

Why to use SmartNode from Vibtech

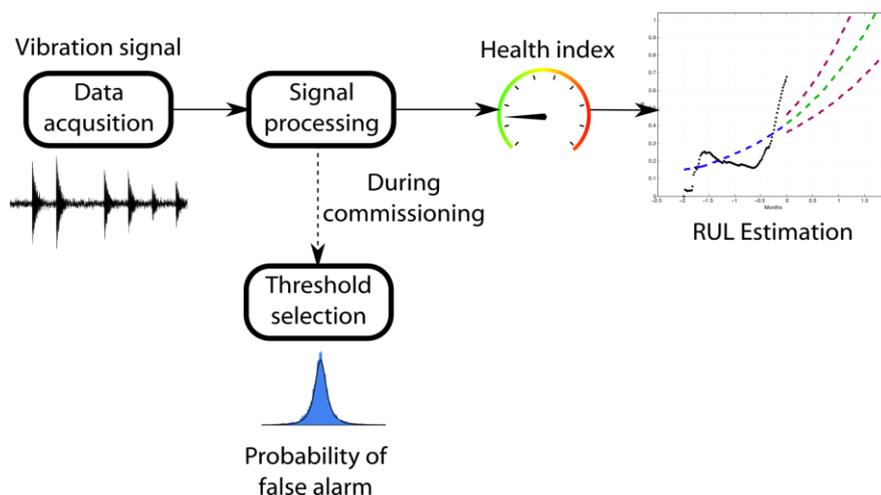
...main advantages, that separate Vibtech's SmartNode from the currently available 24/7 on-line solutions:

1. Robustness to variations of rotational speed and load.

Standard vibration analysis methods (currently used on the market) include RMS, peak-to-peak values, amplitude of specific spectral components from FFT analysis. These methods are effective only for constant operating conditions i.e., constant speed and constant load. For variety of industrial application are therefore such methods not applicable or have very limited value.

SmartNode from **Vibtech** is capable of performing all these standard signal processing tasks. However, the core of the **SmartNode** from **Vibtech** is a novel signal processing algorithm that analyses the statistical footprint of the energy of the generated vibrations. As such the algorithm is capable of detecting mechanical failures regardless of the **variations** in the **rotational speed** and **load**.

The resulting feature is a value between 0-100% that is directly related to the health of the monitored asset hence the name **health index**. The time evolution of the **health index** is employed for estimation of the **remaining useful life** with appropriate confidence intervals.



2. Accurate algorithms for estimation of the remaining useful life.

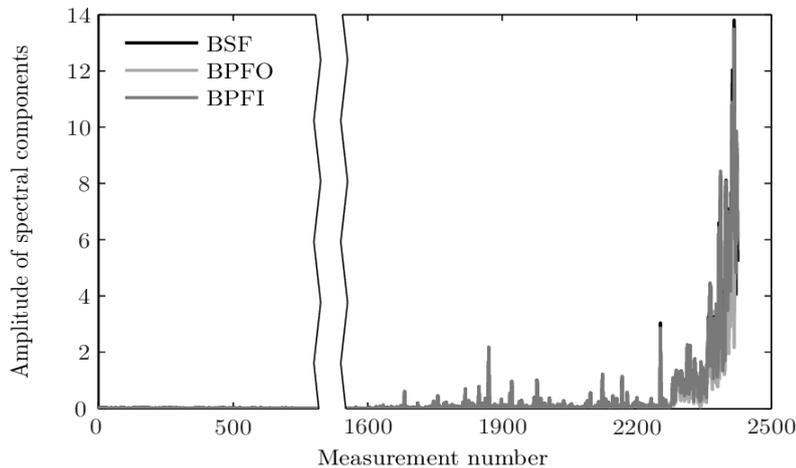
For comparison, the time trend of the BPF0, BPF1, BSF and FTF extracted using the Spectral Kurtosis methods are shown in the Graph 1;

Our proprietary **health index** on the same application is shown in Graph 2.

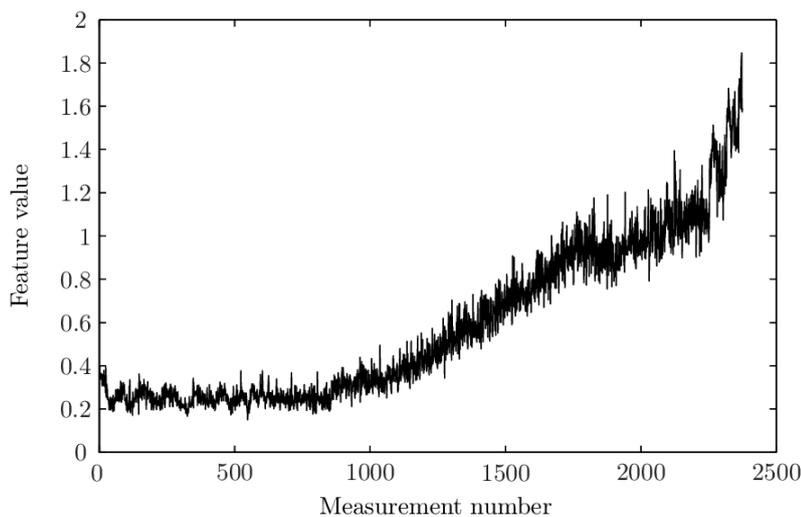
Two main benefits are visible:

- the **health index** detects discrepancies from the fault free mode **far earlier** in the life-time
- the trend of the **health index** is almost monotonic which enables quality estimation of the **remaining useful life (RUL)** (Graph 3). The estimation of RUL on all currently market available systems is not possible or is very inaccurate.

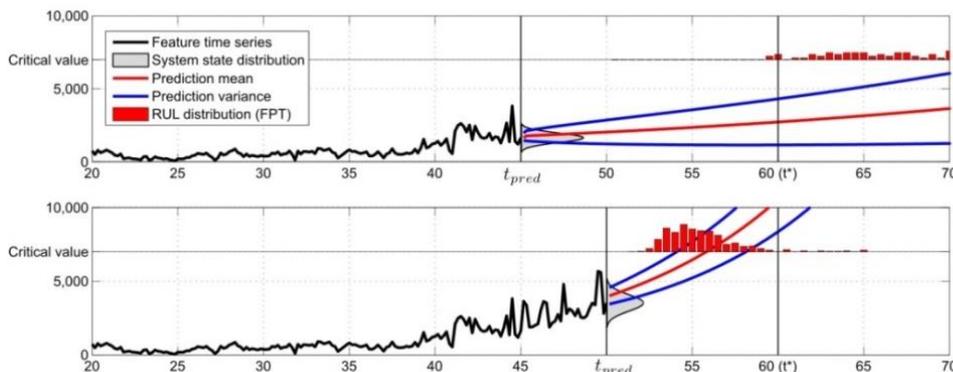
The method for health index calculation was awarded on international IEEE PHM Conference 2012, Denver Colorado.



Graph 1: Time trend of the BPFO, BPF, BSF and FTF for real life application



Graph 2: Time trend of the Health Index from Vibtech d.o.o. for the same application (as in Graph 1)



Graph 3: Remaining Useful Life prediction – with confidence intervals

3. Fast and simple set-up of the system

Typical condition monitoring systems rely on ISO 10816 or similar standards. However, the alarm thresholds proposed by these standards might be unsuitable for the specific machine at hand.

SmartNode from **Vibteh** commissioning is straightforward. After the installation the system performs several measurements that are used for calculation of the baseline status. Due to the nature of the signals processing algorithm, the end-user enters the desired probability of false alarm and the systems calculates the appropriate alarm thresholds based on the acquired baseline measurements.

SmartNode from **Vibteh** monitoring systems can be installed on running systems **during** its life time as for standard systems you need to set the baseline with newly installed components.

...additional advantages to widely used PORTABLE vibration based measurement systems:

- 1. Higher Accuracy:** Every portable measuring device measures only during testing phase, resulting in limited amount of data available for analysis.
- 2. Higher Quality:** With portable systems, the quality of measurement highly depends on the measurer (quality of test rig set-up, mounting of sensors...). With 24/7 systems, after system is set-up, conditions are kept constant during lifetime.
- 3. Additional functionality:** With Portable systems indication of special events in the system are not recorded...(crash with external elements into the system; remote monitoring of operation (on/ off); higher time-limited loads due to various parameters)..consequently fast reaction (...safety shut-down, early service planning) to un-normal situation are not possible.
- 4. Lower operational costs:** With portable systems, you have occurring cost of measurement during life time of the system.

...all that result in SmartNode from Vibteh being currently the best solution on the market for condition monitoring and life time calculations of bearings and gears in various system.