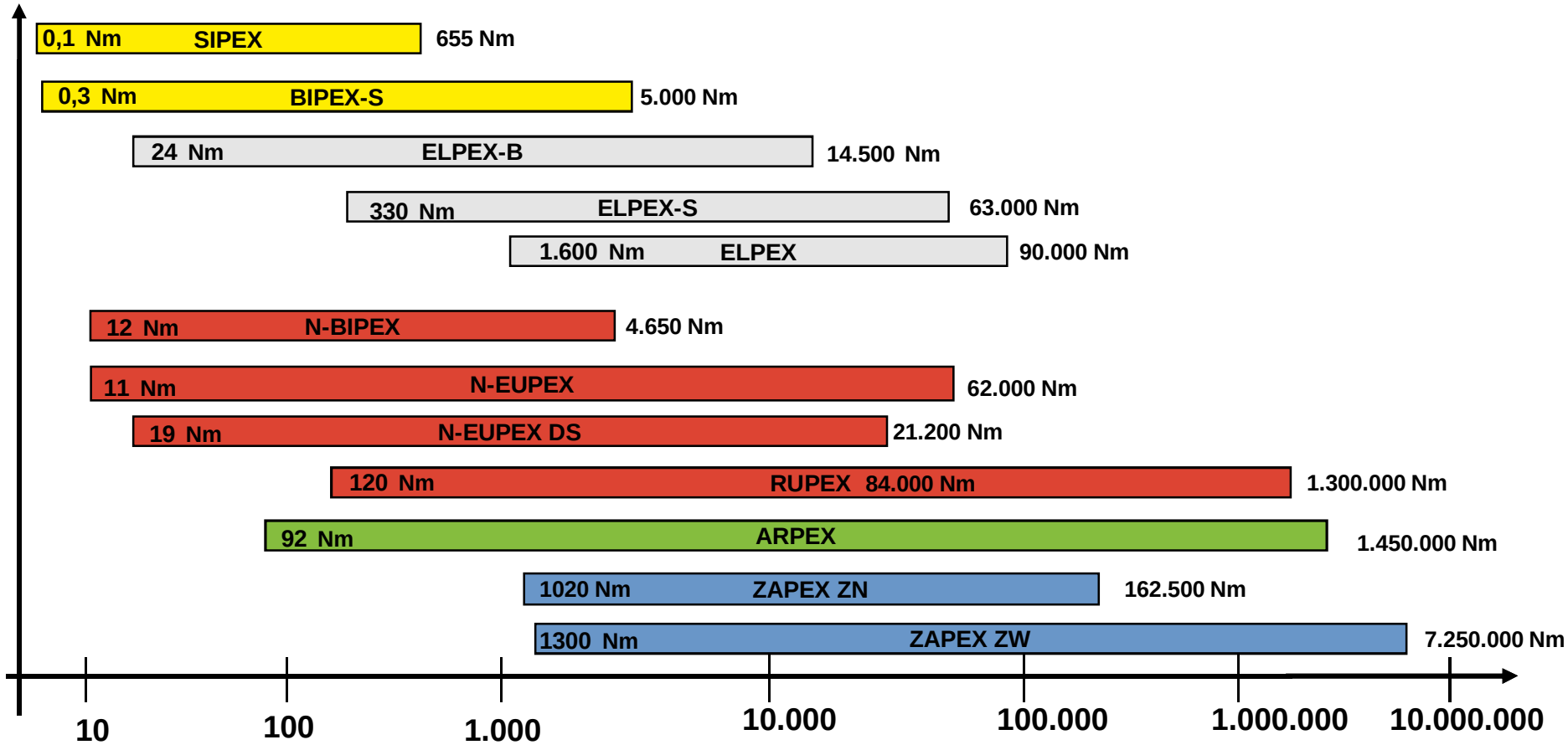


high performance couplings

wind power components

FLENDER couplings
Torque overview

SIEMENS



Torque in TKN [Nm]

Backlash free
Highly flexible
flexible
torsionally rigid

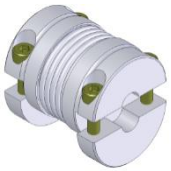
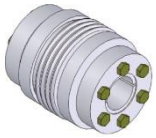
FLENDER Couplings
SIPEX

SIEMENS







- **servo drives**
- **stepper motor drives**
- **rotary encoders**
- **tooling machines**
- **paper & packing machines**
- **medical technology**
- **….**

- **backlash free**
- **angle preserving**
- **low mass moments of inertia**
- **moderate misalignment**
- **wear free & maintenance free**
- **…**

couplings type	metal bellow couplings
characteristics	backlash free, high torsional stiffness -> angle preserving torque transmission; compensation of radial, axial and angular misalignment; low mass moments of inertia; true running characteristics on a high level -> suitable for high rpm
nominal torque	0.5 Nm … 5,000 Nm
permitted circumferential speed	30 m/s
temperature range	–30 ° C to +250 ° C
permitted angular offset	up to 2 °
design	hubs made of aluminium or steel; metal bellows

FLENDER Couplings
BIPEX-S

SIEMENS

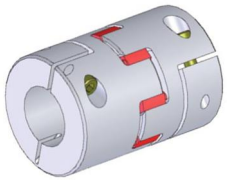
98 Sh A – Standard

92 Sh A

64 Sh D

80 Sh A

- **tooling machines**
- **paper & packing machines**
- **automation**
- **medical technology**
- **….**



- **backlash free**
- **moderate shocks**
- **pluggable**
- **low restoring forces**
- **electrically insolating**
- **…**

couplings type	claw coupling, flexible
characteristics	pretensioned elastomeric elements, filled cam ring, compact design, shock damping
nominal torque	0.5 Nm … 655 Nm
permitted circumferential speed	25 m/s
temperature range	–50 ° C to +120 ° C (for a short period of time -60 ° C up to + 150 ° C)
permitted angular offset	up to 1,1 °
design	various hub designs (clamping hubs; spread hubs; …) ; hubs made out of aluminium; 4 different (various stiffness) cam rings made of PU

FLENDER Couplings
N- BIPEX

bell housing installation

- **bell housing installation**
- **pumps**
- **compressors**
- ***roller tables***
- **…**

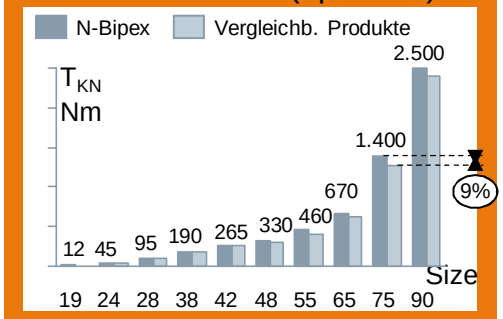
- **moderate shocks**
- **moderate misalignment**
- **available short-time**
- **competitive priced**

couplings type	claw coupling, flexible
characteristics	fail-safe, torsionally flexible, damping
nominal torque	13.5 Nm 4650Nm
permitted circumferential speed	36 m/s
temperature range	–50 ° C to +100 ° C
permitted angular offset	0.1 °
design	available from the standard range: with taper bush, for vertical mounting position

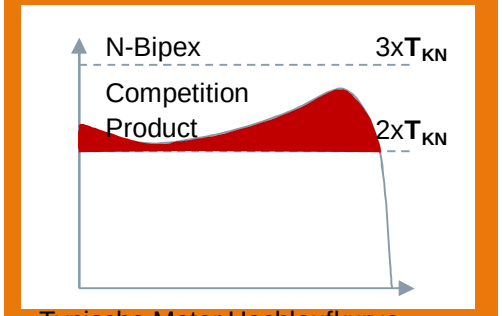
FLENDER coupling
N-Bipex: key take-aways

SIEMENS

Higher torque moments (up to 9%)

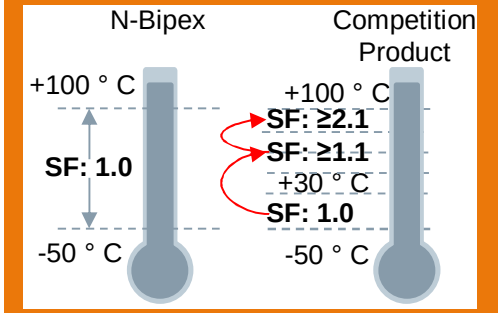


Peak loads 3xT$_{KN}$ vs. 2xT$_{KN}$



Typische Motor Hochlaufkurve

One Servicefactor
-50 ° up to +100 ° C



Only one material

1:3

N-Bipex	Competitior
▪ EN-GJS-400-15	▪ Grauguss GJL225 ▪ Sphäroguss GJS225 ▪ Stahl 250

Marktable Pricing

$$P_{\text{N-Bipex}} \leq P_{\text{vgl. Produkte}}$$

FLENDER couplings
N-EUPEX®

SIEMENS

fail-safe

- **fans / blowers**
- **pumps**
- **compressors**
- **…**

Coupling type	pin coupling, flexible
Features	fail-safe, tore… …ly flexi…
Nominal tor…	
	–50 ° C to +100 ° C
…rm. angular misalignment	0.2 °
Designs	Available from the standard range: with spacer, with brake disk/drum, for vertical mounting position, acc. to directive 94/9/EC Optionally available: with Taper bush, with SAE connection

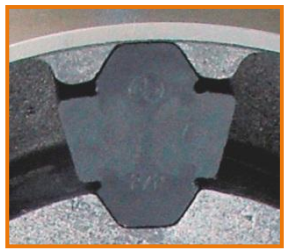
More than 15 million sold!

Mate… ung			Temperatur bereich
NBR		Black elastomeric elements with blue stripe	-30°C…+80°C
NBR w…	65 Shore A	Black elastomeric elements with green stripe	-30°C…+80°C
NBR hart	90 Shore A	Black elastomeric elements with magenta stripe	-30°C…+80°C
NBR standard spielarm	80 Shore A	Black elastomeric elements with yellow stripe	-30°C…+80°C
NBR weich spielarm	65 Shore A	Black elastomeric elements with white stripe	-30°C…+80°C
NR Tieftemperatur	80 Shore A	Black elastomeric elements with orange stripe	-50°C…+50°C
HNBR höhere Temperaturen	80 Shore A	Black elastomeric elements with red stripe	-10°C…+100°C

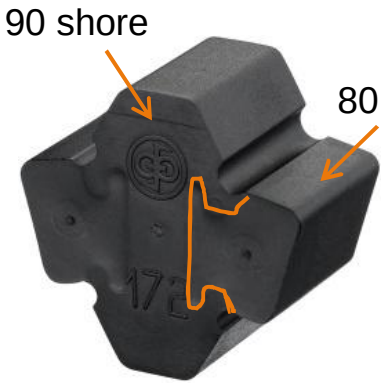
- **moderate shocks**
- **moderate misalignment**
- **available shorttime**
- **competitive priced**
- **…**

FLENDER couplings
N-EUPEX DS®

SIEMENS



non fail-safe



Material/ Beschreibung	Härte	Kennzeichnung		Temperatur bereich
NBR compound für Grösse 66…272	80/90 Shore A	black elastomeric elements		-30°C…+80°C
NBR hart für Grösse 305…556	90 Shore A	black elastomeric elements		-30°C…+80°C
PUelektrisch isolierend	90 Shore A	blue elastomeric elements		-30°C…+50°C

- **pumps**
- **compressors**
- **…**

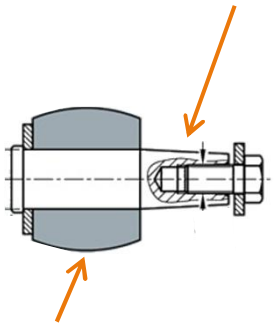
- **moderate shocks**
- **moderate misalignment**
- **available shorttime**
- **competitive priced**
- **…**

Coupling type	Pin coupling, flexible
Features	without fail-safe device, torsionally flexible, damping
Nominal torque	19 Nm to 21,200 Nm
Perm. peripheral speed	36 m/s
Temperature range	–30 ° C to +80 ° C
Perm. angular misalignment	0.2 °
Designs	Available from the standard range: with spacer, for vertical mounting position, acc. to directive 94/9/EC Optionally available: with Taper bush, with creeping current insulation

FLENDER couplings
RUPEX®

SIEMENS

conical bolts
(wear-free disassembly;
avoids fretting corrosion)



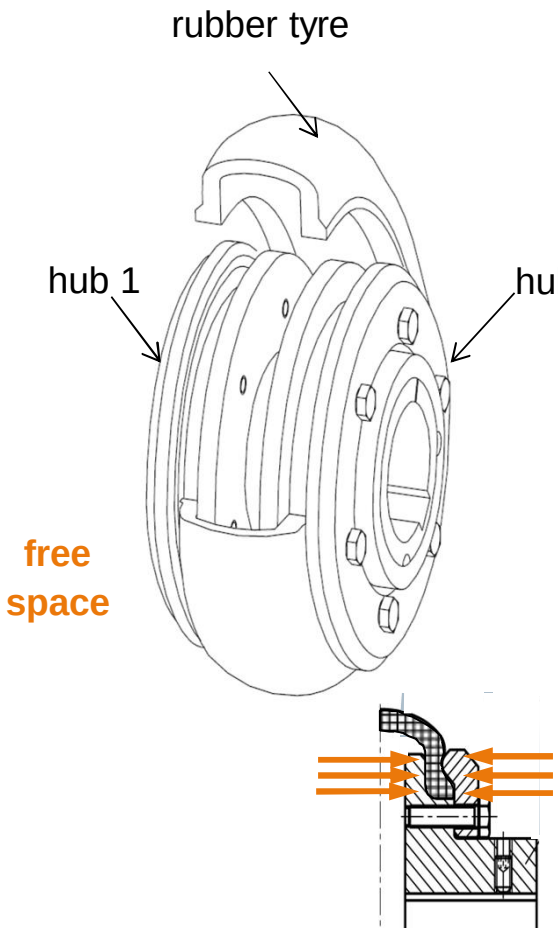
ball shaped
(easy plug in)

- **moderate shocks**
- **moderate misalignment**
- **available shorttime**
- **competitive priced**
- **…**

Coupling type	Pin-and-bush coupling, flexible
Features	fail-safe, torsionally flexible, damping
Nominal torque	200 Nm to 1,300,000 Nm
Perm. peripheral speed	40/60 m/s
Temperature range	–50 ° C to +100 ° C
Perm. angular misalignment	0.2 °
Designs	Available from the standard range: with brake disk/drum, for vertical mounting position, acc. to directive 94/9/EC Optionally available: with Taper bush, with clamping hub, with spacer, with SAE connection, with axial play limiting device, as disengaging coupling, as shear pin coupling, with creeping current insulation

FLENDER couplings
ELPEX B®

SIEMENS



- **roller table drives**
- **pumps**
- **compressors**
- **fans /blowers**
- **shredders**
- **…**

- **heavy shocks**
- **big offset / misalignment**
- **periodical excitation**
- **…**

- **…**

Coupling type	Rubber tyre coupling, highly flexible
Features	without fail-safe device, highly flexible, damping
Nominal torque	24 Nm to 14,500 Nm
Perm. peripheral speed	35 m/s
Temperature range	–50 ° C to +70 ° C
Perm. angular misalignment	4 °
Designs	Available from the standard range: with Taper bush, with spacer, for vertical mounting position Optionally available: with brake disk/drum, with SAE connection, as disengaging coupling

FLENDER couplings
ELPEX S®

SIEMENS

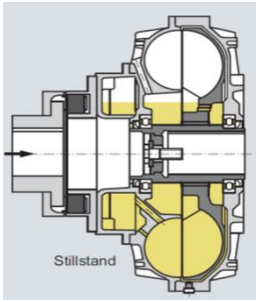
SAE flange connection

- **periodical excitation**
- **heavy shocks**
- **…**

Coupling type	Rubber disk coupling, highly flexible
Features	without fail-safe device, highly flexible, damping
Nominal torque	330 Nm to 63,000 Nm
Perm. peripheral speed	66 m/s
Temperature range	–40 ° C to +120 ° C
Perm. angular misalignment	0.5 °
Designs	Available from the standard range: with Taper bush, with SAE connection, for vertical mounting position, acc. to directive 94/9/EC Optionally available: with spacer, with brake disk/drum, with axial play limiting device, as disengaging coupling, acc. to API 610/API 671, with creeping current insulation

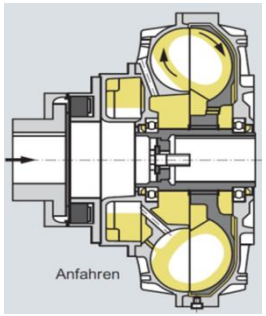
FLENDER couplings
FLUDEX®

SIEMENS

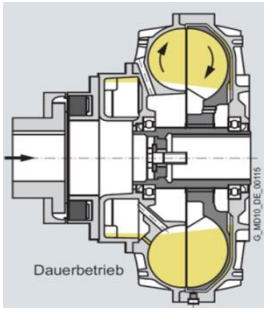


standstill

- **conveyors**
- **shredder**
- **crusher**
- **kneader**
- **…**



start up



continuous operation

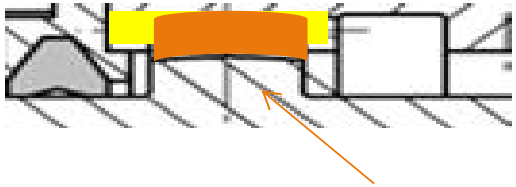
- **soft start**
- **separates vibrations**
- **damps shocks**
- **overload protection**
- **…**

Coupling type	Fluid coupling, hydrodynamic
Features	with operating slip, hydrodynamic
Nominal power rating	0.5 kW to 2,500 kW at 1500 min $^{-1}$
Perm. peripheral speed	80 m/s
Temperature range	–40 ° C to +50 ° C
Perm. angular misalignment	In accordance with the respective add-on coupling
Designs	Available from the standard range: with flexible N-EUPEX add-on coupling, with all-steel ARPEX disc coupling, with brake disk/drum for vertical mounting position, acc. to directive 94/9/EC Optionally available: with SAE connection, with cardan shaft connection, combination possible with all displacement couplings in the Siemens product range

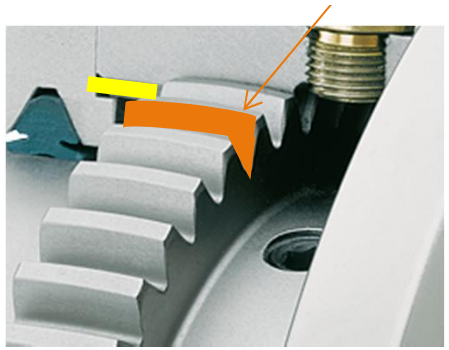
FLENDER couplings
ZAPEX ZW®

SIEMENS

iron-/steel works



spheric teeth



- **robust**
- **compact**
- **highest torques**
- **long spacers**
- **…**

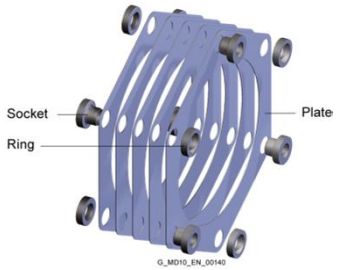
ZAPEX ZW series	
Coupling type	Gear coupling, torsionally rigid
Features	fail-safe, torsionally rigid, double-jointed
Nominal torque	1,300 Nm to 7,200,000 Nm
Perm. peripheral speed	60 m/s
Temperature range	–20 ° C to +80 ° C
Perm. angular misalignment	1 °
Designs	Available from the standard range: with spacer, with brake disk/drum, for vertical mounting position, as disengaging coupling, as shear pin coupling, acc. to directive 94/9/EC Optionally available: with sliding hub, with axial play limiting device, with creeping current insulation

FLENDER couplings
ARPEX ARS/ARC®

SIEMENS

- **turbines / turbo compressors**
- **paper & printing machines**
- **cooling towers**
- **servo drives**
- **pumps (i.e. O&G acc. API)**
- **…**

lamella plate pack:

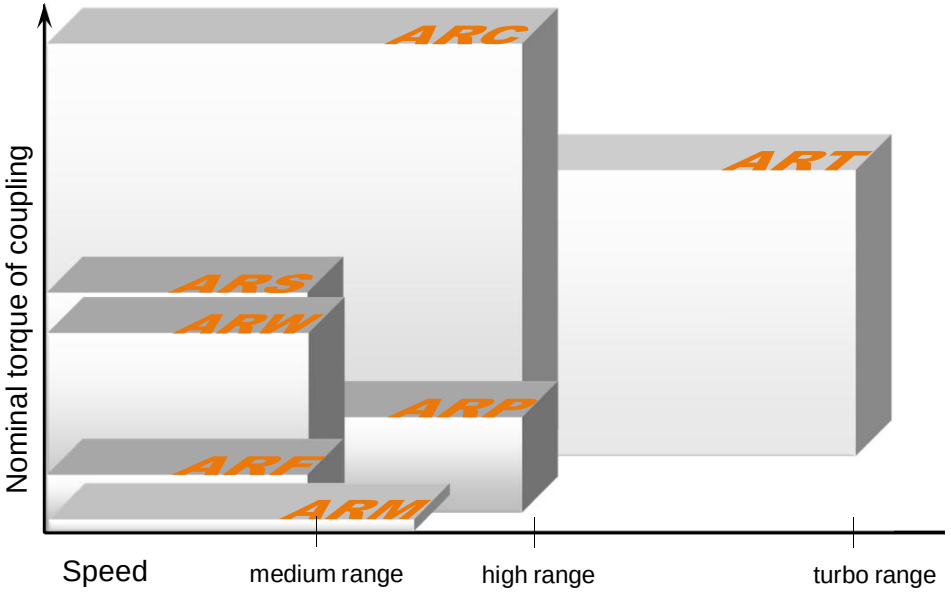


- **high rpm**
- **spacers up to 6m**
- **backlash free**
- **API**
- **high temperatures up to 280 ° C**
- **maintenance free**
- **…**

ARPEX ARS / ARC series	
Coupling type	All-steel disc coupling, torsionally rigid
Features	fail-safe, torsionally rigid, double-jointed
Nominal torque	170 Nm to 1,450,000 Nm
Perm. peripheral speed	55/100 m/s
Temperature range	–40 ° C to +280 ° C
Perm. angular misalignment	0.7 ° / 0.4 ° / 0.3 ° / 0.2 °
Designs	Available from the standard range: with clamping hub, with spacer, acc. to directive 94/9/EC Optionally available: with sliding hub, for vertical mounting position, with axial play limiting device, as disengaging coupling, as shear pin coupling, with creeping current insulation, with Taper bush, with brake disk/drum, with SAE connection

FLENDER couplings
ARPEX various series

ARPEX ARS/ARC®
universal series



ARPEX ART®
turbo series

ARPEX ARW®
big misalignment

ARPEX composite®
spacer length up to 6m

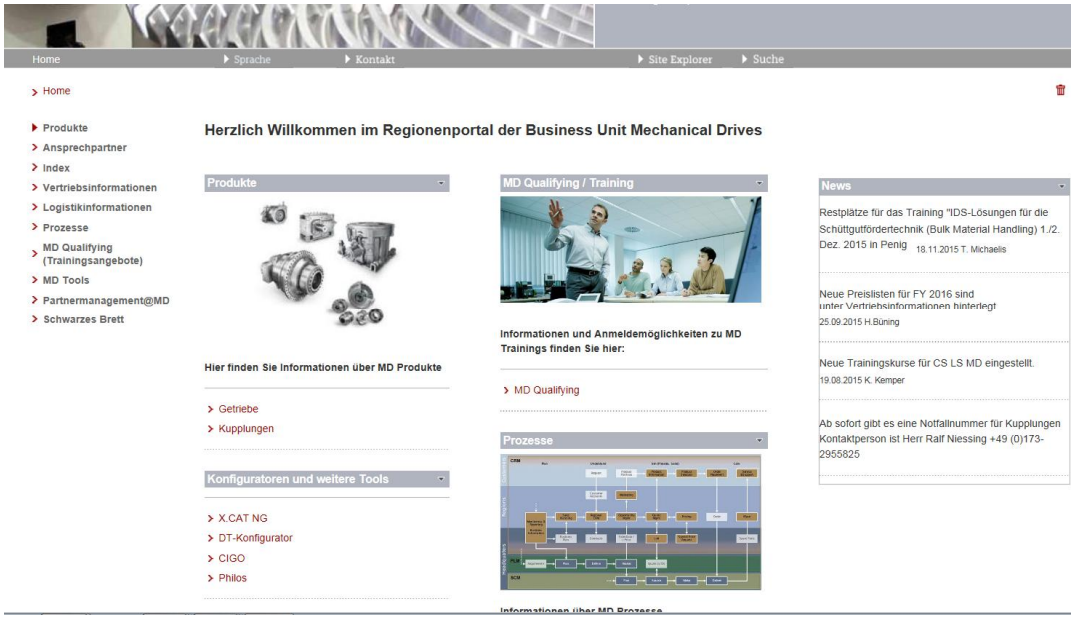
ARPEX ARP®
pump series

Useful Links

MD Regional Portal

Regional Portal

- Link to product catalogues and brochures
- Price lists
- Access to configuration tools and web-based trainings
- Access to documentation of processes



MD Qualifying
Learning path

SIEMENS

BASIC

e-Learning
MD-Qualifying
(Industrial sectors and applications)
WT-MD-AP 2 h

e-Learning
Industry Learning Program
(Organization, Portfolio, Processes)
ILP

e-Learning
MD-Qualifying
(Product portfolio)
WT-MD-Q 2 h

e-Learning
MD-Qualifying
(SIMOGEAR geared motors)
WT-MD-SGM 1,5 h

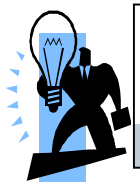
ongoing

Live Meeting
News@MD Application
MD AP current topics
Sharep. Registration by Stefan Hankeln
1 h

ADVANCED

MD Qualifying
Product portfolio
(Bocholt)
DR-MD-Q 3 Days

MD Qualifying
Product portfolio
(in the region)
DR-MD-Q 2 Days



Pilot training Dec. 15

Bulk Material Handling
Application training
MD / LD 2 Days

EXPERT

FLENDER Standard
Industrial Gear Units
Projection
DR-SIG-PL 3 Days

FLENDER couplings
Projection
MD 2 Days

FLENDER Service
Products & Service
misc. module/CS LS MD

- SERCO
- Condition Monitoring
- Field Service & Repair
- Spares & Retrofit

Link zum MD Qualifying

Thank you very much for your attention!

Guido Wiesmann

Siemens AG
Process Industries and Drives
Mechanical Drives
Business Development
PD MD BD 4
Tel: +49 2871 92-2778
Mobile: +49 172 2071767
mailto:guido.wiesmann@siemens.com