

GfM Gesellschaft für Maschinendiagnose mbH

Machine diagnosis report

Customer: XXXXXX
Measuring engineer, date, time: N. Mischol, XX.XX.XX
Test system: PeakStore
operator: XXXXXXXXXXXX
Object, type, ser. no.: XXXXXX, main gearbox
Gear unit supplier, type, ser. no.: XXXXXXXXXXXX
Generator supplier, type, ser. no.: XXXXXX, left
Generator supplier, type, ser. no.: XXXXXX, right
Power during measurement: up to full load
Generator speed: about 601 min⁻¹
Consultant GfM: Dipl.-Ing. Norman Schröter
GfM No.: DXXXX
Number of pages: 7

Berlin, 14. July 2009

(Dr. Rainer Wirth, management)

(Dipl.-Ing. Norman Schröter)

Please find details of the measuring method and of the shortcuts on our homepage www.maschinendiagnose.com/diagnostic-report or please ask for information in written.

The given statements in the report are based on a time slot of the vibration signal according to the measuring time. Consequently are detectable irregularities, which according to the construction and the mode of operation causes untypical vibrations. Irregularities at the toothing are only detectable at enough distribution of forces. The detection bearing irregularities works, if these have a local character and are passed forceful enough by the rolling elements.

For the detected irregularities are made recommendations only on the basis of the vibration signal and if possible a failure probability is stated. For the exact quantification.

Diagnosis results:

no.	found irregularities	trend	recommendation	$P_{\tau < 1a}$
general:				
01	The peaks at the 2,501. order, 3,500. order, 5,500. order and so on (Fig. 4) can not be assigned to the kinematics.			
02	The peak at the 1,226. order and the harmonics (Fig. 7) can not be assigned to the kinematics.			
gear shafts:				
21	input shaft left			
22	input shaft right			
23	output shaft			
24	PTO shaft left	advice for fitting- or bearing seat problems or hitting particles (Fig. 7)	visual inspection, if possible	
25	PTO shaft right			
tooth meshing of gear unit:				
31	1st stage	advice for a revolving deviation of flank shapes (Fig. 1)		< 5 %
		advice for a local deviation of flank shapes at pinion (Fig. 2)		< 5 %
32	2nd stage	advice for a local deviation of flank shapes at pinion and wheel (Fig. 3)		< 5 %
gear unit bearings:				
41	input shaft left			
42	input shaft right			
43	output shaft			
44	PTO shaft left			
45	PTO shaft right	inner ring of bearing 7224B (Fig. 5), cage and rolling elements of bearing 7224B (Fig. 6)	bearing replacement as quickly as possible	50 %
generator left:				
51	shaft	advice for unbalance and misalignment (Fig. 11)	unbalance should be checked	
52	DE bearing			
53	NDE bearing	inner ring of bearing 6328 (Fig. 12)		< 5 %
generator right:				
61	shaft	advice for unbalance and misalignment (Fig. 8)	unbalance should be checked	
62	DE bearing	cage and rolling elements of bearing NU232 (Fig. 10), inner ring and outer ring of bearing NU232 (Fig. 9)	visual inspection, if possible	20 %
63	NDE bearing			

trend - comparison to the last report, see reference report

- ↑ - intensity of irregularities increased
- - intensity of irregularities almost unchanged
- ↓ - intensity of irregularities decreased

n.m. - comparison not possible, because e.g. the measurement conditions were different

$P_{\tau < 1a}$ - estimated probability, that the by the vibration diagnosis assumed irregularity will lead to a failure within the next 12 months

- < 5 % - a minimal irregularity is detectable, no need for action
- 20 % - one of five of such irregularities will lead to a failure within one year
- 50 % - one of two of such irregularities will lead to a failure within one year

Spectra:

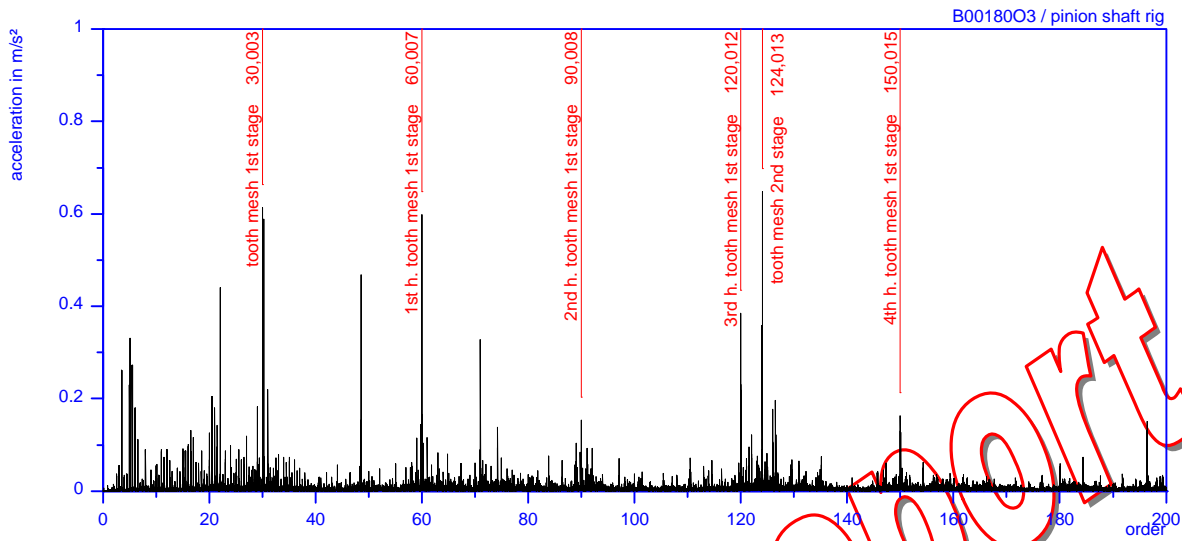


Fig. 1: Order spectrum, measured at the right pinion shaft, generator sided, radial

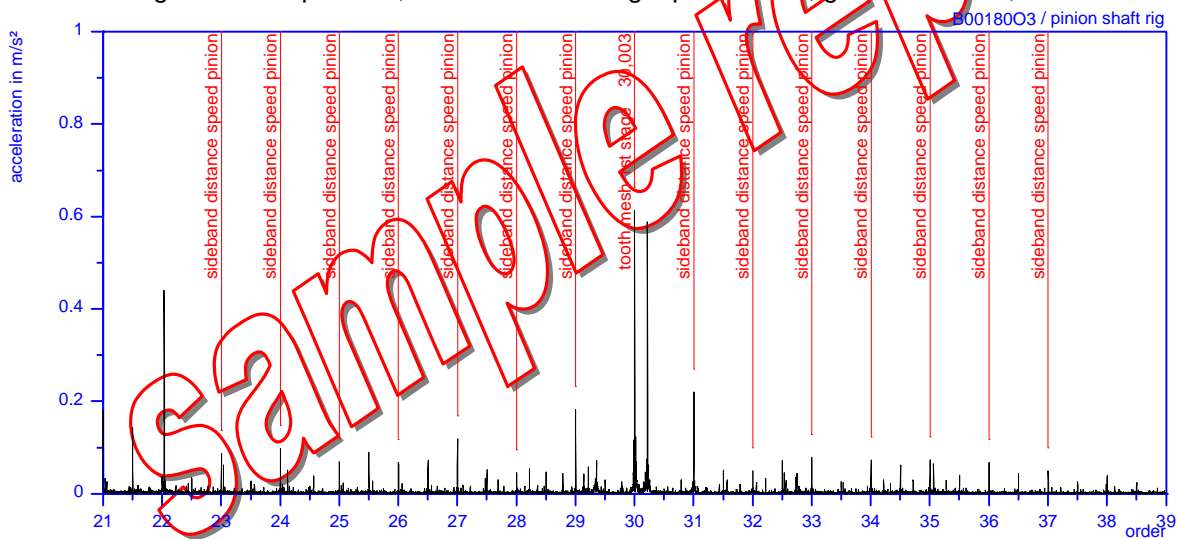


Fig. 2: Order spectrum, measured at the right pinion shaft, generator sided, radial

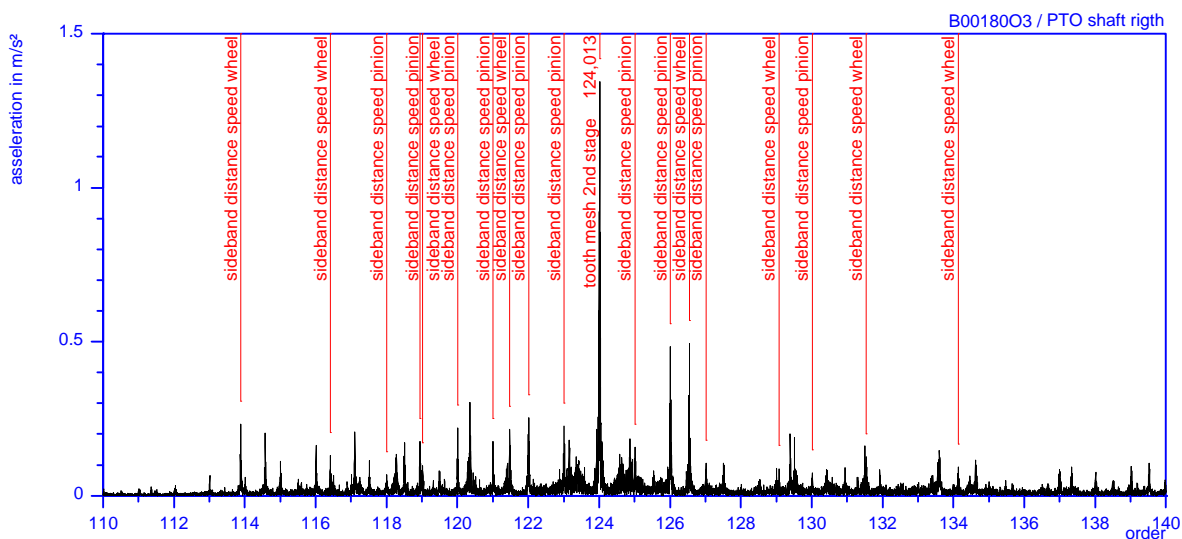


Fig. 3: Order spectrum, measured at the right PTO shaft, generator sided, radial

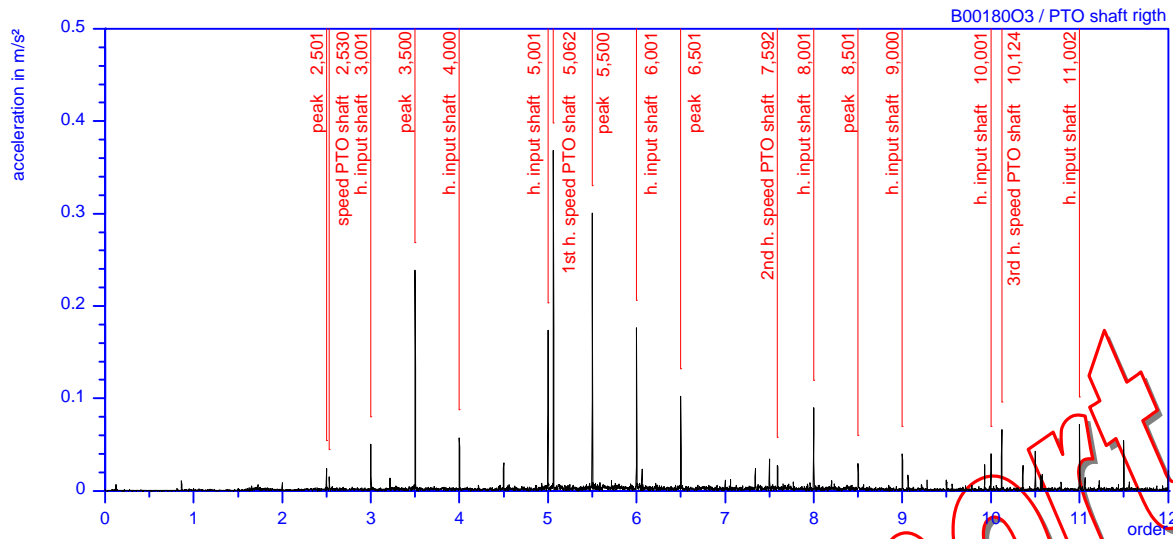


Fig. 4: Order spectrum, measured at the right PTO shaft, generator sided, radial

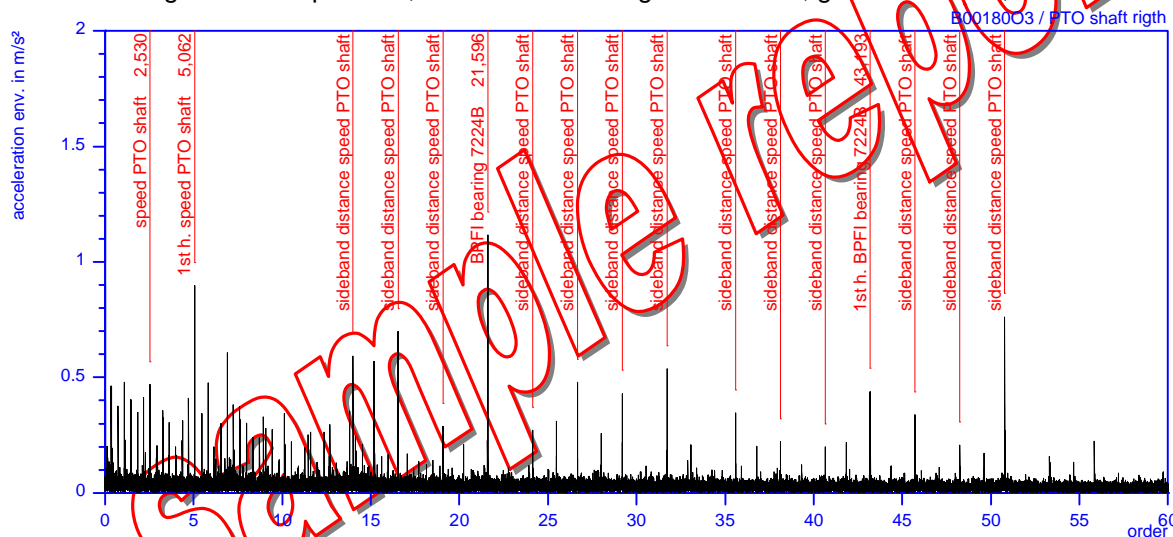


Fig. 5: Envelope curve order spectrum, measured at the right PTO shaft, generator sided, radial

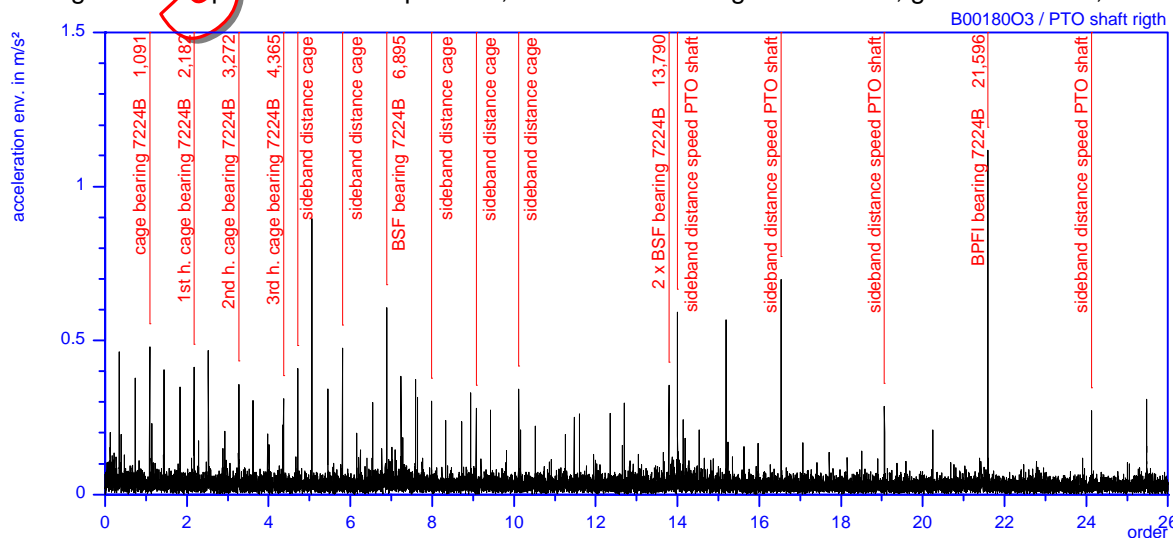


Fig. 6: Envelope curve order spectrum, measured at the right PTO shaft, generator sided, radial

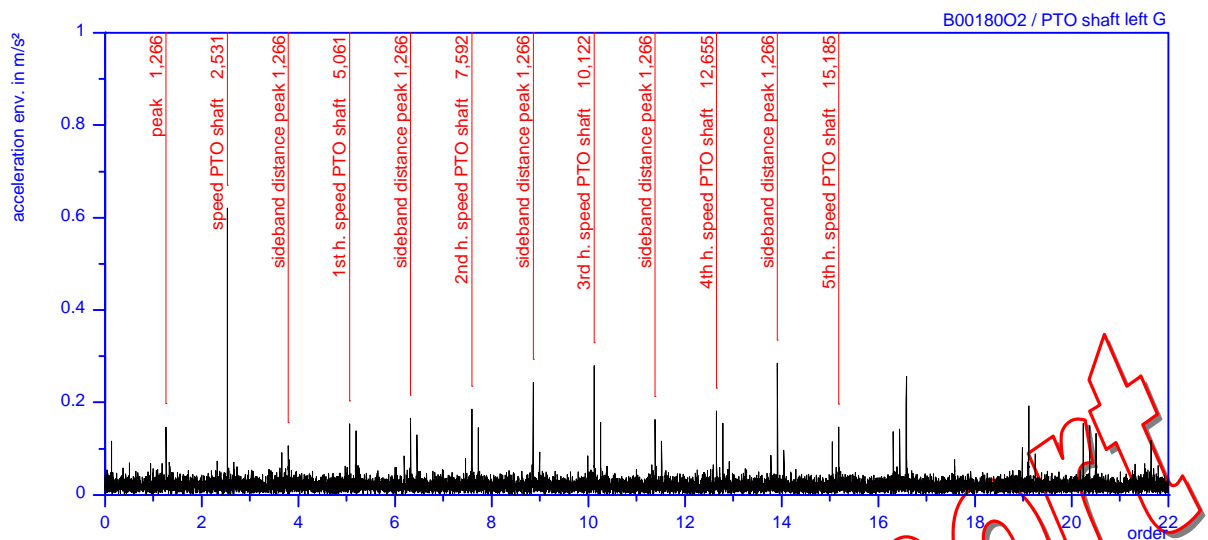


Fig. 7: Envelope curve order spectrum, measured at the left PTO shaft, generator sided, radial

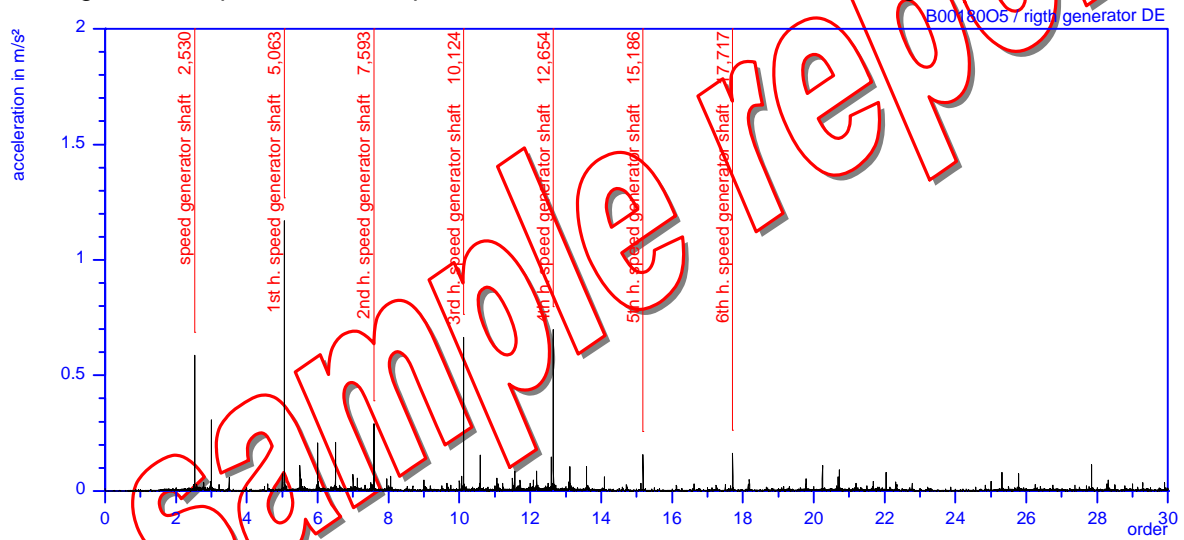


Fig. 8: Order spectrum, measured at the right generator, DE bearing, radial

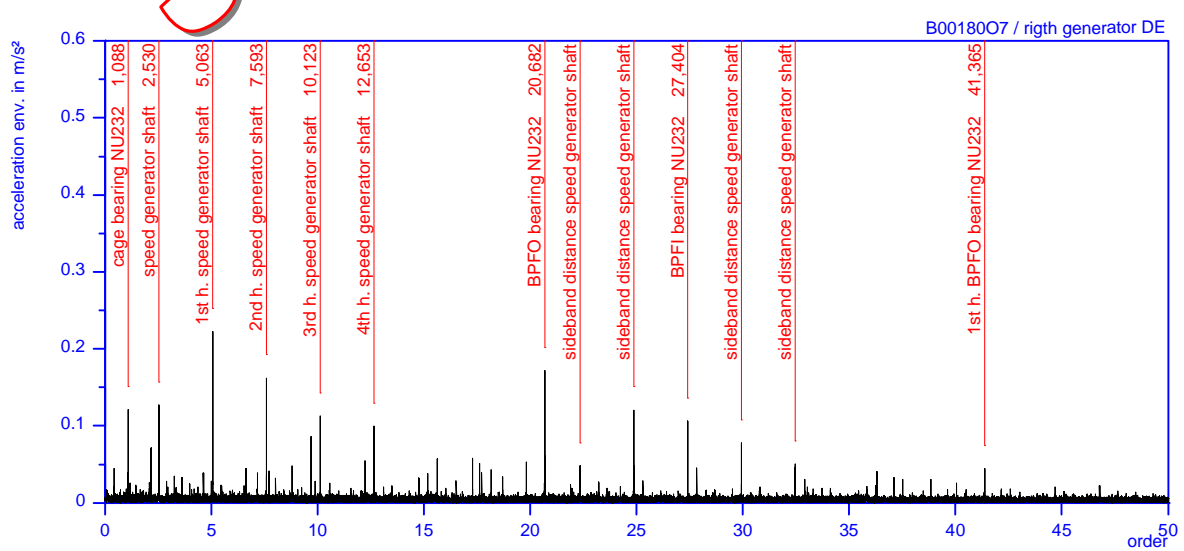


Fig. 9: Envelope curve order spectrum, measured at the right generator, DE bearing, radial

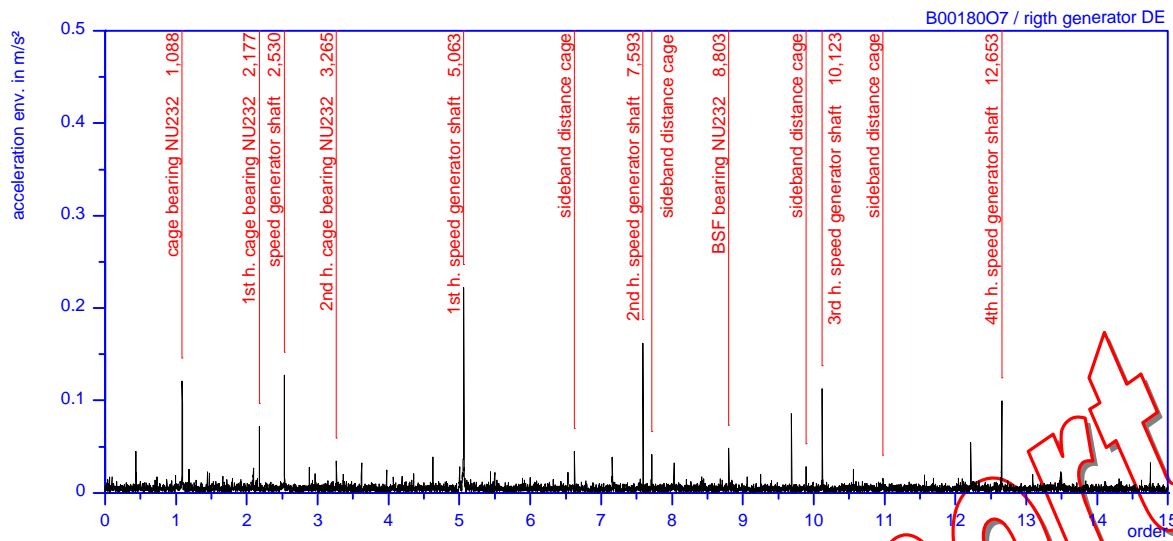


Fig. 10: Envelope curve order spectrum, measured at the right generator, DE bearing, radial

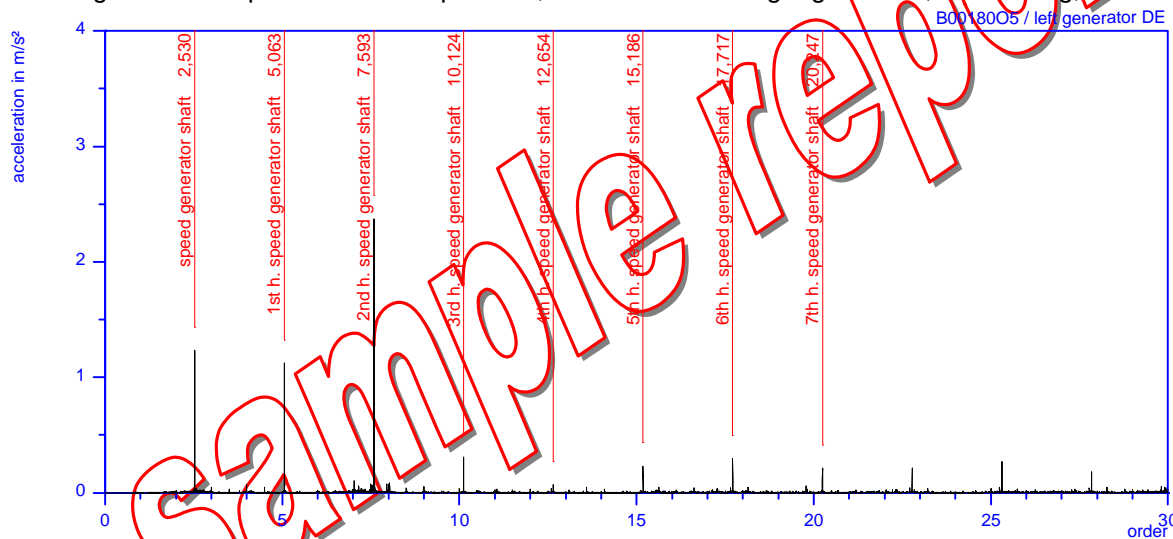


Fig. 11: Order spectrum, measured at the left generator, DE bearing, radial

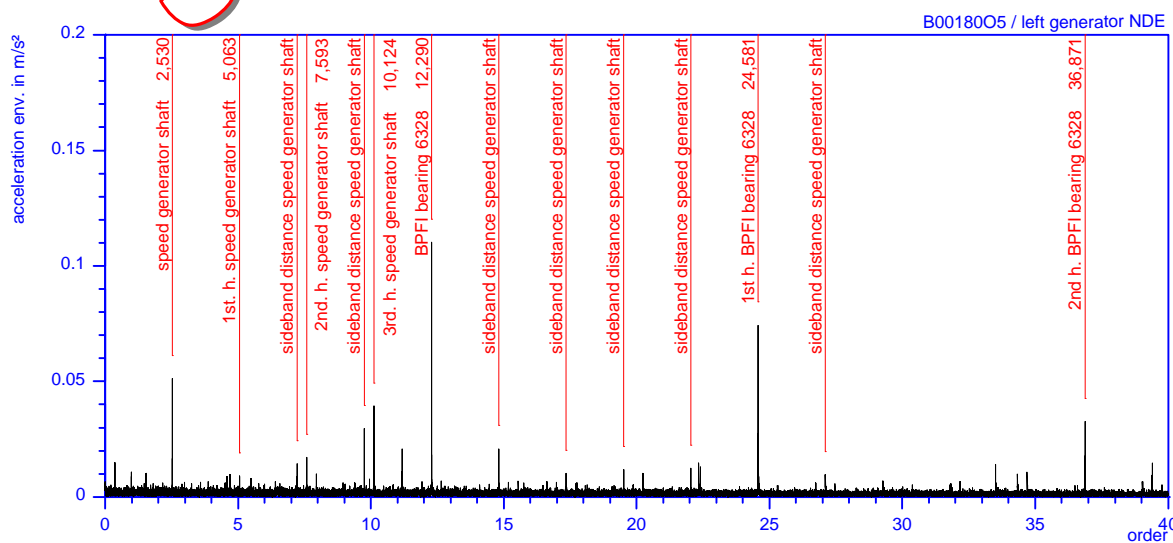


Fig. 12: Envelope curve order spectrum, measured at the left generator, NDE bearing, radial

Kinematics:

Table 1: Kinematics (theoretic) in orders

spure gear stage	1.	2.
tooth number pinion	30	124
tooth number wheel	139	49

speed pinion:	1,0000	1,0000
speed wheel:	0,2158	2,5306

tooth mesh	30,000	124,000
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bearing input shaft	comment	roller element	cage	BSF	2 x BSF	BPFO	BPFI
SKF 23240CC		19	0,433	3,555	7,110	8,223	10,778
SKF 23956CC		37	0,465	7,057	14,113	17,204	19,796
SKF 6313		8	0,380	2,040	4,080	3,070	4,950

bearing output shaft	comment	roller element	cage	BSF	2 x BSF	BPFO	BPFI

bearing pinion shaft	comment	roller element	cage	BSF	2 x BSF	BPFO	BPFI
SKF 23240CC		19	0,433	3,555	7,110	8,223	10,778
SKF 29336E		21	0,450	3,530	7,060	9,460	11,540

bearing PTO shaft	comment	roller element	cage	BSF	2 x BSF	BPFO	BPFI
SKF 32321		15	1,043	6,757	13,513	15,614	22,345
SKF NU1034		23	1,136	12,236	24,472	26,124	32,080
SKF 7224B		15	1,091	6,906	13,813	16,366	21,593

bearing generator	comment	roller element	cage	BSF	2 x BSF	BPFO	BPFI
SKF NU232	DE	18	1,096	9,321	18,642	19,739	25,812
SKF NU232E	DE	19	1,087	8,797	17,595	20,652	27,430
SKF 6328	NDE	8	0,987	5,567	11,135	7,921	12,324
FAG 6328	NDE	8	0,992	5,605	11,211	7,931	12,314

Sample