Assignment 4
Frequency Analysis in MATLAB II

Purpose:	More advanced frequency analysis in MATLAB concerning rotating machinery.
Preparation:	Read the chapters in the text book concerning frequency analysis. Study the MATLAB function waterfall.
Equipment:	Computer with MATLAB software. Two signal packages are given: Ass4_signal1 vibrations from a tracked armoured vehicle Ass4_signal2 vibrations from an automotive engine
Software:	Matlab
Latest Submission date:	**T.B.D**

Matlab Work

Task 1. Vibrations from a tracked vehicle, ass4_signal1
The signal package consists of a vibration signal x, units m/s^2, a speed signal, units km/h, and the sampling frequency fs. The signals are recorded when the vehicle in figure 1 was running at changing speed. **The vibration values are not the real ones!**

Figure 1. Armoured tracked vehicles.

You shall produce a Time Spectral Map of the vibration.

Parameters:
Frequency range: 0 – 500 Hz
FFT block size: 8192
Number of spectra: 200.

You should get something like figure 2.

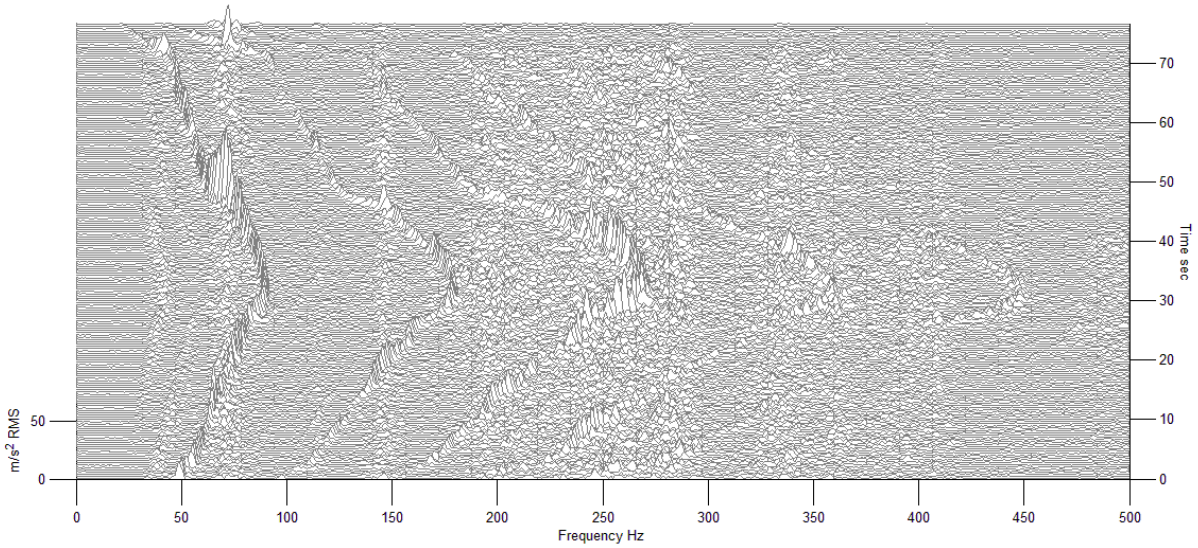

Figure 2. Time Spectral Map

Using the information from the speed signal, estimate the track pad length! See figure 3, where we see the track from a similar vehicle.

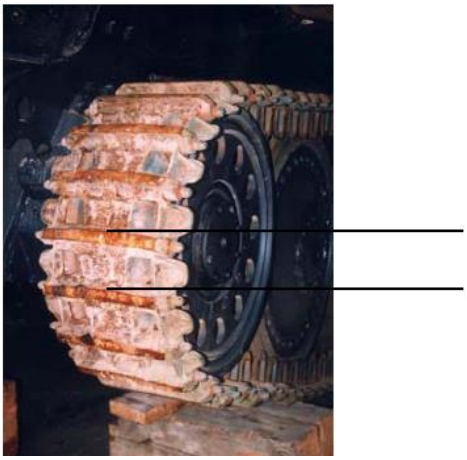

Figure 3. Track from a similar *vehicle.*

Task 2. Vibration from rotating machinery, ass4_signal2

Signal 2 package comes from a measurement recorded in a passenger car with the engine running at varying speed. The signal x is vibration, unit m/s^2. A tacho signal is also given, one pulse per revolution. The car may be like the one in figure 4.

The task is to produce an RPM Spectral Map. To be able to do that, you will first have to get the RPM as function of time from the tacho signal. Then the RPM signal may be used to produce an RPM Spectral Map of the vibration signal x.

Parameters:
Frequency range: 0 – 250 Hz
FFT block size: 16384
RPM range: 1100 – 5800 RPM
Number of RPM:s 95 (RPM increment 50)

The result should look like figure 5.

Figure 4. Passenger car

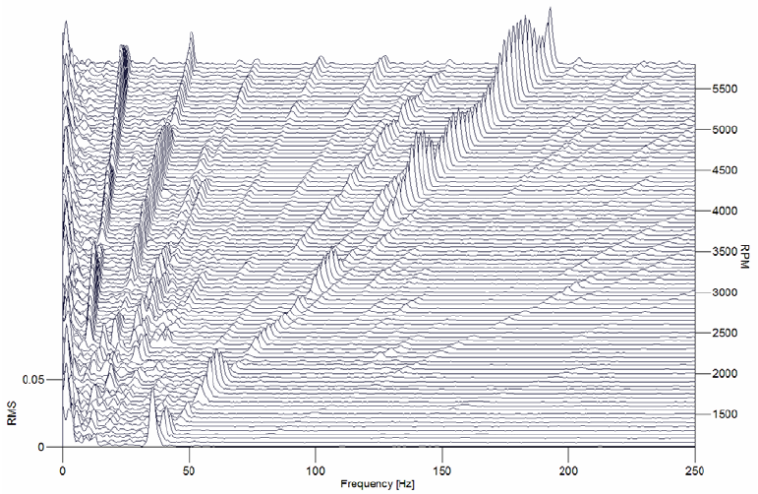

Figure 5. RPM Spectral Map

Report

A short and well written technical report shall be produced.
Follow the Template On "itslearning"!

Submission

Use "itslearning" to submit your report before the deadline.

Good luck!