#### Tutorial 5: Vibration-based condition monitoring of rolling element bearings

In **Tutorial 1** of this course, students applied a global surveillance strategy of a mechanical system comprising rolling element bearings. You have applied many global indicators (like RMS, kurtosis and skewness) to monitor the overall evolution of the acquired data and detect anomaly in the system. However, we could not know with this approach what component is actually faulty.

The aim know is to perform an accurate diagnosis of the rolling element bearing of interest whose rotation frequency equals 33.33Hz and its geometry is summarized in the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bearing geometry** | **Pitch Diameter [Inch]** | **Rolling element diameter [Inch]** | **Number of rolling elements** | **Contact angle** |
|  | 2.815 | 0.331 | 16 | Unknown (set to zero) |

The analysis will concern three files (i.e. three signals), namely:

* Record 100 (i.e. the 100th file)
* Record 600 (i.e. the 600th file)
* Record 850 (i.e. the 850th file)

Students are requested to perform an accurate vibration-based diagnosis based on Lecture 5. This must comprise the following analysis:

* Calculation of the theoretical failure frequencies of the bearing
* Time-domain analysis
* Frequency domain analysis on the spectrum
* Calculation of the envelope and envelope spectrum
* Frequency domain analysis on the envelope spectrum