ISO 13373-2:2016-01 (E)

Condition monitoring and diagnostics of machines - Vibration condition monitoring - Part 2: Processing, analysis and presentation of vibration data

Contents

Page

Foreword v

Introduction vi

1 Scope 1

2 Normative references 1

3 Signal conditioning 1
3.1 General 1
3.2 Analogue and digital systems 3
3.2.1 General 3
3.2.2 Digitizing techniques 4
3.3 Signal conditioners 4
3.3.1 General 4
3.3.2 Integration and differentiation 4
3.3.3 Root-mean-square vibration value 5
3.3.4 Dynamic range 6
3.3.5 Calibration 6
3.4 Filtering 7

4 Data processing and analysis 7
4.1 General 7
4.2 Time domain analysis 8
4.2.1 Time wave forms 8
4.2.2 Beating 9
4.2.3 Modulation 10
4.2.4 Envelope analysis 11
4.2.5 Monitoring of narrowband frequency spectrum envelope 11
4.2.6 Shaft orbit 12
4.2.7 d.c. shaft position 12
4.2.8 Transient vibration 12
4.2.9 Impulse 13
4.2.10 Damping 14
4.2.11 Time domain averaging 16
4.3 Frequency domain analysis 17
4.3.1 General 17
4.3.2 Fourier transform 17
4.3.3 Leakage and windowing 18
4.3.4 Frequency resolution 19
4.3.5 Record length 19
4.3.6 Amplitude modulation (sidebands) 19
4.3.7 Aliasing 21
4.3.8 Synchronous sampling 22
4.3.9 Spectrum averaging 23
4.3.10 Logarithmic plots (with dB references) 23
4.3.11 Zoom analysis 24
4.3.12 Differentiation and integration 24
4.4 Display of results during operational changes 25
4.4.1 Amplitude and phase (Bode plot) 25
4.4.2 Polar diagram (Nyquist diagram) 26

4.4.3 Cascade (waterfall) diagram 27
4.4.4 Campbell diagram 29
4.5 Realtime analysis and realtime bandwidth 30
4.6 Order tracking (analogue and digital) 31
4.7 Octave and fractionaloctave analysis 31
4.8 Cepstrum analysis 31

5 Other techniques 32

Bibliography 34