# DIN ISO 13373-2:2016-11 (E)

## Condition monitoring and diagnostics of machines - Vibration condition monitoring - Part 2: Processing, analysis and presentation of vibration data (ISO 13373-2:2016)

## Contents

Page


**National foreword** 4

**National Annex NA** (informative) **Bibliography** 6

**Introduction** 8

**1 Scope** 9

**2 Normative references** 9

**3 Signal conditioning** 9
3.1 General 9
3.2 Analogue and digital systems 11
3.2.1 General 11
3.2.2 Digitizing techniques 12
3.3 Signal conditioners 12
3.3.1 General 12
3.3.2 Integration and differentiation 12
3.3.3 Root-mean-square vibration value 13
3.3.4 Dynamic range 14
3.3.5 Calibration 14
3.4 Filtering 15

**4 Data processing and analysis** 15
4.1 General 15
4.2 Time domain analysis 16
4.2.1 Time wave forms 16
4.2.2 Beating 17
4.2.3 Modulation 18
4.2.4 Envelope analysis 19
4.2.5 Monitoring of narrow-band frequency spectrum envelope 19
4.2.6 Shaft orbit 20
4.2.7 d.c. shaft position 20
4.2.8 Transient vibration 20
4.2.9 Impulse 21
4.2.10 Damping 22
4.2.11 Time domain averaging 24
4.3 Frequency domain analysis 25
4.3.1 General 25
4.3.2 Fourier transform 25
4.3.3 Leakage and windowing 26
4.3.4 Frequency resolution 27
4.3.5 Record length 27
4.3.6 Amplitude modulation (sidebands) 27
4.3.7 Aliasing 29
4.3.8 Synchronous sampling 30
4.3.9 Spectrum averaging 31
4.3.10 Logarithmic plots (with dB references) 31
4.3.11 Zoom analysis 32
4.3.12 Differentiation and integration 32

4.4 Display of results during operational changes ..... 33
4.4.1 Amplitude and phase (Bode plot) ..... 33
4.4.2 Polar diagram (Nyquist diagram) ..... 34
4.4.3 Cascade (waterfall) diagram ..... 35
4.4.4 Campbell diagram ..... 37
4.5 Real-time analysis and real-time bandwidth ..... 38
4.6 Order tracking (analogue and digital) ..... 39
4.7 Octave and fractional-octave analysis ..... 39
4.8 Cepstrum analysis ..... 39
**5 Other techniques ..... 40**
**Bibliography ..... 42**