

TECHNICAL REPORT

ISO/TR
230-8

Second edition
2010-06-01

Test code for machine tools —

Part 8: Vibrations

Code d'essai des machines-outils —

Partie 8: Vibrations

ISO/PASCAL



Reference number
ISO/TR 230-8:2010(E)

© ISO 2010

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2010

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office

Case postale 56 • CH-1211 Geneva 20

Tel. + 41 22 749 01 11

Fax + 41 22 749 09 47

E-mail copyright@iso.org

Web www.iso.org

Published in Switzerland

http://www.iso.org/iso/iso_tr_230-8.htm

Contents

Page

Foreword	v
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Theoretical background to the dynamic behaviour of machine tools	13
4.1 Nature of vibration: basic concepts	13
4.2 Single-degree-of-freedom systems	16
4.3 Mathematical considerations	20
4.4 Graphical representations	22
4.5 Different types of harmonic excitation and response	26
4.6 More degrees of freedom	33
4.7 Other miscellaneous types of excitation and response of machine tools	40
4.8 Spectra, responses and bandwidth	43
5 Types of vibration and their causes	44
5.1 Vibrations occurring as a result of unbalance	44
5.2 Vibrations occurring through the operation of linear slides	48
5.3 Vibrations occurring externally to the machine	49
5.4 Vibrations initiated by the machining process: forced vibration and chatter	50
5.5 Other sources of excitation	52
6 Practical testing: general concepts	54
6.1 General	54
6.2 Measurement of vibration values	54
6.3 Instrumentation	55
6.4 Relative and absolute measurements	56
6.5 Units and parameters	56
6.6 Uncertainty of measurement	58
6.7 Note on environmental vibration evaluation	58
6.8 Type testing	59
6.9 Location of machine	59
7 Practical testing: specific applications	60
7.1 Unbalance	60
7.2 Machine slide acceleration along its axis (inertial cross-talk)	64
7.3 Vibrations occurring externally to the machine	67
7.4 Vibrations occurring through metal cutting	67
8 Practical testing: structural analysis through artificial excitation	68
8.1 General	68
8.2 Spectrum analysis and frequency response testing	69
8.3 Machine set-up conditions	70
8.4 Frequency analysis	71
8.5 Modal analysis	73
8.6 Cross-response tests	73
8.7 "Non-standard" vibration modes	75
8.8 Providing standard stability tests	76
Annex A (informative) Overview and structure of this part of ISO 230	77
Annex B (informative) Relationships between vibration parameters	78