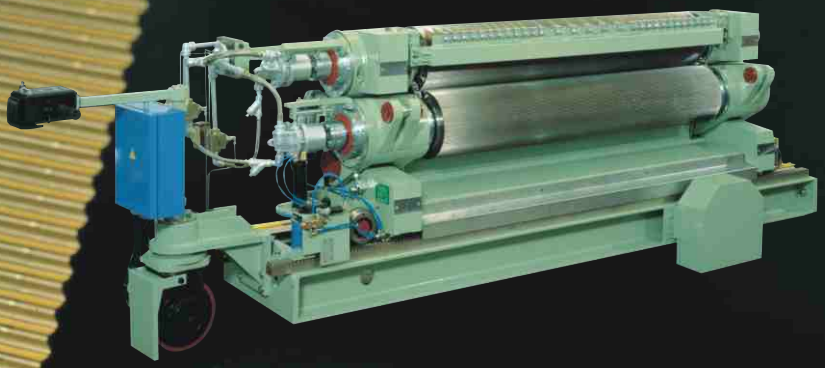
We have the solution...

...the future has a name

LUBCON®



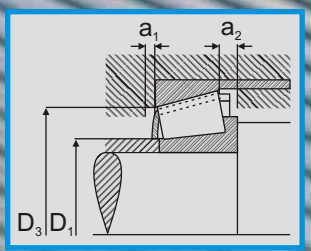
HT/HL

Lubricating grease for various types of rolling bearings, subject to high loads, high and extreme temperatures, with favourable friction behaviour

CERTIFIED IQNet MANAGEMENT SYSTEM

ZERTIFIZIERT DIN ISO 14001 QUALITÄTSMANAGEMENTSYSTEM Reg.-Nr. 17581-04

ZERTIFIZIERT DIN ISO 9001 QUALITÄTSMANAGEMENTSYSTEM Reg.-Nr. 17581-04



LUBCON TURMOTEMP®

LP 2502

LP 5002

Your Partner
for the Lubrification of Bearings

The high efficiency of the **LUBCON** lubricants is proven by

- **long service life**
- **good running properties**
- **high operational reliability**

In many machines containing rolling bearings a lubrication for life is used nowadays to avoid the troublesome relubrication which might even imperil the good function of the machine.

This applies above all to ball bearings which are subject to moderate loads. The k_f-values of the known service life diagram of greases (see **diagram 1**, **p. 8**) are low for ball bearings and thus guarantee sufficiently long lubrication intervals or a lubrication for life.
The lubrication interval is, of course, shorter than the service life of the grease. For rolling bearing types with higher demands on the lubrication, such as tapered roller bearings and spherical roller bearings, the k_f-values are, however, definitely higher and consequently allow only moderate lubrication intervals of about 30 % of the lubrication intervals of ball bearings.

Machines for the corrugated board industry are subject to high loads and thus require bearing types providing a particularly high load carrying capacity and a high resistance to extreme service conditions, e. g. high temperatures. Such points of application, as for instance the bearing of the corrugated roll (see **fig. 1**), can only be operated safely over long lubricating intervals if the lubricating greases used are specificly conceived for such high demands.

Lubricating greases containing a temperature resistant thickener as well as efficient base oils and additives have proved of good results. Such high performance greases show favourable reducing factors in the field application (see **table 5**, **p. 8**) and guarantee long lubricating intervals.

For the other lubricating points of the corrugating machines - such as knives, spindles and chains - efficient lubricants tailor-made to the demands of modern machines are, of course, also required. Last but not least, an assembly paste which has proved of good results is also indispensable for the assembly works on corrugating machines.

In the following, lubricants are described which are excellently suitable for the mentioned lubricating points. Their efficiency is documented by technical data and proved in sophisticated mechanical dynamical tests.

High Performance Grease TURMOTEMP® LP 2502 - Properties and Performance

The technical information of the lubricating grease **TURMOTEMP® LP 2502** (**table 1**, **p. 5**) presents a grease which has worldwide proved of good results for bearings of corrugated-, press- and preheating rolls.

The base oil of this grease is a PFPE-oil, its viscosity at +40 °C is approximately 250 mm^2/s.
Another version of this grease is called **TURMOTEMP® LP 5002**, it has the same structure as **TURMOTEMP® LP 2502**, its base oil viscosity, however, is approximately 500 mm^2/s and therefore it is better suitable for bearings running at low speeds.
Both lubricating greases show a good lubricity at high temperatures.

TURMOTEMP LP 2502 is also suitable for high speeds and is consequently considered as standard grease for corrugating machines.

The specific lithium soap used as thickener provides good lubricity to the grease even when used for rolling bearing types subject to high requirements in terms of lubrication engineering. Good protection against corrosion and wear as well as compatibility with elastomers and bearing materials are assured. The application range and the advantages of the grease **TURMOTEMP® LP 2502** are documented in **table 3**, **p. 6**.

The grease life-time diagram (**diagram 1**, **p. 8**) results from tests partly run until bearing failure and allows to calculate the lubrication intervals.
The infrared spectrum of **TURMOTEMP® LP 2502** in comparison to the PFPE/PTFE paste (**diagram 2**, **p. 8**) clearly illustrates the typical differences between grease and paste.

Fig. 1: Corrugated roll

The indications made concerning the application range and the grease life-time diagram are based upon test runs on the known, standardized test machines FE9 acc. to DIN 51821 and FE8, acc. to DIN 51819.
From the results of these complicated tests, the designer of lubricating greases recognizes the efficiency of his products already in the stage of development.

Diagram 4, **p. 10** shows the results of an FE8 test run carried out with tapered roller bearings as test bearings. The test conditions chosen correspond to those of a corrugated roll bearing subject to a relatively high speed. The wear rates of the bearing parts are low and meet with the requirements of the rolling bearing industry, as shown in the **table 7**.
The tactile recorder printouts of the test bearing flanges hardly reveal any running-in (see **fig. 7**, **p. 10**). The running treads of rollers and inner ring show a texture corresponding to the low wear (**fig. 5**, **p. 9**).

In comparison to these test results, the test was run under the same test conditions with a PFPE/PTFE paste lubrication. The composition of this paste is almost the same as that of the lubricating grease **TURMOTEMP® LP 2502**, except for the thickener.

The test run (**diagram 5**, **p. 10**) and the tactile recorder printout of the flange surface (**fig. 8**, **p. 10**) as well as the texture of the treads (**fig. 6**, **p. 9**) in total show definitely less favourable results, whereby the increased wear of the bearing parts, the unsteady friction behaviour, the increased running-in wear of the flange surfaces play an important role in this evaluation.

The test run with the grease **TURMOTEMP® LP 2502** was performed under test conditions that correspond to the application conditions of the corrugated roll bearing at a moderate speed, but in this case spherical roller bearings were used as test bearings. The test was run with operational intermissions during weekends up to a service time of 500 hours and, after a total service time of 973 hours, the results showed moderate wear rates of under 12 mg for the rollers, of under 70 mg for the rings and of under 170 mg for the cages, as illustrated by the **diagram 3**, **p. 9** and the photo of the tread of one of the inner rings (**fig. 4**, **p. 7**).

The temperature resistance of the grease **TURMOTEMP® LP 2502** was proved successful in FE9 test runs at +200 °C, as demonstrated in **diagram 6**, **p. 11**. The service time reached of F_{50} = 300 hours points to an upper temperature limit of at least +220 °C.

Lubrication of the Flanks of Corrugated Rolls, Grooved Elements and Knives as well as of the Disc-Cut System

Grooved elements and flanks of corrugator rolls, knives and the Disc-Cut system (**fig. 2 + 3**, **p. 6** and **fig. 9**, **p. 12**) are to be lubricated with the products **TURMOCUT® VP 65-91**, **TURMOCUT® VG 22** and **TURMOCUT® SI 22**. The indicated products are suitable for various temperature ranges.
The lubricants provide the required lubricating effect and prevent that glue sticks to the functional surfaces.

For the technical data of **TURMOCUT® line** please refer to the **page 12**.

Lubrication of Spindles and Chains with TURMOFLUID® ED 13

This universally applicable synthetic lubricating oil shows a good spreading effect. Owing to the excellent creeping behaviour, the oil reaches even hardly accessible lubrication points. The specific active material compound allows an application even on wet metal parts, where due to its water separation ability and to the high metal affinity, an optimum lubrication and also a good corrosion protection is assured.
The technical data of **TURMOFLUID® ED 13** are shown on the **page 12**.

Assembly Works Supported by TURMOPAST® NBI 2 white

This paste has three essential properties:

- The paste prevents direct contact to surfaces rolling or sliding against each other and avoids local weldings. This is realized by a chemical bond of the paste with the parts in contact, tribocorrosion is avoided.
- When applying the paste, the asperities of the contact area become smaller. Due to the smoothing of the surfaces, the pressure load in the contact area is transmitted to a larger surface.
- Solid lubricants with a low shear resistance, such as **TURMOPAST® NBI 2 white**, offer a low kinetic resistance due to their lamellar structure and thus have a low moment of friction when used for rolling bearings.

According to experience, a thin layer is sufficient, as the asperities of the parts are mostly minor. It is, however, important that all contact areas are covered with such a thin film.
For the technical data of **TURMOPAST® NBI 2 white** please refer to the **page 12**.

Table 1: Technical data of **TURMOTEMP® LP 2502**

Technical data	TURMOTEMP® LP 2502	proved acc. to
Service temperature range (°C)	-30 up to +250	
Colour	light beige	
Structure	homogeneous/ creamy	
Density at +20 °C (g/cm^3)	1.7	
Base oil viscosity +40 °C/+100 °C (mm^2/s)	PFPE 250/26	DIN 51562
Thickener	Li-special	
Worked penetration (mm/10)	265 - 295	DIN ISO 2137
Drop point (°C)	>+250	DIN ISO 2176
VKA welding force (N)	> 5 500	DIN 51350 pt4
Flow pressure at -30 °C (hPa)	< 1 600	DIN 51805
Water resistance 3h/ +90 °C, rating	0 - 90	DIN 51807
Corrosion protection acc. to SKF Emcor	0 - 0	DIN 51802
Copper corrosion 24 h/+100 °C	0 - 100	DIN 51811
Speed factor $n \cdot d_m$ (min^{-1} · mm)	500 000	
Oil separation +40 °C/+100 °C (%)	approx. 1.0 approx. 2.5	DIN 51817
Contents of solid foreign matter, particle 25 µm (mg)	< 5	

Table 2: Technical data of **TURMOTEMP® LP 5002**

Technical data	TURMOTEMP® LP 5002	proved acc. to
Service temperature range (°C)	-30 up to +260	
Colour	light beige	
Structure	homogeneous/ creamy	
Density at +20 °C (g/cm^3)	1.7	DIN 51757
Base oil viscosity +40 °C/+100 °C (mm^2/s)	PFPE 485/45	DIN 51562
Thickener	Li-special	
Worked penetration (mm/10)	265 - 295	DIN ISO 2137
Drop point (°C)	>+250	DIN ISO 2176
VKA welding force (N)	> 5 500	DIN 51350 pt4
Flow pressure at -30 °C (hPa)	< 1 600	DIN 51805
Water resistance 3h/ +90 °C, rating	0 - 90	DIN 51807
Corrosion protection acc. to SKF Emcor	0 - 0	DIN 51802
Copper corrosion, 24 h/+100 °C	0 - 100	DIN 51811
Speed factor $n \cdot d_m$ (min^{-1} · mm)	300 000	
Oil separation +40 °C/+100 °C (%)	approx. 1.0 approx. 2.5	DIN 51817
Content of solid foreign matter, particle 25 µm (mg)	< 5	

Behaviour towards FPM elastomer, 14 days/+200 °C	Intitial value	Value after testing or change	proved acc. to
Hardness Shore A	75	74	DIN 53505
Change in volume (%)		3.2	DIN 53521
Tensile strength (N/mm^2)	11.8	11.5	DIN 53504
PAEK-GF 20, 42 days/+200 °C			
Bending strength σbB (N/mm^2)	198	220	DIN 53452
Perimeter fibre elongation εbB (%)	3.7	3.5	DIN 53452

Behaviour towards FPM elastomer, 14 days/+200 °C	Intitial value	Value after testing or change	proved acc. to
Hardness Shore A	75	74	DIN 53505
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PAEK-GF 20, 42 days/+200 °C			
Bending strength σbB (N/mm^2)	198	220	DIN 53452
Perimeter fibre elongation εbB (%)	3.7	3.5	DIN 53452

Table 3: Application range of TURMOTEMP® LP 2502 at load ratio P/C = 0.05 and temperature up to +200 °C

Bearing	Speed factor $n \cdot d_m$ ($min^{-1} \cdot mm$)
Ball bearing Taper roller bearing and spherical roller bearing	500 000 250 000

Comparison of field-conditions: Application conditions of bearings in corrugated-, press- and preheating rolls.

Bearing	Speed factor $n \cdot d_m$ ($min^{-1} \cdot mm$)	Life-time
Taper roller bearing Spherical roller bearing	60 000 ... 100 000 at P/C < 0.05 and temperatures +170 ... +210 °C	1. Generation: Shaft hardened, grinded, 1.5 years, i. e. 20 Mill. meter corrugated board 2. Generation: Shaft chromium plated, 2 years, i. e. 30 Mill. meter corrugated board 3. Generation: Shaft coated with tungsten, 4 years, i. e. 70 Mill. meter corrugated board

Influence of speed factor on lubrication interval - see **diagram 1**, **p. 8**.

Advantages of TURMOTEMP® LP 2502/5002

Why is the grease **TURMOTEMP® LP 2502** (or **TURMOTEMP® LP 5002**) so favourable for the lubrication of roller bearings?

- A lithium soap is used as a thickener providing a high dropping point of >+250 °C and thus softening at a higher temperature. Consequently, the grease flows back to the point of contact leading indirectly to a relubrication of such points of lubrication. This very important characteristic is the reason why the lubricating effect is outstanding even in roller bearing types which are subject to high requirements in terms of lubrication engineering.
- The grease shows good lubricating properties over extended service times. The long lubrication interval can be calculated by means of the grease life-diagram for **TURMOTEMP® LP 2502**.
- The good lubricating effect results in low wear rates, approximately only 1/6 of the wear that has to be tolerated with various PFPE/PTFE pastes.
- The grease shows good damping properties and provides low noise operation.
- With **TURMOTEMP® LP 2502** the user saves **13 %** compared to the PFPE/PTFE containing pastes: The weight of one litre of the grease **TURMOTEMP® LP 2502** is 1.73 kg, whereas that of one litre of PFPE/PTFE paste is 1.96 kg.
  It is the weight that has to be paid for, but it is the volume that counts for the lubrication of the bearings!
- The grease is non-poisonous, not detrimental to health, not subject to identification.
- There is no special cleaner required.
- The grease can be mixed with PFPE/PTFE containing pastes without any disadvantages.
- The grease is not water-soluble, there is no risk of a washing-out effect caused by the formation of condensate.

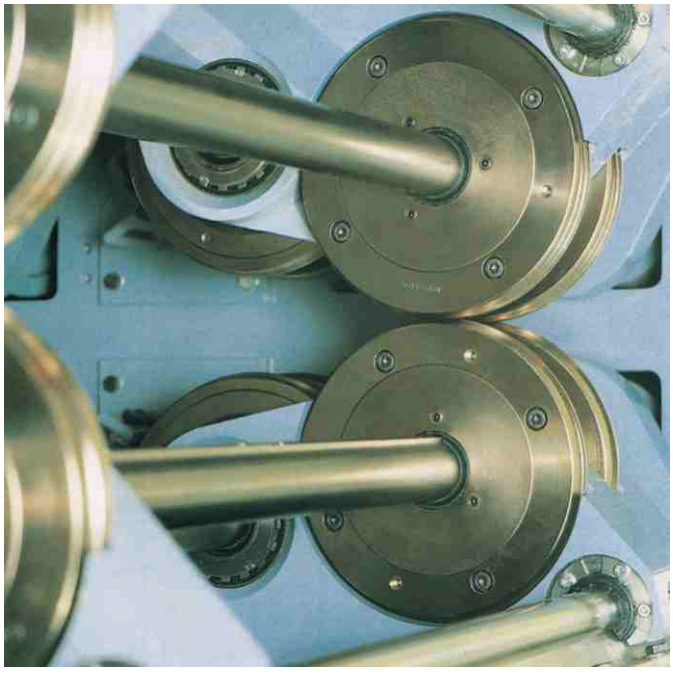


Fig. 2:
Tool body grooving element

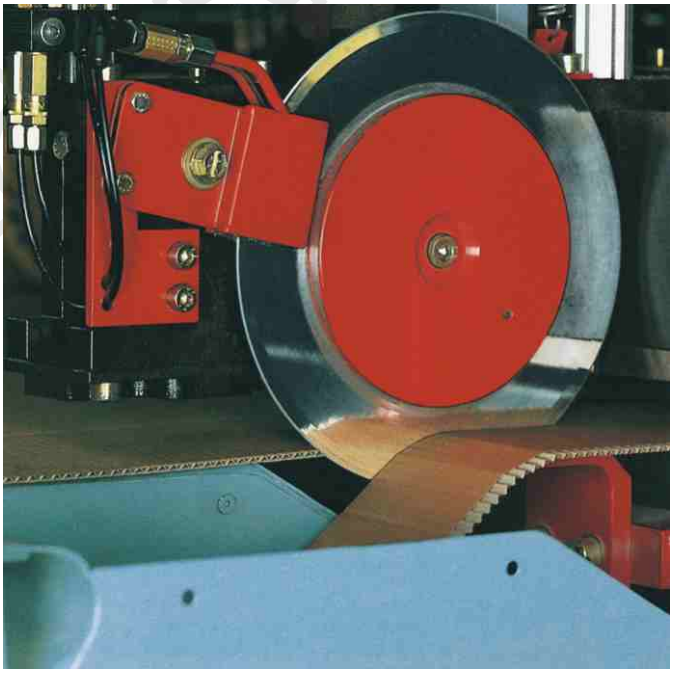


Fig. 3:
Disc-Cut cutting system

Table 4: LUBCON TURMOTEMP® general survey (product features)

Product characteristics	TURMOTEMP® II/400 S	TURMOTEMP® II/400	TURMOTEMP® II/400 MI	TURMOTEMP® II/400 IL	TURMOTEMP® II/400 EL
Service temperature range (°C)	-30 ... +280	-30 ... +250	-35 ... +220	-40 ... +200	-40 ... +180
Colour	whitish	whitish	whitish	whitish	whitish
Structure	homogeneous	homogeneous	homogeneous	homogeneous	homogeneous
Density (g/cm^3) DIN 51757 at +20 °C	1.9	1.9	1.9	1.9	1.9
Consistency class NLGI DIN 51818	2	2	2	2	2
Mechanical load *VKA-o.k. load (N)	> 7 000	> 7 000	> 7 000	> 7 000	> 7 000
Speed factor n · d_m (min^{-1} · mm)	450 000	450 000	500 000	650 000	750 000
Corrosion protection DIN 51802	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0
Product characteristics	**TURMOTEMP® II/400 OX[3)]**	**TURMOTEMP® II/400 RS 2[1)]**	**TURMOTEMP® II/400 VAC-1**	**TURMOTEMP® II/400 SM**	**TURMOTEMP® II/400 KL[2)]**
Service temperature range (°C)	-40 ... +200	-30 ... +260	-30 ... +280	-30 ... +280	-30 ... +260
Colour	whitish	whitish	whitish	grey/metallic	whitish
Structure	homogeneous	homogeneous	homogeneous	homogeneous	homogeneous
Density (g/cm^3) DIN 51757 at +20 °C	1.9	1.9	1.9	1.9	1.9
Consistency class NLGI DIN 51818	2	2	2	2	2
Mechanical load *VKA-o.k. load (N)	> 8 500	8 500	> 7 000	> 7 000	> 8 500
Speed factor n · d_m (min^{-1} · mm)	450 000	450 000	450 000	450 000	450 000
Corrosion protection DIN 51802	- -	0 - 0	- -	0 - 0	0 - 0

1) FE9 lifetime test +220 °C $F_{50} \approx 300$ h 2) FE9 lifetime test +150 °C $F_{50} \approx 1\,000$ h 3) Oxygen-shock pressure limit 110 bar/+60 °C

According to DIN 51801 the dropping point of **TURMOTEMP®** lubricants is not determinable, that means they are not melting. Above +150 °C a certain oil dispensing is possible varying to the type.

*Four Ball Wear: Determines the wear preventive properties under conditions of boundary lubrication. Carried out under specific speed, temperature and load conditions with four balls arranged in the form of a tetrahedron (pyramid). Results are measured in mm, the average diameter of the scars on the lower three balls in the pyramid.

Fig. 4:
Photos of roller tube surfaces as well as running tread of bearing inner ring - as tested see **diagramm 3**, **p. 9**

Grease Life-time and Reduction Factors

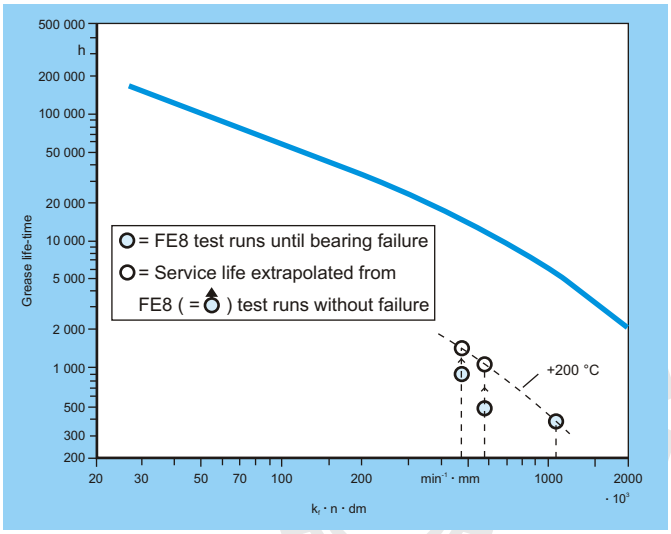


Diagram 1:
Grease life-time of **TURMOTEMP® LP 2502**

Table 5:

Bearing type		k_f
Deep groove ball bearing	single row	0.9 ... 1.1
	double row	1.5
Angular contact ball bearing	single row	1.6
	double row	2
Spindle bearing	α = 15°	0.75
	α = 25°	0.9
Four-point contact ball bearing		1.6
Self-aligning ball bearing		1.3 ... 1.6
Thrust ball bearing		5 ... 6
Angular contact thrust ball bearing	double row	1.4
Cylindrical roller bearing	single row	3 ... 3.5
	double row	3.5
	full complett	25
Cylindrical roller thrust bearing		90
Needle bearing		3.5
Taper roller bearing		4
Barrel roller bearing		10
Spherical roller bearing, no lips (”E”)		7 ... 9
Spherical roller bearing with center lip		9 ... 12

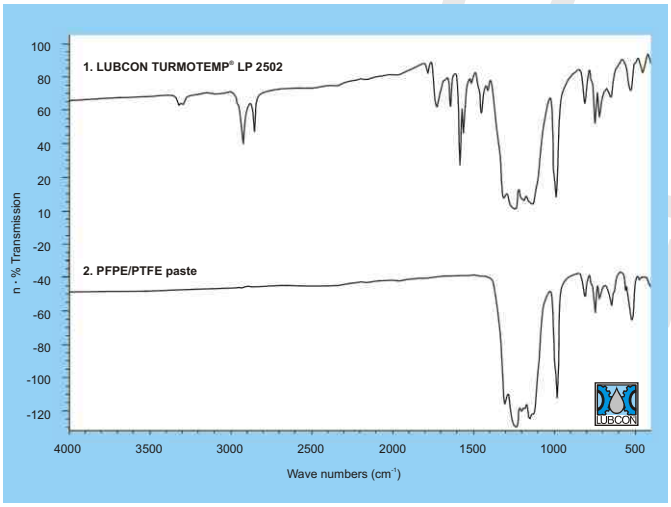


Diagram 2:
Infrared spectrum of grease **TURMOTEMP® LP 2502** (=1) as well as a PFPE/PTFE-paste (=2). As PFPE/PTFE-paste **TURMOTEMP® II/400 RS 2** had been used.

Reduction factors for application of TURMOTEMP® LP 2502 in bearings of corrugated rolls

The grease life-time getting from diagram must be multiplied by these reduction factors to get the realistic grease life-time. As lubrication interval should be taken according to requirements 50 % up to 80 % of the realistic grease life-time.

Effect of dust and moisture on the bearing contact surfaces, moderate — $f_1 = 0.7 ... 0.9$

Effect of shock load and vibrations, moderate — $f_2 = 0.7 ... 0.9$

Effect of high bearing temperature must not be considered because the grease life-time-diagram contains results at realistic temperature.

Effect of high loads according to P/C = 0.03 ... 0.05 — $f_4 = 0.7 ... 1.0$

Effect of air slight current passing through the bearing — $f_5 = 0.7 ... 1.0$

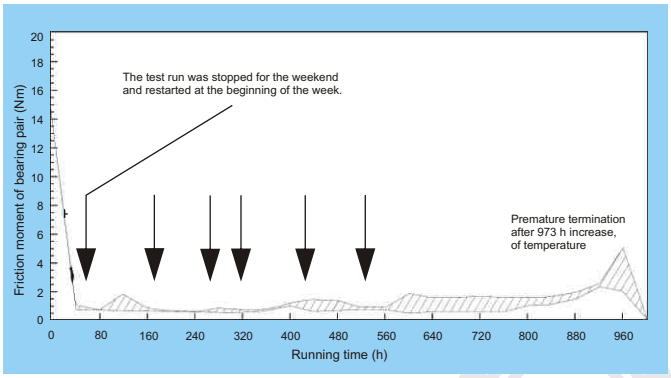


Diagram 3:
FE8 test run with spherical roller bearings 22312 E.A.S.M.C3; axial load F_a = 5 kN; speed n = 750 min^{-1}; running time 973 h, up to a service time of 500 h with intermissions during the weekend
Lubrication with **TURMOTEMP® LP 2502**

Table 6:

Parameters	Test run 1	FAG requirements after 500 h of service time
Steady-state temperature in °C	202/220	
Wear in mg of		
- rolling elements	11/9	< 35
- cage	170/30	< 100
- inner ring	67/10	Evaluation:
- outer ring	30/7	good wear protection
Friction behaviour over the time (see diagram left)	smooth operation, later not smooth	

Results of the FE8 Tests Runs in Comparison

The results of the FE8 test runs with **TURMOTEMP® LP 5002** and **TURMOTEMP® II/400 RS 2**, are shown in direct comparison on the following diagram.

It is obvious that the wear is reduced to 80 % and therefore an extended lifetime of the bearings is guaranteed.

On the following pages the different FE8 test runs are represented.

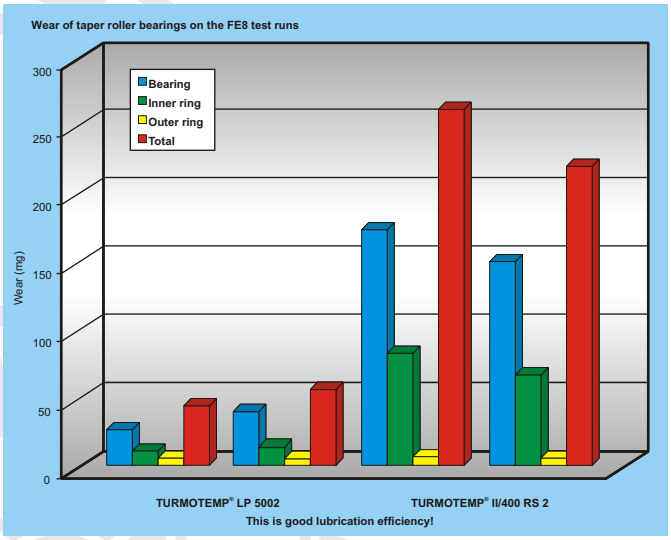


Fig. 5:
Running tread of inner ring - trial see **diagram 4**, **p. 10**, lubrication with **TURMOTEMP® LP 5002**

Fig. 6:
Running tread of inner ring - trial see **diagram 5**, **p. 10**, lubrication with **PFPE/PTFE paste**

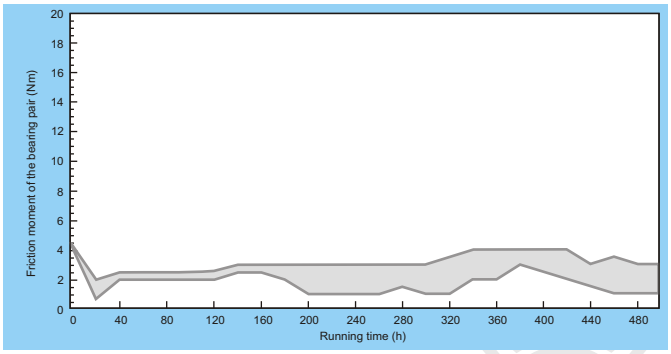
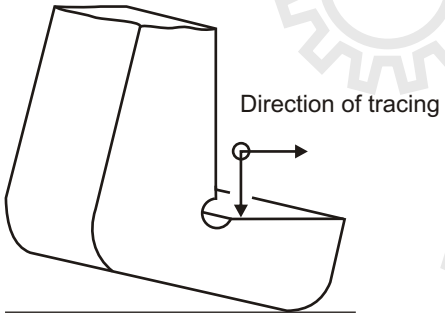


Diagram 4:
FE8 test run with taper roller bearing 536048 (≙ 31312); axial load F_a = 10 kN; speed n = 1500 min^{-1}; running time 500 h
Lubrication with **TURMOTEMP® LP 5002**

Table 7:

Parameters	Test run 1	FAG requirements
Steady-state temperature in °C	200	
Peak temperature in °C	208	
Wear in mg of - the rolling elements - the cage - the inner ring - the outer ring Friction behaviour over the time (see diagram left)	 28/38 79/59 10/12 5/4 smooth operation	 < 35 < 100 **Evaluation: good wear protection**



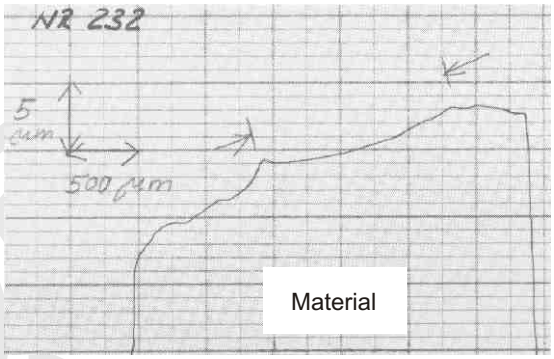


Fig. 7:
Running-in profile of the lip surface of a bearing as tested in **diagram 4**: low running-in wear

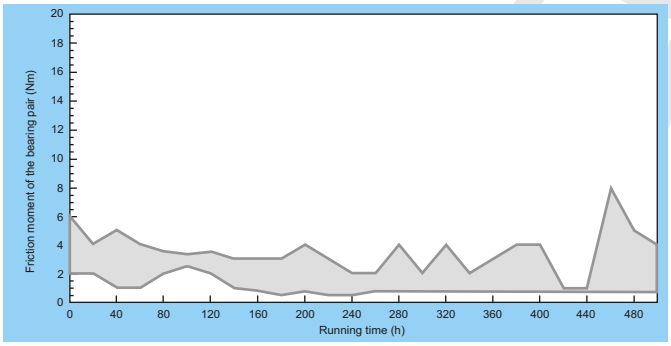
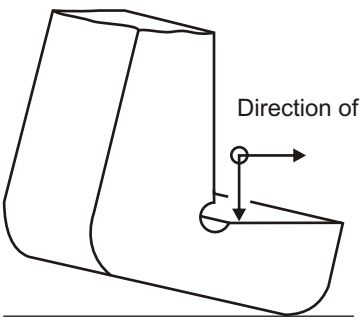


Diagram 5:
FE8 test run with taper roller bearing 536048 (≙ 31312); axial load F_a = 10 kN; speed n = 1500 min^{-1}; running time 500 h
Lubrication with **TURMOTEMP® II/400 RS 2**

Table 8:

Parameters	Test run 1	FAG requirements
Steady-state temperature in °C	201	
Peak temperature in °C	--	
Wear in mg of - rolling elements - cage - inner ring - outer ring Friction behaviour over the time (see diagram left)	 169/148 0/15 82/63 6/5 not smooth	 < 35 < 100 **Evaluation: insufficient wear protection**



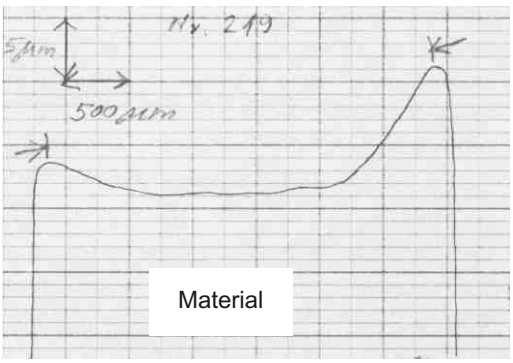


Fig. 8:
Running-in profile of the lip surface of a bearing as tested in **diagram 5**: high running-in wear

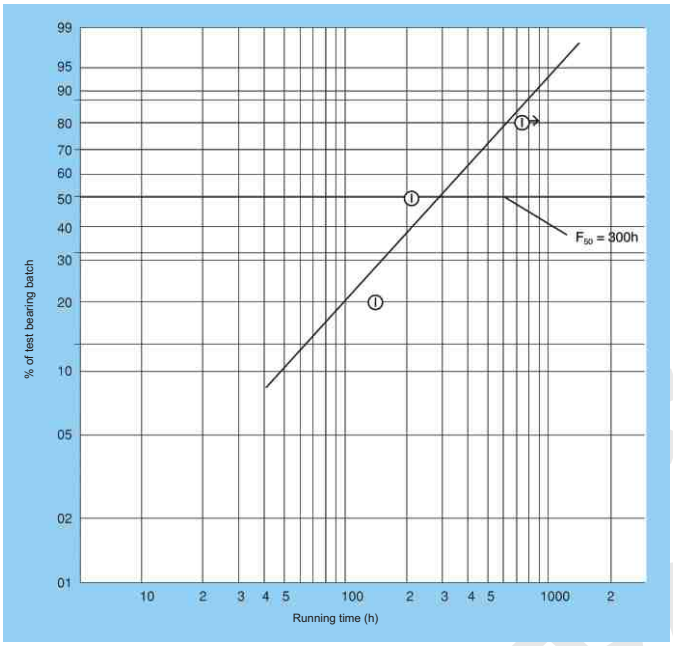


Diagram 6:
FE9 test run with angular contact ball bearing 529689 (≙7206 B), assembly A, i. e. open bearing; axial load F_a = 1.5 kN; speed n = 3000 min^{-1}; temperature +200 °C

Lubrication with **TURMOTEMP® LP 2502**, grease service life of tested bearings in hours according to the Weibull diagram:
F_{50} = 300 h

LUBCON General Survey of Lubricants

Table 9:

Product characteristics	TURMO®CUT VP 65-91	TURMO®CUT VG 22	TURMO®CUT SI 22	TURMOFLUID® ED 13
Base oil	mineral	synthetic	SI	synthetic
Service temperature range (°C)	-10 ... +140	-30 ... +150	-40 ... +240	-45 ... +150
Colour/appearance	yellowish, clear	light/transparent	brownish/transparent	clear/transparent
Density (g/cm^3) DIN 51757 at +20 °C	0.88	0.88	0.95	0.87
Viscosity (mm^2/s) DIN 51562 T1 at +40 °C/+100 °C	130/13.4	23/4.3	15.2/7.2	20/4.5
Viscosity index VI_E	96	100	530	105
Pourpoint ISO 3016 (°C)	-12	-35	≤ -70	-50
Flash point DIN 51376 (°C)	>+200	>+200	≥+240	>+200

Product characteristics	TURMOPAST® NBI 2 white	Product characteristics	TURMOPAST® NBI 2 white
Service temperature range (°C)	-40 ... +180	Worked penetration (1/10 mm) DIN ISO 2137	265 - 295
Colour/appearance	light beige	Water resistance (5 h/+90 °C) DIN 51807	0 - 90
Density (g/cm^3) DIN 51757 at +20 °C	0.96	Corrosion protection acc. to SKF-Emcor DIN 51802	0 - 0
Friction coefficient	appr. 0.10, no slip-stick	Mechanical load (N) DIN 51350	4000/4200

Product Features and Application Ranges

TURMO®CUT VP 65-91 - Special cutting oil

Product Features
Due to the selected additives it shows a very good adhesiveness and excellent lubricating properties.
This product is suitable for a wide temperature range.

Application
It is a cutting oil for the lubrication of cross cutters in the paper and corrugated cardboard industry.

TURMO®CUT VG 22 - Special cutting oil

Product Features
It has excellent surface creeping abilities and shows very good lubrication properties. Due to the low oil viscosity, it guarantees an optimum pumpability.

Application
It is a fully synthetic oil for the lubrication of cross and longitudinal cutters for the paper and cardboard industry.

TURMO®CUT SI 22 - Silicone oil (heat stabilized)

Product Feature
Silicone oils of the **TURMO®CUT** serie are liquid polydimethylsiloxanes with transparent appearance. They differ from the organic compounds as regards their physical as well as chemical properties. At the same time, the high temperature range is extended up to approx. +250 °C over a long period and their excellent behaviour at low temperatures is therefore not influenced.
The **TURMO®CUT** serie is compound of different types of silicone oils which differ in their viscosity and corresponding properties. A miscibility with each other is possible.

Characteristics
Low pourpoint, large application temperature range, low pressure/viscosity behaviour, good viscosity-temperature behaviour, high thermal and low temperature resistance, high compressibility, low vapour pressure, large surface activity. Besides their physical properties, the excellent compatibility with most sealing materials has to be advised.

Application
It is especially used as a thermal carrying oil and lubricant for synthetic/metal and synthetic/synthetic material combinations. It is suitable for capping mechanism in packaging machines and specially for bottle screwing machines.

Product Features and Application Ranges

TURMOFLUID® ED 13

Product Feature
It is a synthetic lubricant for multipurpose use with good spreading effect. Even not easily accessible lubrication points can be reached due to its excellent creeping ability.
A special combination of substances enables lubrication also on humid metal parts. The water displacement behaviour and high metal affinity ensure an optimum lubrication and an excellent corrosion protection.

Application
It is used for the lubrication of machines as well as machine parts and chains in the control and measurement techniques, in the machine construction and machine tool manufacture as well as in the food and plastic industry.

TURMOPAST® NBI 2 weiß - Assembly paste

Product Feature
It is a light-coloured lubrication and assembly paste containing a new type of solid lubricants against frictional and fretting corrosion. Owing to special additives such as anti-ageing, anti-wear and anti-corrosion additives with metal activators, this assembly paste also provides the qualities of a good rolling and sliding bearings grease.

Application
Rolling and sliding bearings in general, textile finishing machines, fans and washing machines.
All sliding surfaces (material combinations: Fe/Fe, Fe/nonferrous, nonferrous/nonferrous) subject to low and up to medium speeds. Also suitable when exposed to high static and dynamic loads, such as dovetailed and other profile guides.
Assures a smooth operation of mechanical adjusting devices. It is highly suitable as protection against frictional and fretting corrosion, also in difficult cases (spline shafts, press fits and bearing seats, bolts, groove toothings). Prevents slip-stick, also in case of pneumatic cylinders and increases the efficiency of chucks in the tool industry.

Fig. 9:
Cutter bar

Table 10:

LUBCON Product	Application range	Packing units
TURMO®CUT VP 65-91 mineral temperature <+140 °C TURMOSYNTH®OIL GV 220 on SHC-base, NSF/H1-quality temperature <+150 °C	Cross cutter	20 l canister 60 l disposable drum 200 l disposable drum
TURMO®CUT VG 22 synthetic oil temperature <+150 °C TURMO®CUT LMI 18 on SHC-base, NSF/H1-quality temperature >+140 °C	Disc-Cut cutting system - BHS	20 l canister 60 l disposable drum 200 l disposable drum
TURMO®CUT VP 65-91 mineral temperature <+140 °C TURMOSYNTH®OIL GV 100 on SHC-base, NSF/H1-quality temperature <+140 °C	Disc-Cut cutting system - Agnati for all kind of glues	20 l canister 60 l disposable drum 200 l disposable drum
TURMOTEMP® LP 2502 teflon-free	Lubrication of rolling bearings Press, preheating and corrugator rolls	400 ml cartridges 1 kg cans 10 kg hobbock
TURMOGREASE® PHS 1002 Polyurea, water resistant temperatures up to +160 °C	Universal grease for the corrugated cardboard industry	400 ml cartridges 1 kg cans 25 kg hobbock
TURMOFLUID® ED 13	Dust loaded drive and conveyor chains Spindles/groove automatic machine	400 ml aerosol can 20 l canister
THERMOPLEX® ALN 252 EP	Spindle bearings/groove automatic machine	400 ml cartridges 1 kg cans
TURMOPAST® NBI 2 white	Assembly paste to prevent tribo corrosion Eccentric bearing/cross cutter	100 ml tubes 400 ml cartridges 1 kg cans
TURMO®CUT LMI 18	Cleaning oil for corrugator rolls Corrosion protecting oil for corrugator rolls	5 l canister 20 l canister
Kaltreiniger P	Bearing cleaner Cleaning agent for PFPE/PTFE lubricants	60 l disposable drum 200 l disposable drum

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