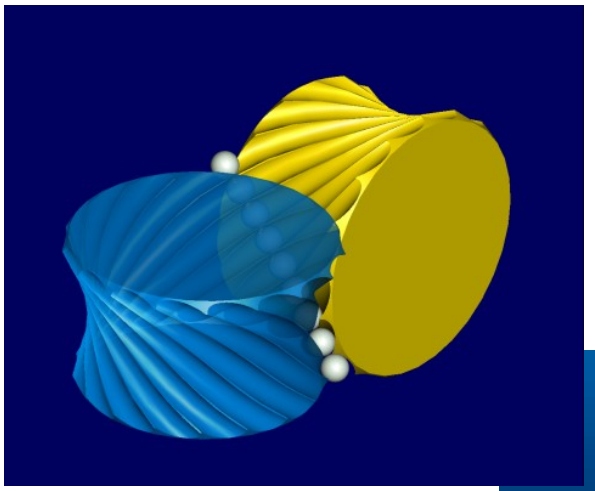
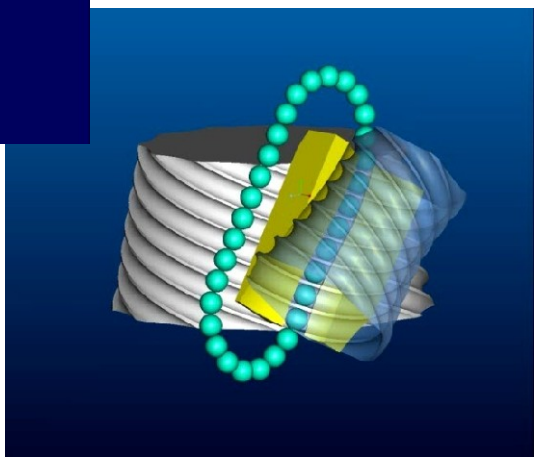
BOGAR DRIVE

DIRECT-LINE KFT.

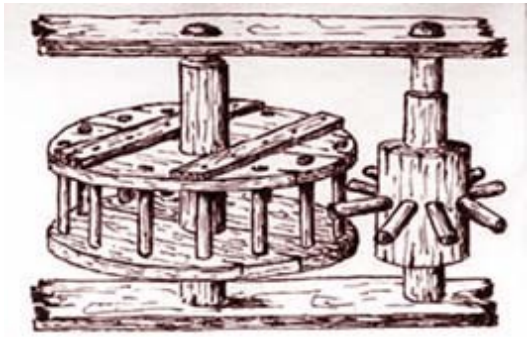
István Bogár:

Roller Gearing Mechanism





Gearwheel has been applied since thousends of years



Ancient, primitive gear:
-Equal pitch on both of the wheels
-Interference-free tooth profile

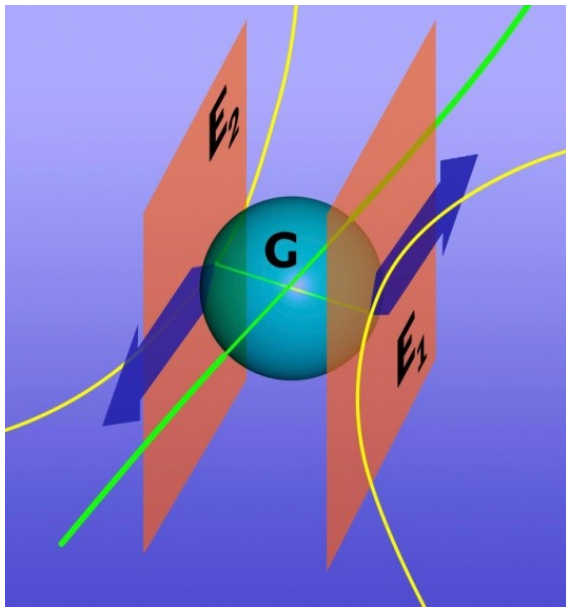


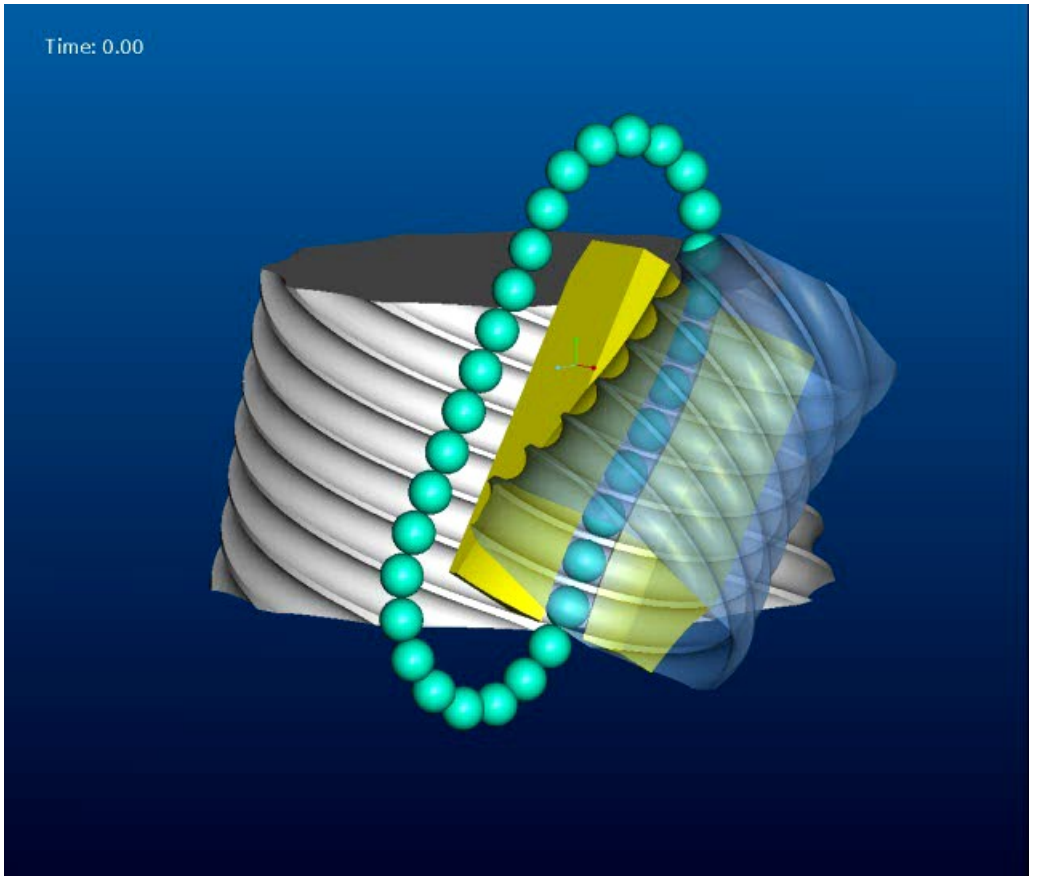
Modern gears:
-Fulfill primitive conditions
-Constant gearing ratio
BUT:
-Sliding friction
-Difficult discharge of back-lash

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How the Roller Gearing Mechanism works?





mathematical theory

BOGAR DRIVE

DIRECT-LINE KFT.

From theory to CAD-design

Input parameters:

-Gearing ratio

-Axis distance

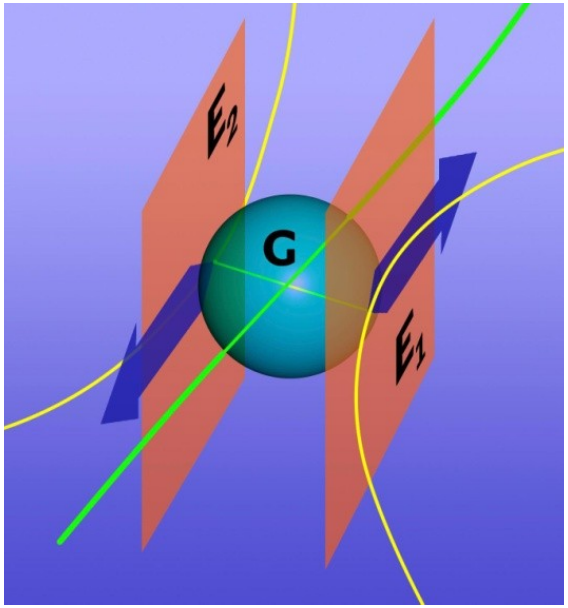
-Axis angle

-Ball diameter

-Direction of force on the ball

-Relative direction of rotation

-One point of the ball center path (coupling path)

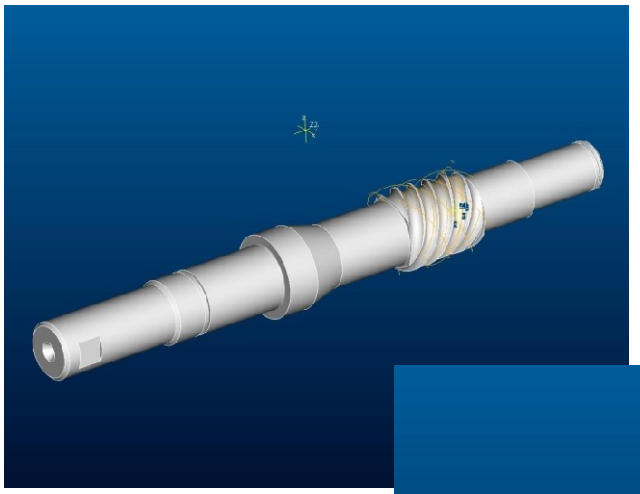


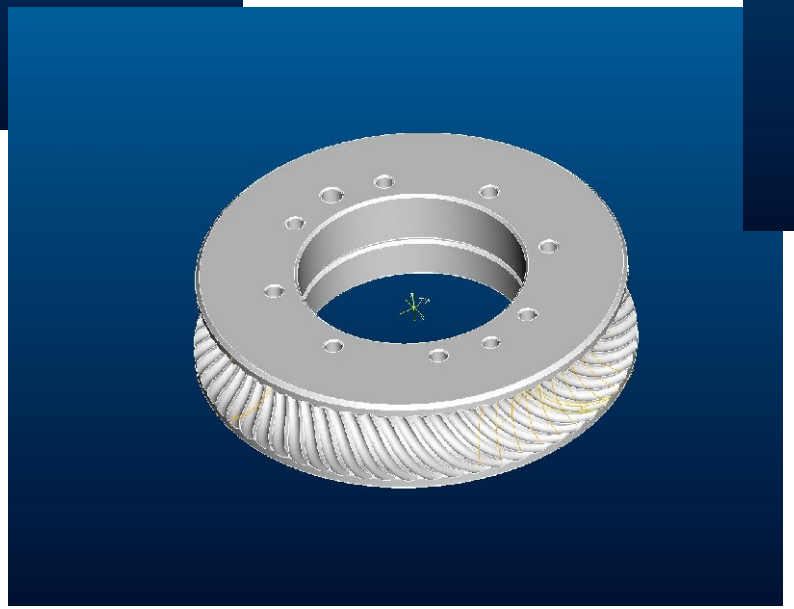
BOGAR DRIVE

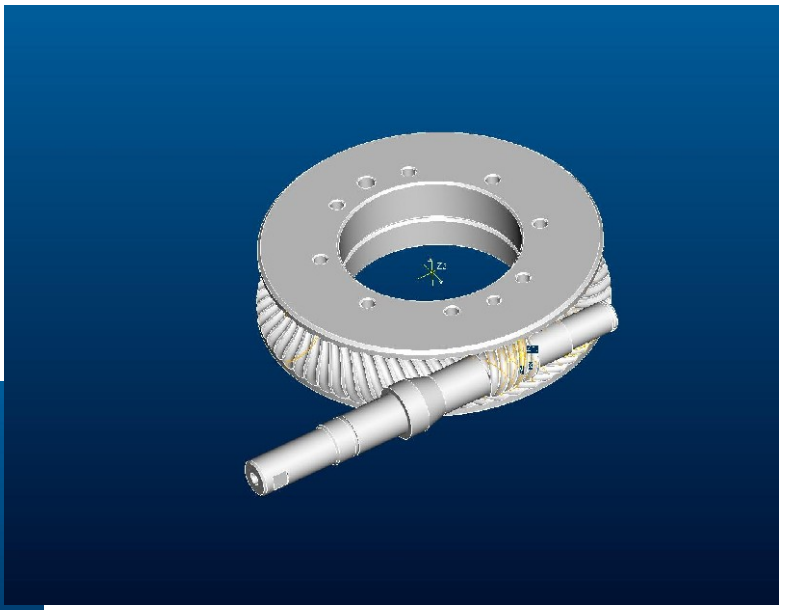
DIRECT-LINE KFT.

From theory to CAD-design

Full CAD-design of wheels







BOGAR DRIVE

DIRECT-LINE KFT.

From theory to CAD-design

Complete design of Roller Gearing Mechanism



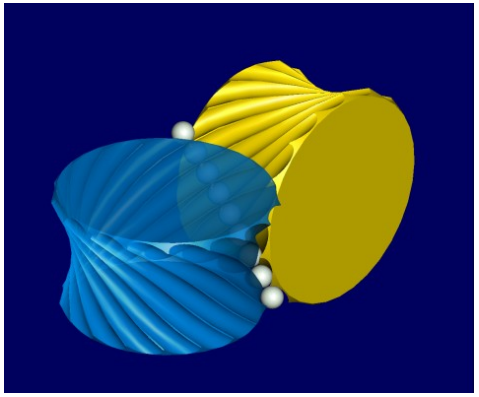


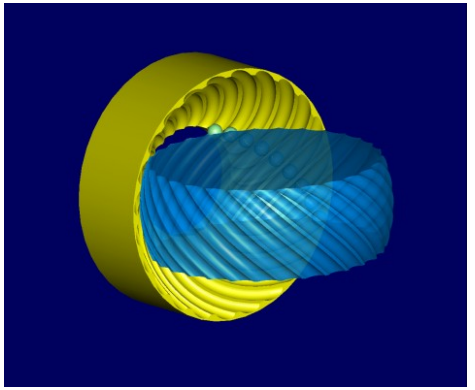
BOGAR DRIVE

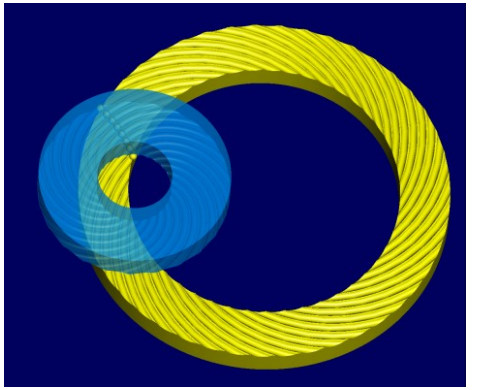
DIRECT-LINE KFT.

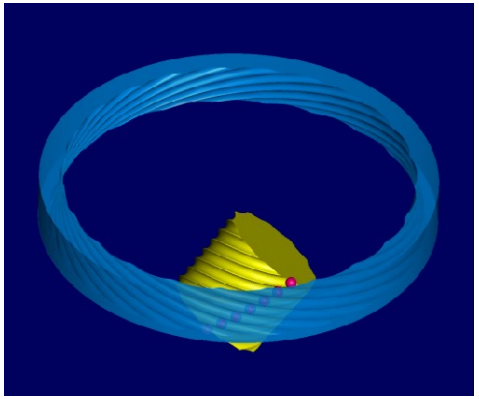
Features

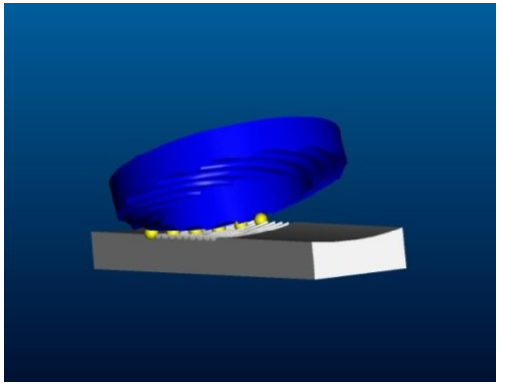
Universally applicable for all gearing problems

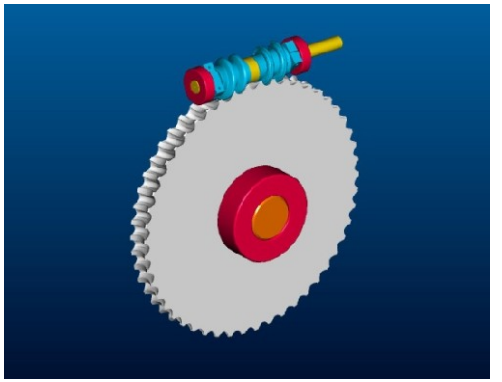








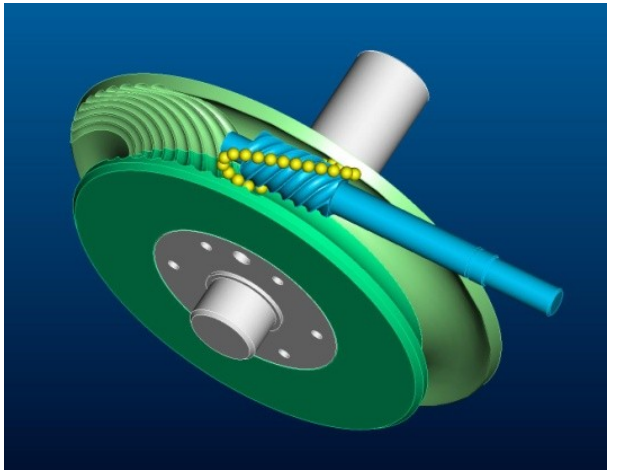




BOGAR DRIVE

DIRECT-LINE KFT.

Features



- *Universally applicable: any angle/offset*
- *High efficiency – both static and dinamic*
- *Low starting torque*
- *Many rollers in coupling*
- *Easy to eliminate backlash (by pre-loading)*
- *Flexibility:*

- diameter ratio of the wheels and gearing ratio are independent from each other

- relative direction of rotation is an input parameter

BOGAR DRIVE

DIRECT-LINE KFT.

Possible areas of application

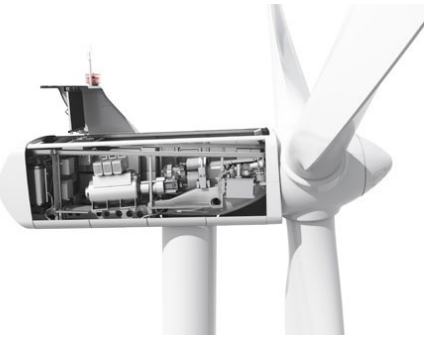
- *Gears with non-intersecting axes*
- *Backlash-free gears*
- *Higher gearing ratio - smaller dimensions*
- *Accelerating gears*
- *Lubrication-free gears*
- *Gears able to operate under extren conditions (cold)*











BOGAR DRIVE

DIRECT-LINE KFT.

Prototypes

Gearing ratio: 10

Non-intersecting axes



BOGAR DRIVE

DIRECT-LINE KFT.

Prototypes

Gearing ratio: 50

Wormgear shaped solution



BOGAR DRIVE

DIRECT-LINE KFT.

Prototypes

Gearing ratio: 10

Gearing for CNC rotary table

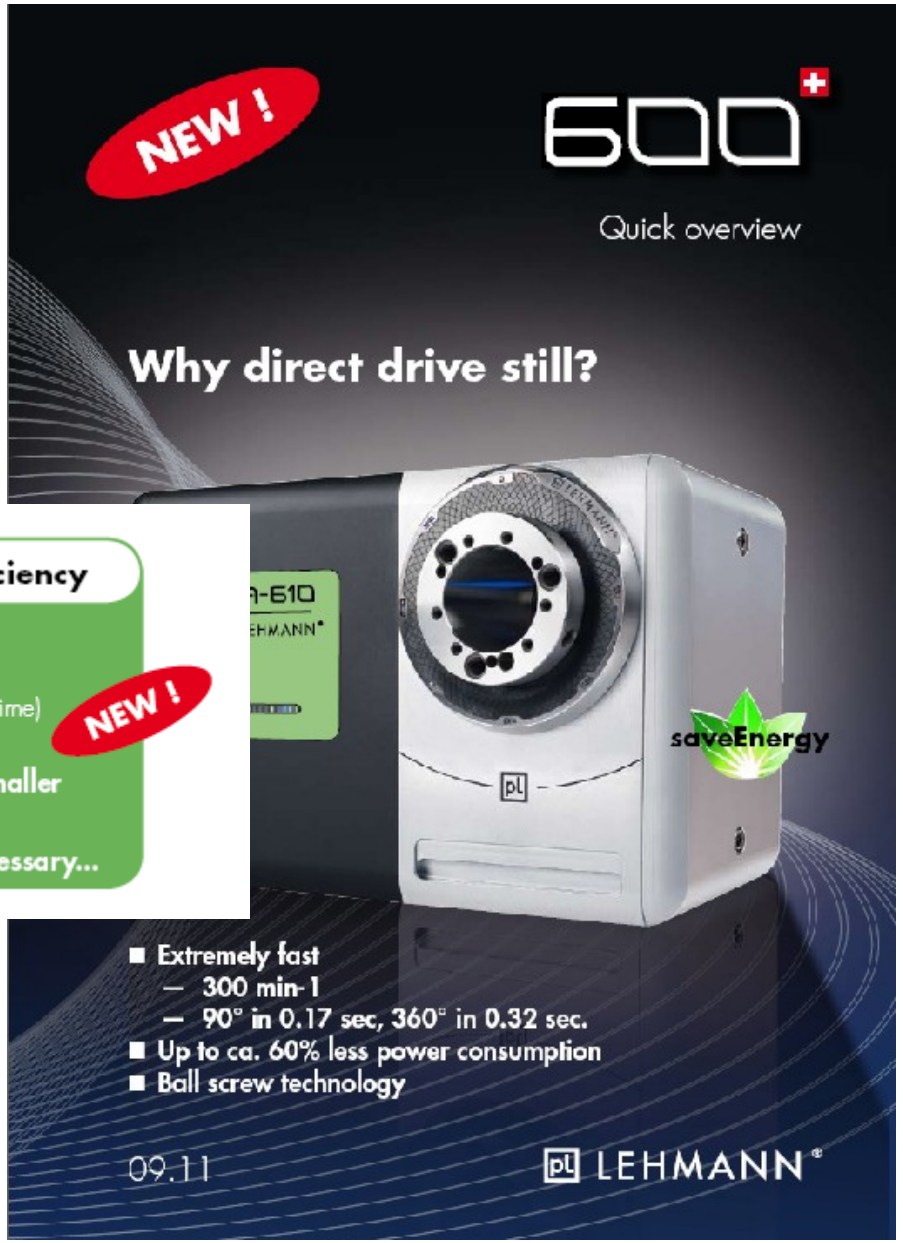




BOGAR DRIVE

DIRECT-LINE KFT.

Application presented in EMO Hannover in september 2011



Advantages compared to direct drives - energy efficiency

- Energy consumption reduced by ca. 60%, less heat
- Servo size only ca. 1/3 (e.g. with EA-610 only 16A compared to 50A)
- Comparable, sometimes even better cycle times (very short clamping time)
- Significantly easier to control
- Ca. 50% smaller, ca. 50% lighter = machine has to carry much smaller loads = machine consumes less energy
- No fail-safe brake, no angular measuring system, no cooling necessary...

NEW !

BOGAR DRIVE

DIRECT-LINE KFT.

Comparing

Roller Gearing Mechanism

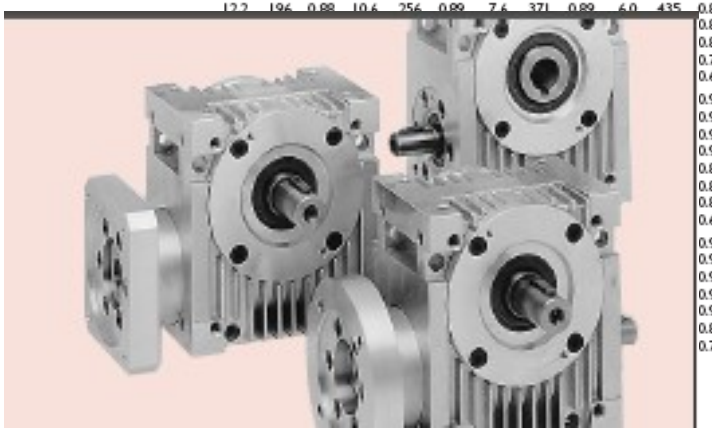
Gearing ratio: 10
Axis distance: 50 mm
Axis angle: 90°
Efficiency: 95-97% !



Conventional gear

Leistungstabellen **Tableau des caractéristiques** **Efficiency tables**

			n_1 (min^{-1}) 6000			4500			3000			1500			1000			500		
Typ	i	T_{2max}	P_1	T_{2N}	η	P_1	T_{2N}	η	P_1	T_{2N}	η	P_1	T_{2N}	η	P_1	T_{2N}	η	P_1	T_{2N}	η
030	4.63	20	1.16	6.57	0.77	0.99	7.64	0.78	0.76	9.12	0.81	0.46	11.33	0.83	0.34	12.33	0.83	0.19	13.51	0.82
	5.57		0.95	6.37	0.76	0.81	7.37	0.77	0.63	8.74	0.79	0.37	10.74	0.81	0.27	11.63	0.81	0.15	12.67	0.80
	6.83		0.82	6.54	0.73	0.70	7.53	0.74	0.54	8.88	0.76	0.32	10.82	0.79	0.23	11.68	0.79	0.12	12.67	0.78
	8.60		0.73	6.86	0.69	0.62	7.88	0.70	0.47	9.25	0.72	0.27	11.21	0.76	0.19	12.06	0.76	0.11	13.05	0.75
	11.25		0.61	7.23	0.66	0.52	8.28	0.67	0.39	9.69	0.69	0.23	11.68	0.71	0.16	12.55	0.72	0.09	13.54	0.71
	15 1/3		0.50	7.33	0.60	0.41	8.39	0.63	0.31	9.80	0.65	0.18	11.77	0.66	0.13	12.62	0.66	0.07	13.60	0.64
	23.50		0.42	7.46	0.48	0.33	8.52	0.52	0.25	9.94	0.54	0.14	11.91	0.55	0.10	12.76	0.56	0.06	13.74	0.55
	47.00		0.27	7.51	0.37	0.20	8.57	0.42	0.15	9.99	0.44	0.09	11.96	0.45	0.06	12.80	0.46	0.03	13.77	0.45
045	4.63	80	3.64	22.5	0.84	3.20	26.9	0.86	2.61	33.5	0.87	1.71	44.3	0.88	1.28	49.7	0.88	0.74	56.6	0.86
	5.57		3.02	22.0	0.82	2.64	26.2	0.84	2.13	32.3	0.86	1.37	42.3	0.87	1.02	47.1	0.87	0.59	53.2	0.85
	6.83		2.61	22.7	0.80	2.26	26.9	0.82	1.81	33.0	0.84	1.15	42.8	0.85	0.85	47.5	0.85	0.49	53.3	0.83
	8.60		2.27	23.9	0.77	1.95	28.3	0.79	1.55	34.6	0.82	0.98	44.5	0.83	0.72	49.2	0.83	0.41	55.0	0.81
	11.25		1.91	25.3	0.74	1.65	29.8	0.76	1.30	36.3	0.78	0.81	46.5	0.80	0.60	51.2	0.79	0.34	57.1	0.77
	15 1/3		1.57	25.7	0.67	1.31	30.3	0.71	1.03	36.8	0.73	0.64	46.9	0.75	0.47	51.6	0.75	0.27	57.4	0.72
	23.50		1.19	26.2	0.59	0.98	30.8	0.63	0.77	37.4	0.65	0.48	47.5	0.66	0.35	52.3	0.66	0.20	58.0	0.64
	47.00		0.77	26.4	0.46	0.62	31.0	0.50	0.48	37.6	0.52	0.30	47.7	0.53	0.22	52.5	0.53	0.13	58.2	0.50
060	4.63	200	7.88	50	0.87	7.11	62	0.88	6.00	79	0.89	4.15	109	0.90	3.19	126	0.89	1.90	148	0.88
	5.57		6.52	50	0.86	5.84	60	0.87	4.89	76	0.88	3.33	105	0.89	2.54	120	0.89	1.50	139	0.87
	6.83		5.62	51	0.84	5.00	62	0.86	4.15	78	0.87	2.80	107	0.88	2.12	121	0.87	1.25	140	0.86
	8.60		4.85	54	0.82	4.30	65	0.83	3.54	82	0.85	2.36	111	0.86	1.79	126	0.85	1.05	145	0.84
	11.25		4.10	57	0.78	3.61	69	0.80	2.96	87	0.82	1.96	116	0.83	1.48	131	0.82	0.87	150	0.80
	15 1/3		3.28	59	0.73	2.86	70	0.75	2.33	88	0.77	1.53	118	0.79	1.16	132	0.78	0.68	151	0.76
	23.50		2.49	60	0.64	2.14	72	0.67	1.72	89	0.70	1.12	119	0.71	0.85	134	0.71	0.50	152	0.68
	47.00		1.68	60	0.48	1.39	72	0.52	1.09	90	0.55	0.71	120	0.56	0.53	135	0.56	0.32	153	0.54
090	4.63	800				20.3	182	0.91	17.9	241	0.92	13.3	359	0.92	10.6	429	0.92	6.6	533	0.91
	5.57					16.7	179	0.90	14.6	236	0.91	10.7	347	0.92	8.5	411	0.91	5.2	505	0.90
	6.83					14.3	185	0.89	12.4	243	0.90	9.0	354	0.91	7.1	418	0.91	4.4	509	0.89
	8.60					12.2	196	0.88	10.6	256	0.89	7.6	371	0.89	6.0	435	0.89	3.7	527	0.88
	11.25																0.87	3.0	549	0.85
	15 1/3																0.83	2.3	550	0.82
	23.50																0.77	1.6	549	0.75
	47.00																0.63	1.0	551	0.61
120	4.63																0.93	16.8	1378	0.93
	5.57																0.93	13.3	1311	0.92
	6.83																0.92	11.1	1326	0.92
	8.60																0.91	9.3	1376	0.90
	11.25																0.89	7.6	1437	0.88
	15 1/3																0.86	5.8	1443	0.85
	23.50																0.81	4.1	1438	0.79
	47.00																0.68	2.4	1445	0.66
180	6																0.95	46.7	5091	0.95
	8																0.94	41.4	5950	0.94
	10																0.94	31.2	5553	0.93
	13 1/3																0.92	23.5	5473	0.92
	16																0.90	22.2	6100	0.90
	24																0.87	15.2	5963	0.86
	47																0.77	8.6	5920	0.76



n_1	(min^{-1})	:	Eintriebsdrehzahl / Vitesse d'entrée / input speed
T_{2Max}	(Nm)	:	Max. Drehmoment bei Not – Aus / Couple max en cas d'arrêt d'urgence / Max. torque in case of ergency stop.
T_{2N}	(Nm)	:	Nenndrehmoment am Abtrieb / Couple de sortie nominale / Nominal output torque
P_1	(kW)	:	Eintriebsleistung / Puissance d'entrée / Input power
η		:	Wirkungsgrad / Rendement / Efficiency

Thank You for Your attention!

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