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Damage Detection on a Bearing

Data_Archive: WS2223_4 Password: WS2223_42923

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Mr. Marcel Wiemann

Done By:
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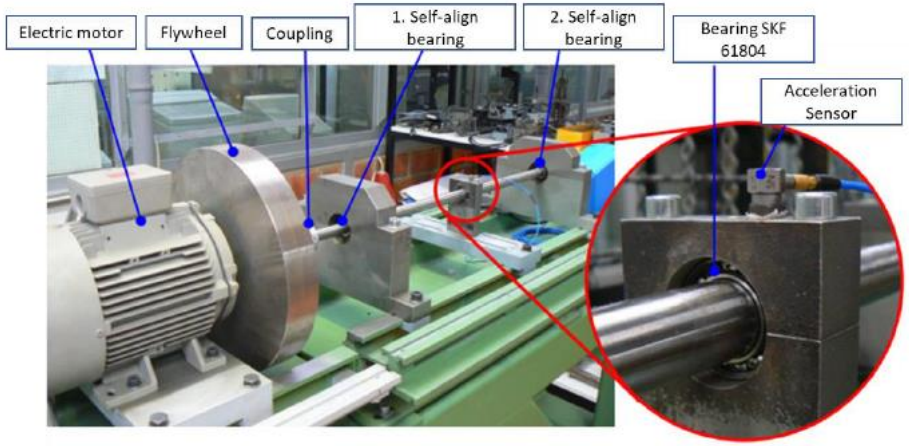
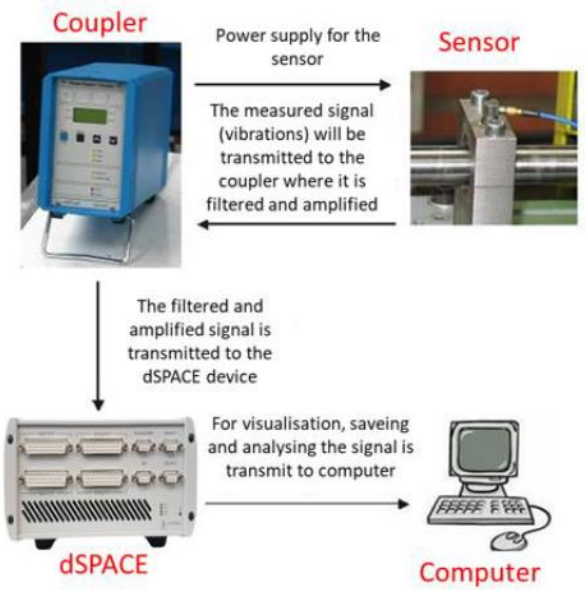
Experimental Setup

Test rack



Description of test rack and view of Bearing that has been investigated



Measurement chain

- **Sensor used:** vibration sensor PCB353B15
- **Sampling frequency of transfer:** 40kHz
- **Measurement Device:** dSpace MicroLabBox 16 bit(A/D convertor)

Single row till bearing

Bearing: SKF 61804

nWK	13	(Number of rolling elements)
DW	3,7mm	(Diameter of rolling elements)
DT	26,15mm	(Part-circle diameter)
αB	0°	(Operating contact angle)
fn	50Hz	(Rotational frequency)

Data From Measurement

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Structure	Signal_1 structure	Signal_2 structure	Signal_3 structure	Description
datensatz	D_1	D_2	D_3	Acceleration signal
fs	40000 Hz	40000 Hz	40000 Hz	Sampling rate in Hz
fn	49.8417Hz	49.8417Hz	37.9650Hz	Rotational speed in Hz
size	1×1219752 double	1×1236032 double	1×1620069 double	Size of data
name	file_002_23192223 .mat	file_009_23192223 .mat	file_023_23192223 .mat	Name of archive file

Damage Frequencies

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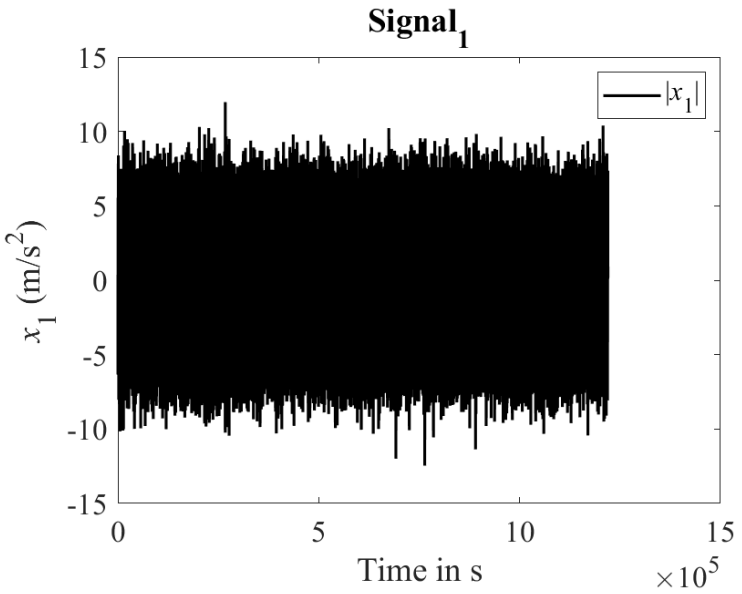
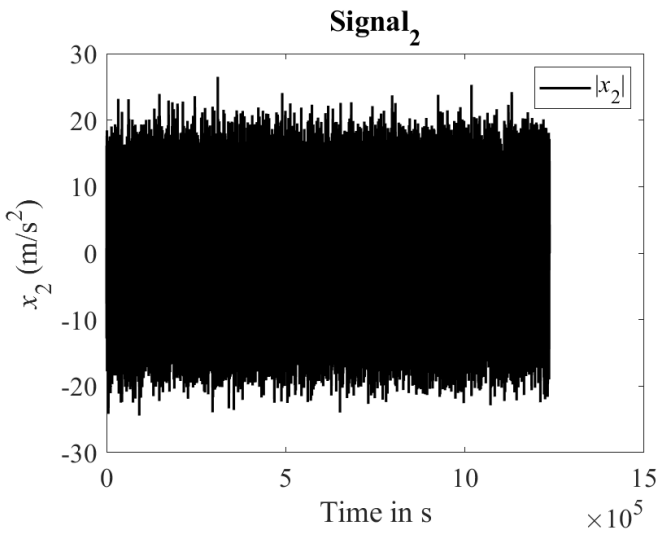
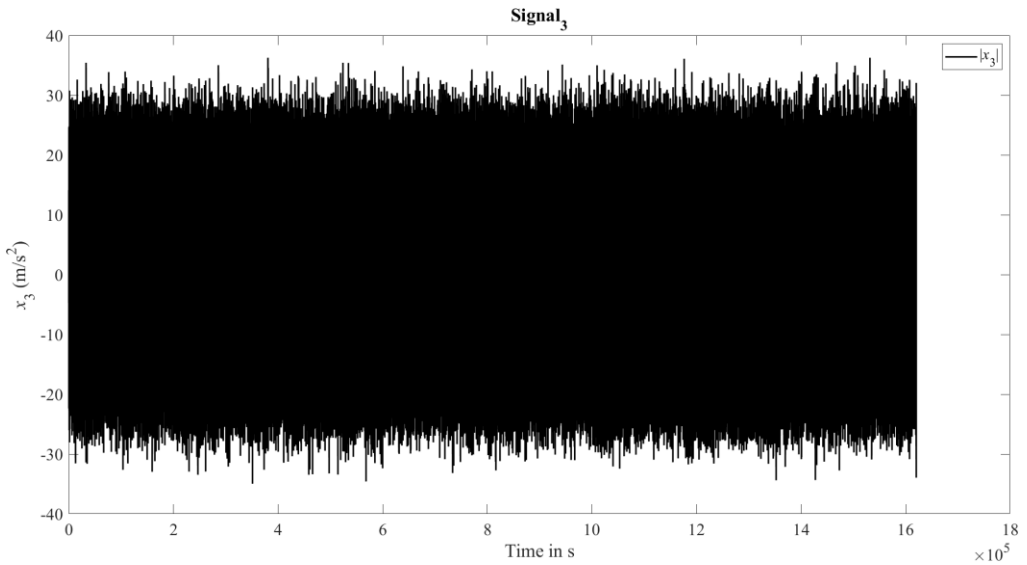
Description	Variables	Signal_1	Signal_2	Signal_3
Cage rotational frequency with fix outer ring	fk	21.3947	21.3948	16.2966
Cage rotational frequency with fix inner ring	fk_	28.4469	28.4469	21.6684
Rollover frequency of an irregularity on the outer ring	fa	278.1317	278.1319	211.8563
Rollover frequency of an irregularity on the inner ring	fi	369.8099	369.8102	281.6887
Rolling element rotation frequency or rolling element spin frequency	fwa	2243.8	2243.8	1709.2
Rollover frequency of a rolling element irregularity on both tracks	fw	4487.7	4487.7	3418.3

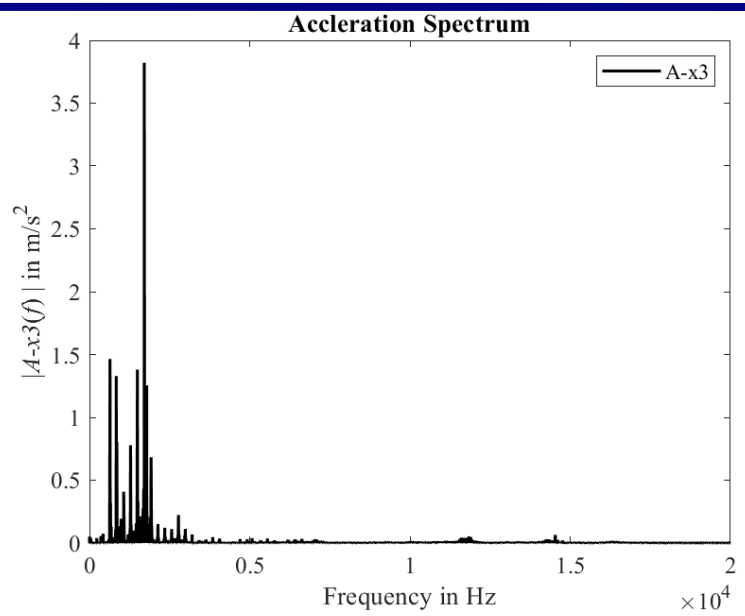
Signal Visualization

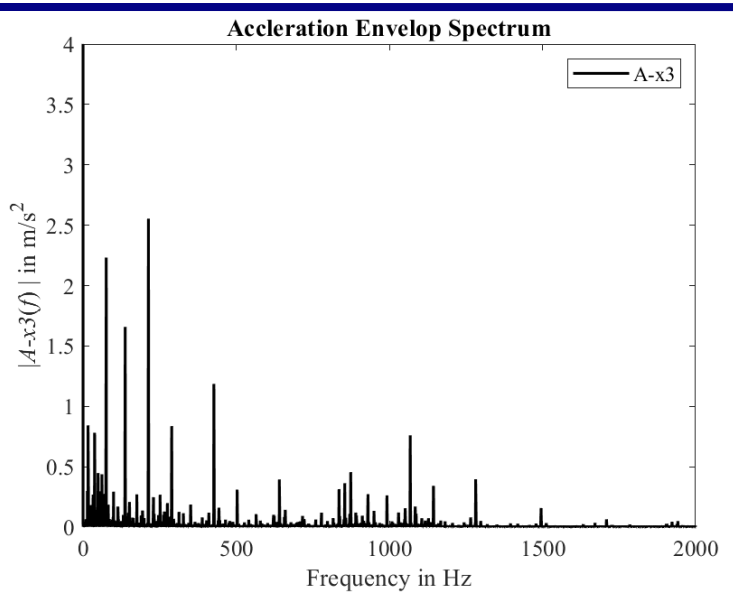


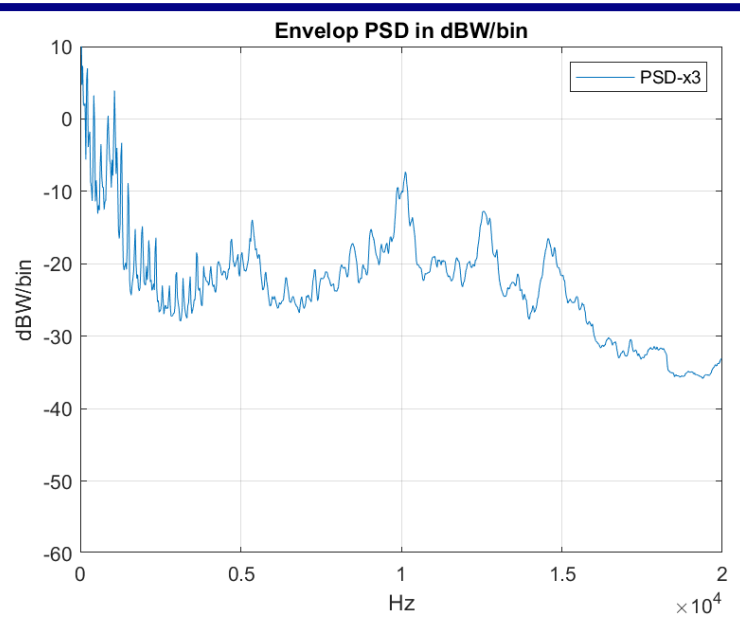


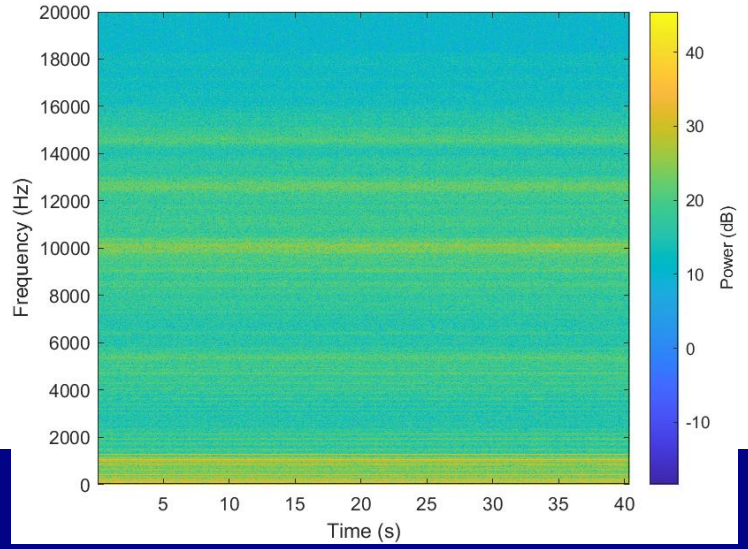


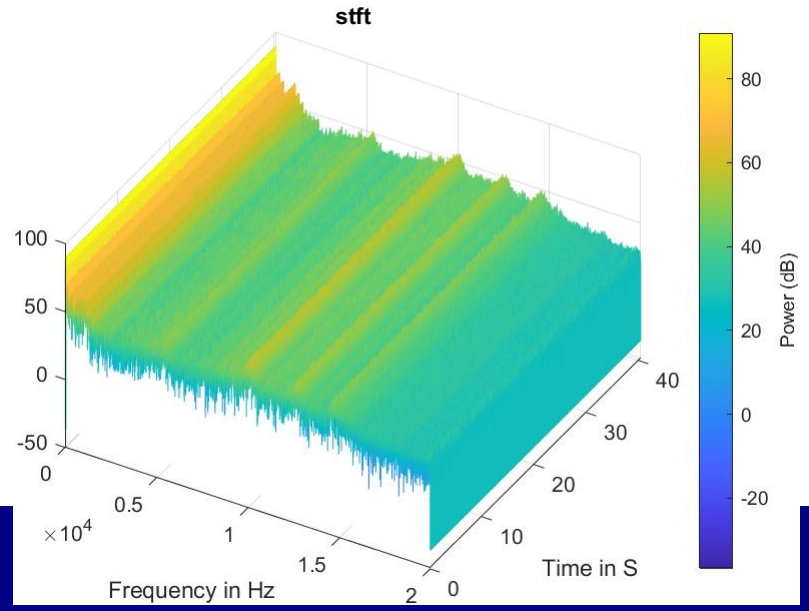
Signal Processing for Signal_3

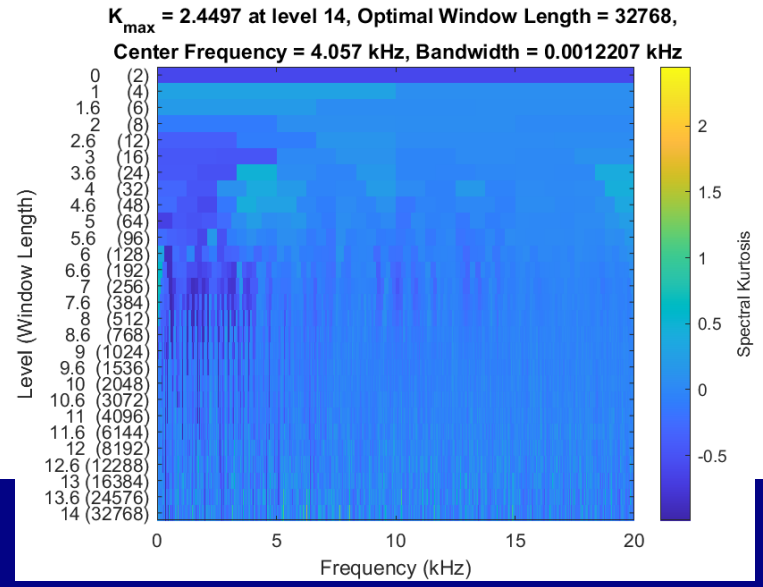




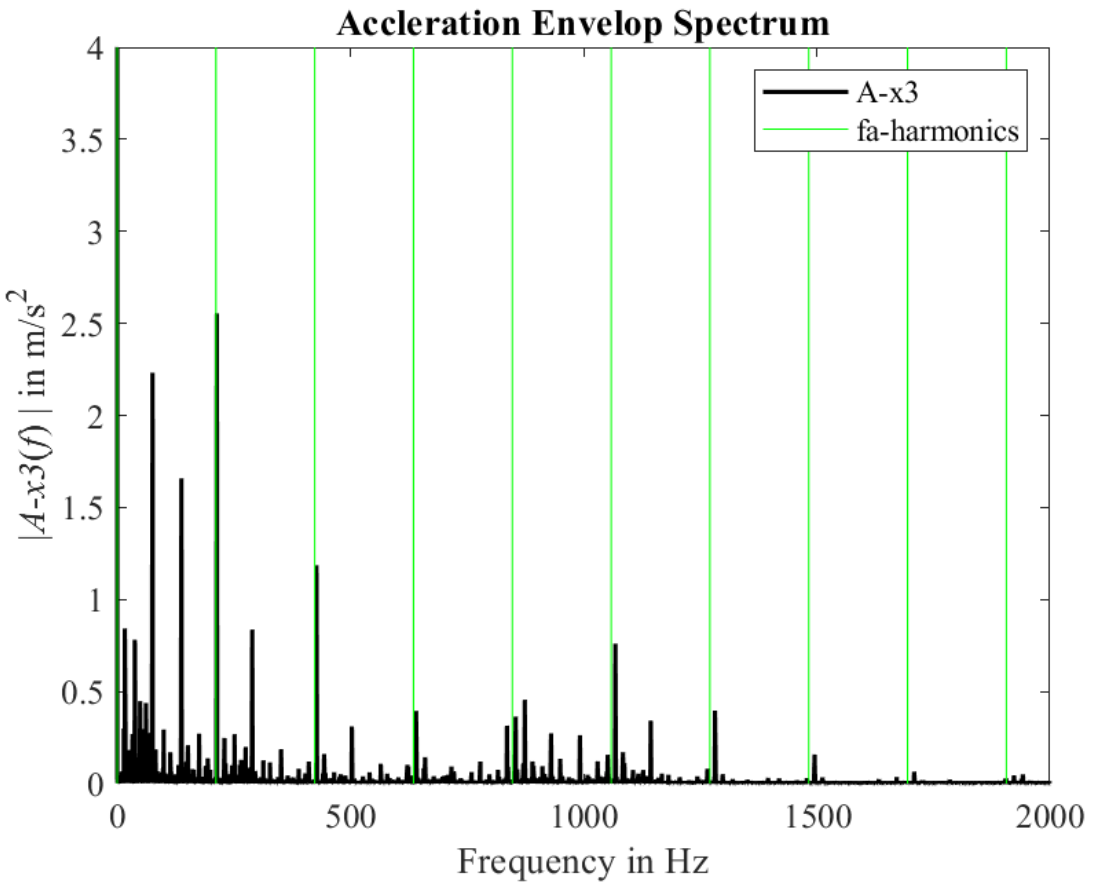


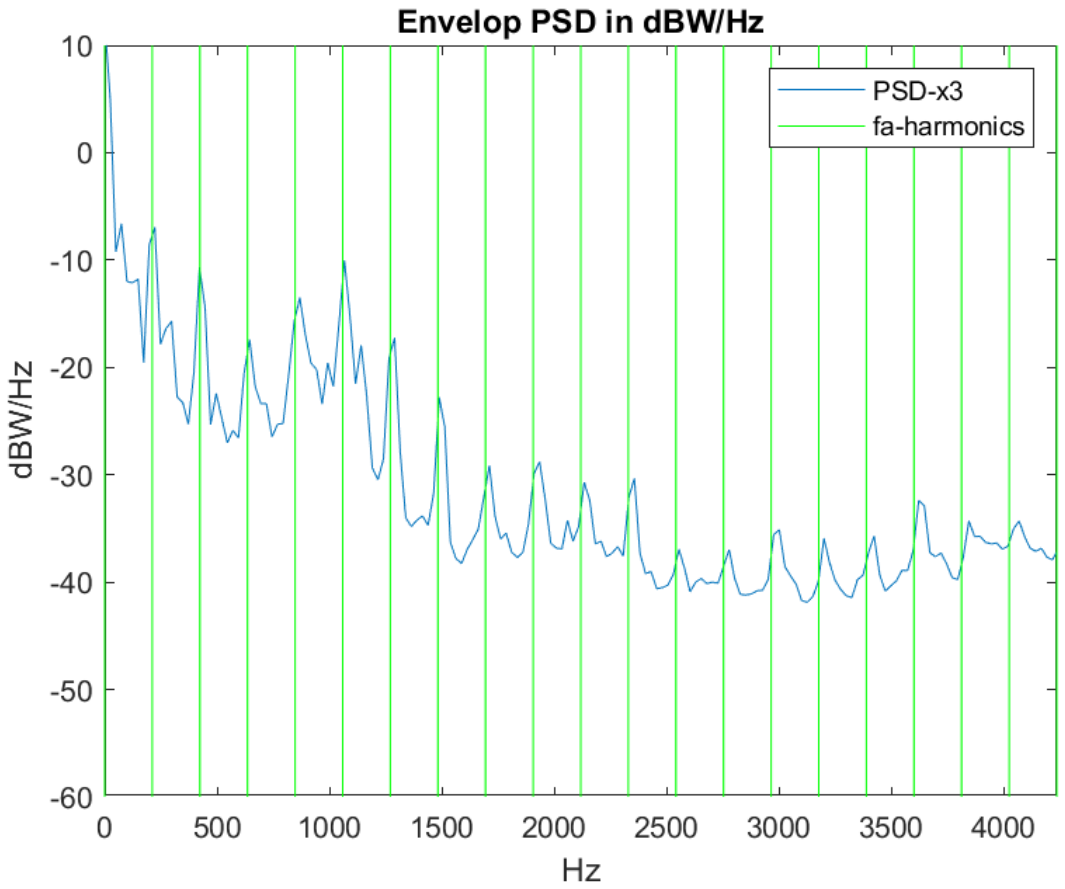






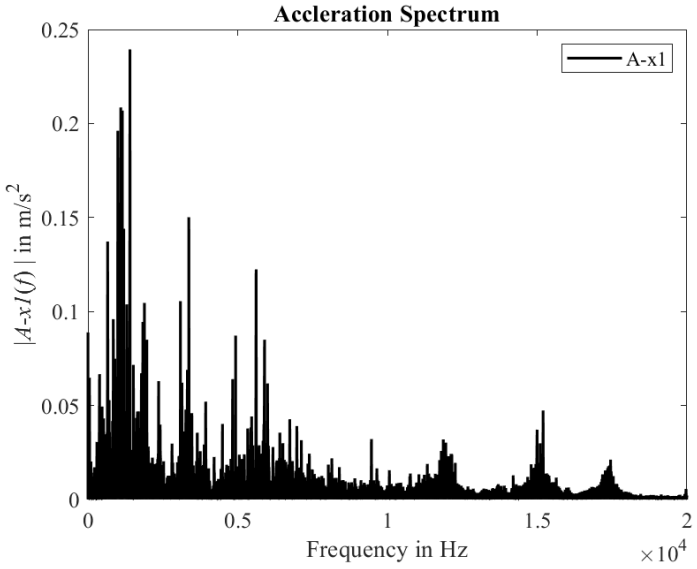
Damage Detection for Signal_3

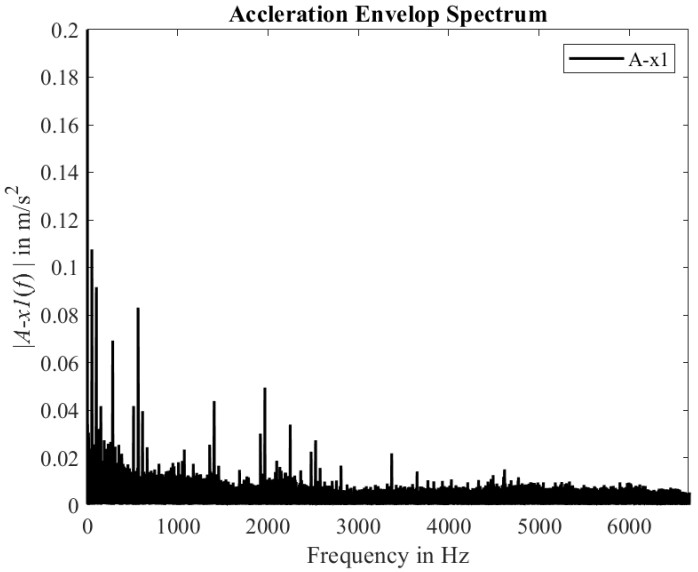


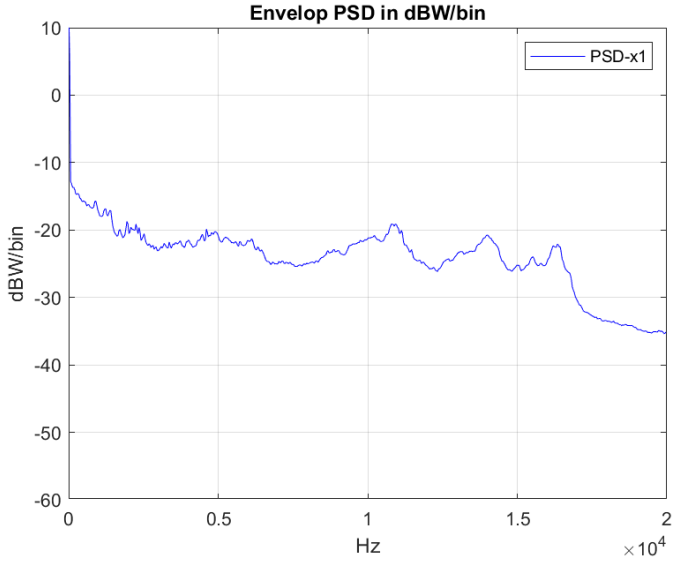


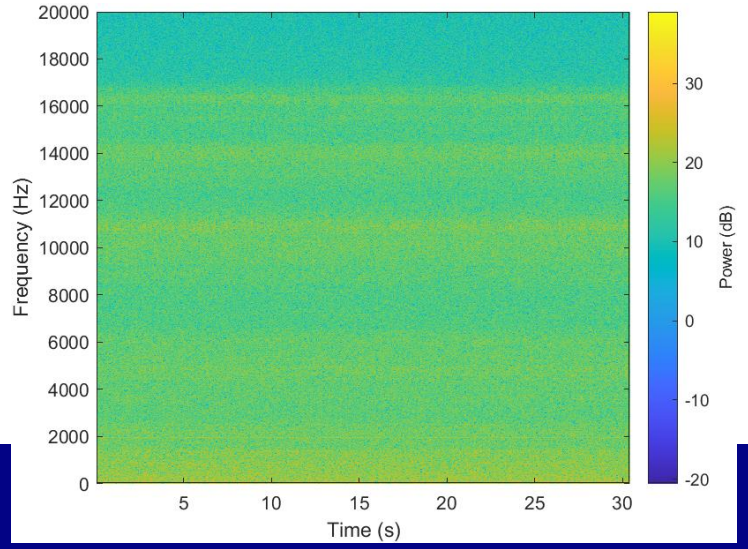
Damaged Frequency with Rollover frequency of an irregularity on the outer ring

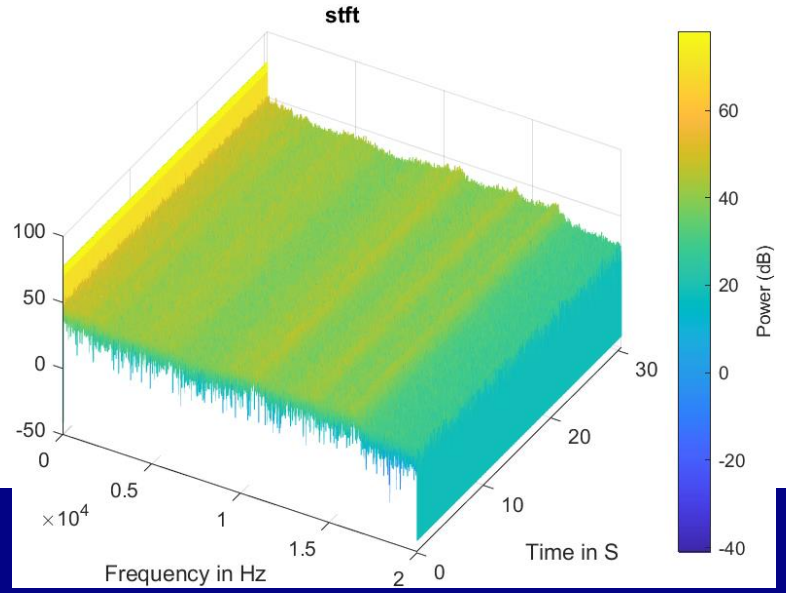
Signal Processing for Signal_1

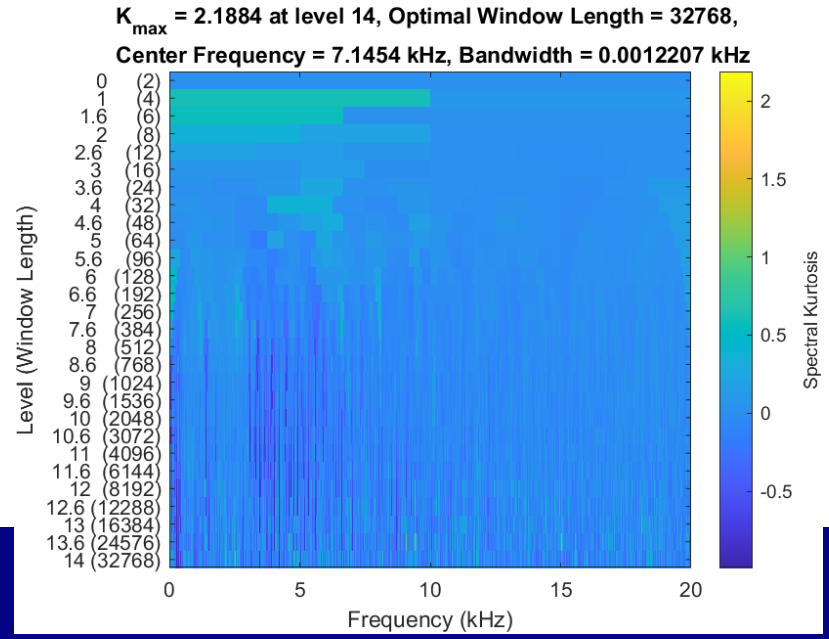




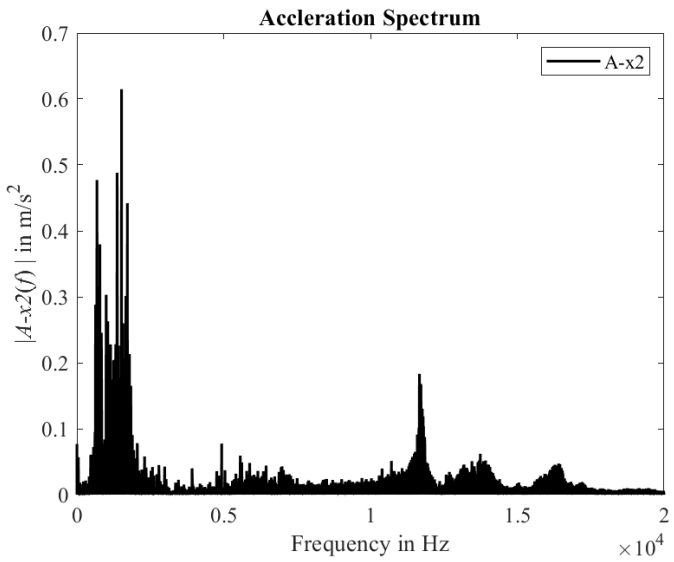


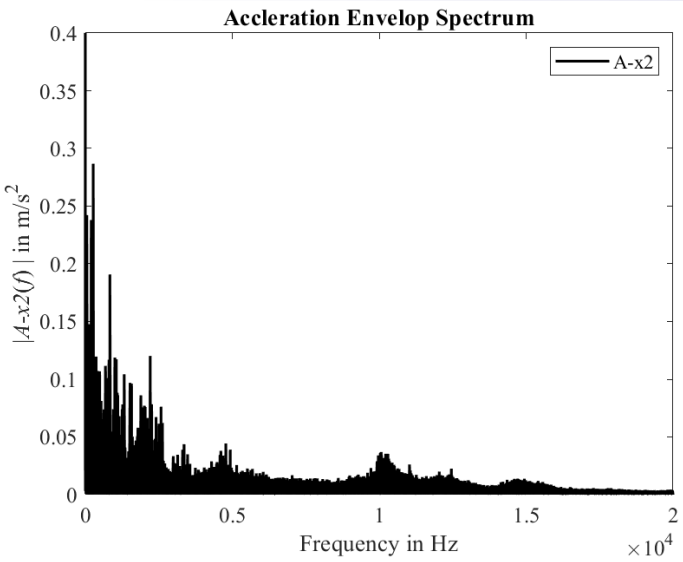


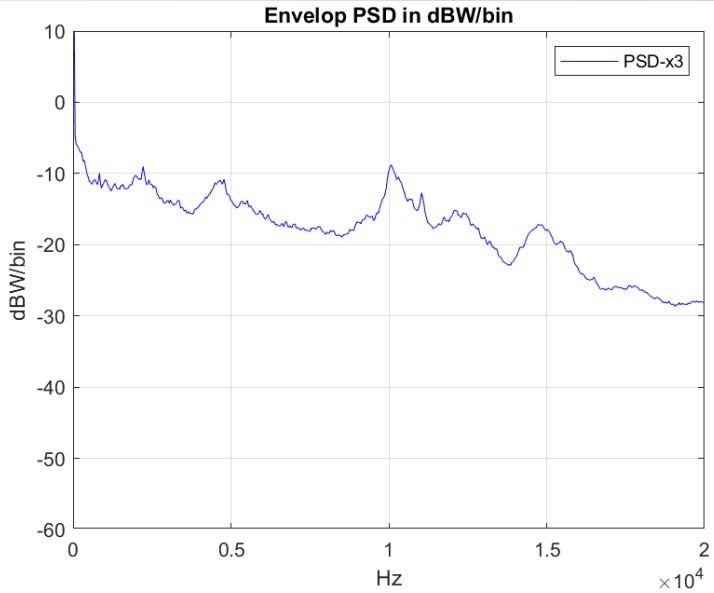


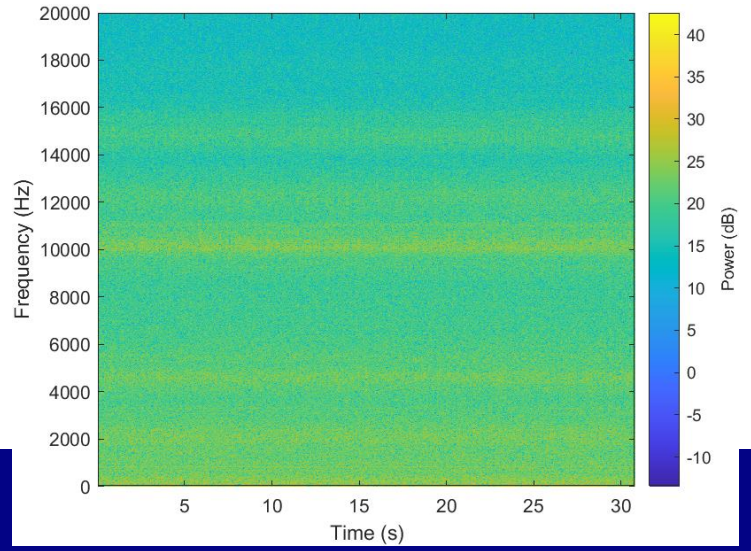


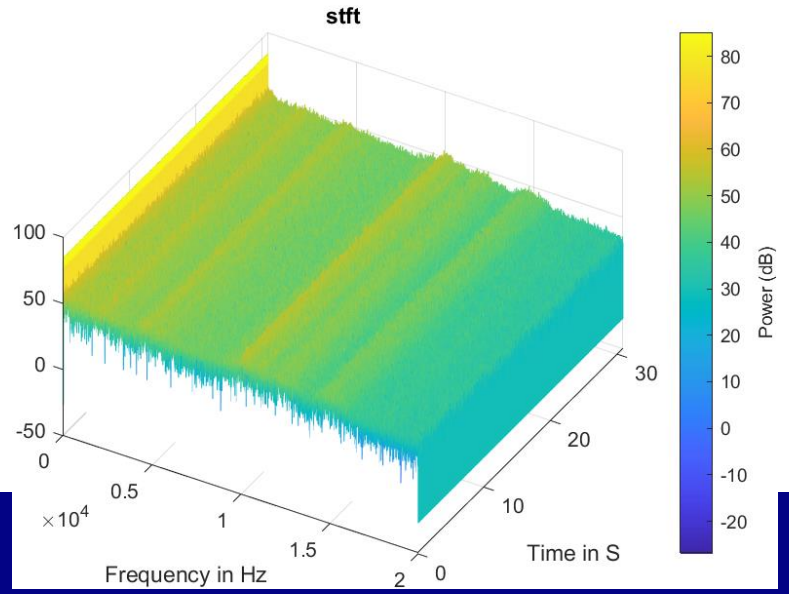
Signal Processing for Signal_2

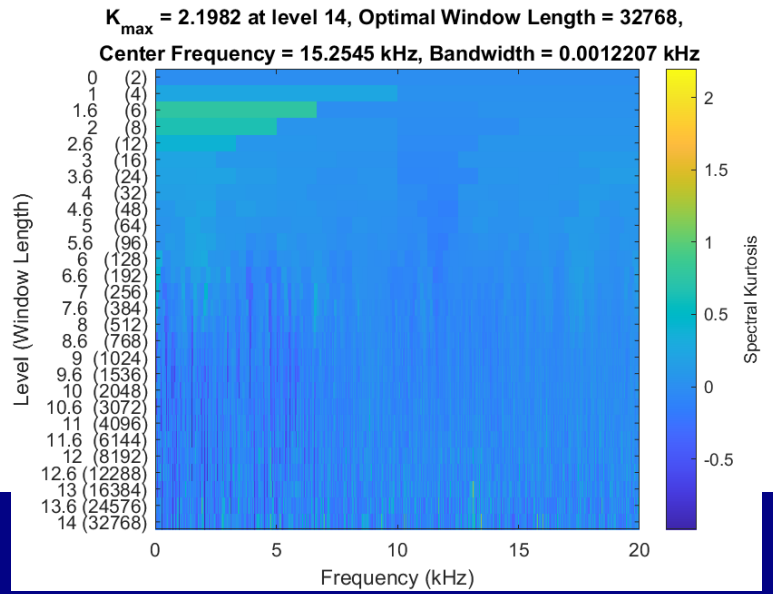




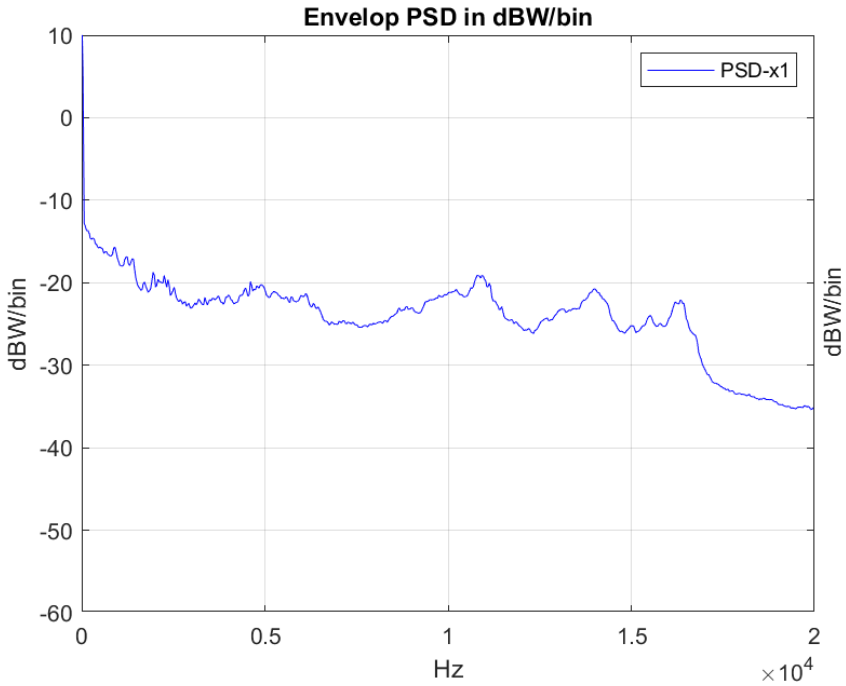




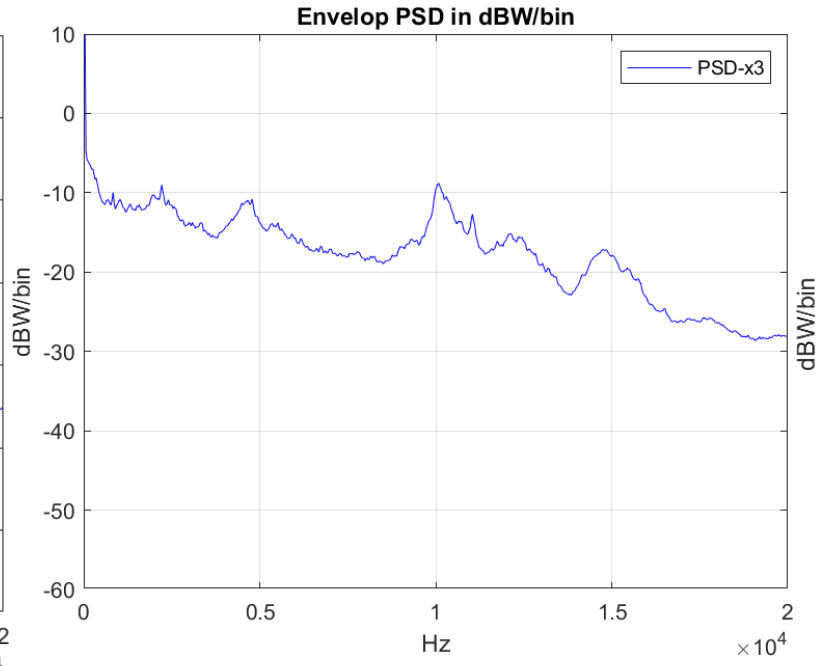




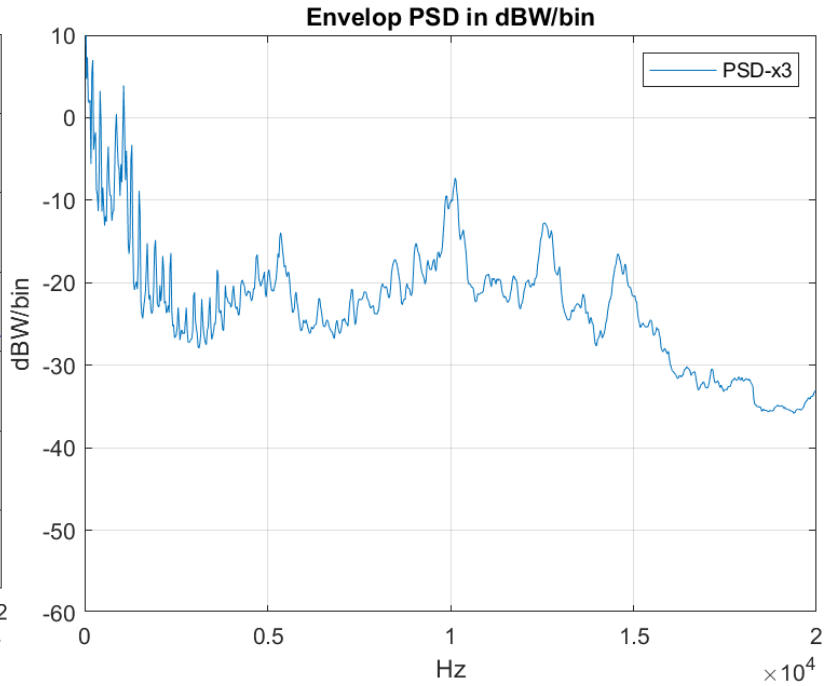
PSD Comparison



Signal_1



Signal_2



Signal_3
Faulty

REFERENCES

1. Lecture Slides from, Condition Monitoring Vibration Based Method, Universität Siegen.
2. https://de.mathworks.com/help/
3. https://www.dsprelated.com/showarticle/1221.php

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THANK YOU