Experimental Dataset for Gear Fault Diagnosis

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***Abstract*—The report provides required descriptions regarding acquired acceleration signals from a gearbox with helical gears in different pinion conditions. The setup test configuration was described and a link to download the datasets are presented in the report. The dataset is authorized to be used for any academic and research intents.**

***Index Terms*—Gearbox, fault diagnosis, dataset, signal, vibration.**

I. Introduction

THE provided datasets are related to radial vibration signals acquired in a gearbox setup (see Fig. 1 and 2) with three different gear conditions: healthy, one chipped tooth, and three worn teeth in helical gears, the setup test has been described in [1], [2]. Please cite these publications when you address these materials. The tested gears with faults are shown in Fig. 3. Also, Fig. 4 shows direction and position of the mounted accelerometer. Datasets can be downloaded from the link below:

https://goo.gl/TorZJq

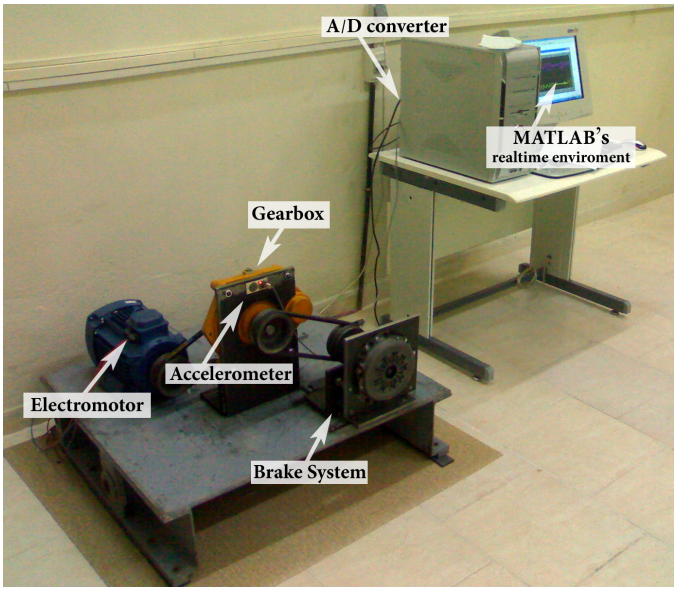

Fig. 1. Experimental test setup.

The helical gear, pinion (15 teeth) and wheel (110 teeth), provides speed ratio of 7.33 in the gearbox. The gearbox was tested in three different pinion conditions; no fault, a chipped tooth, and three consequent worn teeth as shown in Fig. 3. The pinion was rotated with a nominal speed of 1420 RPM. This speed provides a gear mesh frequency (GMF) of 355 Hz based on the nominal speed; however, the accurate GMF can be calculated by observing the first major peak in the FFT of the acquired signals in different gear conditions that are equal to 365 Hz. In each case, the acceleration was recorded for a duration of 10 seconds.

II. Test Setup Description

The datasets have been recorded in MATLAB and stored in mat-file format. The files are opened by "load" command in MATLAB. All measured channels are in volts. The signals are detrended to eliminate bias in the accelerometer.

A. Data Acquisition

The experiment was included an analog to digital converter (Advantech PCI-1710, 12-bit, 100kS/s) with sampling frequency rate 10 kHz, an accelerometer (Analog Device, ADXL210JQC) for measurement of vibration signals. The acquisitions were performed with Real-Time MATLAB Workshop.

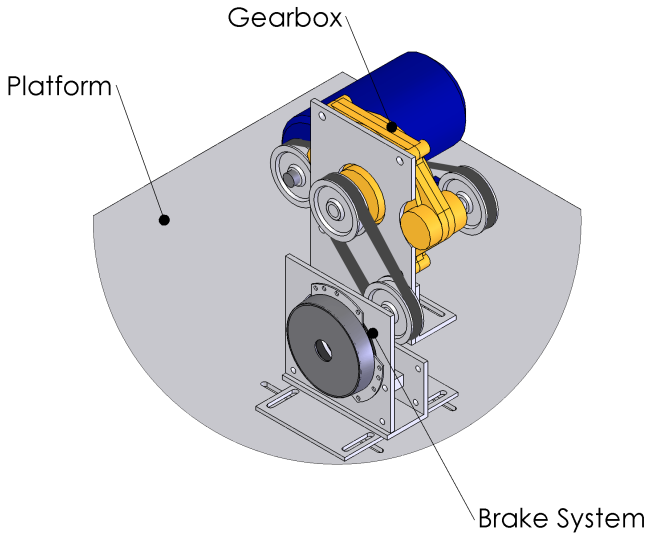

Fig. 2. Schematic of the test setup.

Fig. 3. Gears with worn teeth and a chipped tooth.

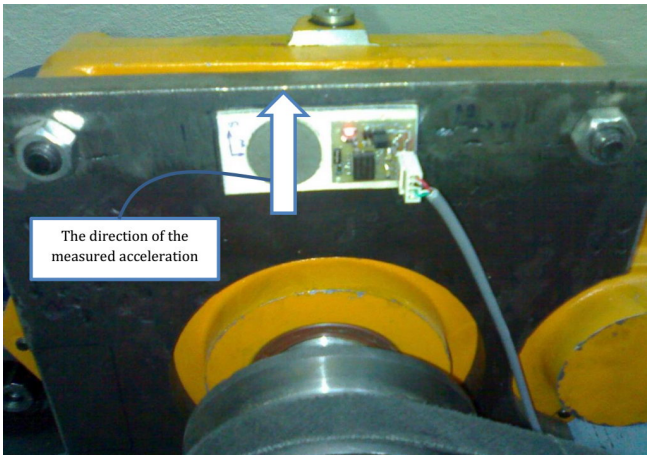

Fig. 4. Direction and position of the accelerometer.

1) Accelerometer Configurations: V_{ref} = 5 V, ADXL210 Sensitivity = 100 mV/g, AD unit number = V_{ref}/212 = 5/4096 = 1.22 mV, Resolution = AD unit number / ADXL210 Sensitivity = 1.22 mV / 100 mV/g = 0.0122 g = 12.2 mg.

REFERENCES

[1] A. H. Zamanian and A. Ohadi, "Gear fault diagnosis based on gaussian correlation of vibrations signals and wavelet coefficients," *Applied Soft Computing*, vol. 11, no. 8, pp. 4807–4819, 2011.

[2] A. H. Zamanian and A. Ohadi, "Gearbox fault detection through PSO exact wavelet analysis and SVM classifier," in *18th Annual International Conference on Mechanical Engineering-ISME2010*, 2010.