

ISO 230-7:2015-05 (E)

Test code for machine tools - Part 7: Geometric accuracy of axes of rotation

Contents		Page
Foreword		v
Introduction		vi
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
3.1	General concepts	2
3.2	Error motion terms	6
3.3	Consequences of axis of rotation error motion	8
3.4	Directional decomposition of axis of rotation error motion	10
3.5	Decomposition of measured axis of rotation error motion based on rotational frequency ..	11
3.6	Terms for axis of rotation error motion polar plots	12
3.7	Terms for axis of rotation error motion polar plot centres	14
3.8	Terms for axis of rotation error motion values	15
3.9	Terms for structural error motion	17
3.10	Terms for axis shift	17
4	Preliminary remarks	18
4.1	Measuring units	18
4.3	Recommended instrumentation and test equipment	18
4.4	Environment	19
4.5	Rotary component to be tested	19
4.6	Rotary component warm-up	19
4.7	Structural error motion tests	19
4.7.1	General	19
4.7.2	Test procedure	19
4.7.3	Analysis of results	19
5	Error motion test methods for machine tool spindle units	20
5.1	General	20
5.2	Test parameters and specifications	20
5.3	Spindle axis of rotation tests -- Rotating sensitive direction(s)	20
5.3.1	General	20
5.3.2	Radial error motion	20
5.3.3	Tilt error motion	23
5.3.4	Axial error motion	25
5.4	Spindle tests -- Fixed sensitive direction	26
5.4.1	General	26
5.4.2	Test setup	26
5.4.3	Radial error motion	27
5.4.4	Axial error motion	29
5.4.5	Tilt error motion	30
6	Error motion test methods for machine tool rotary tables/heads	31
6.1	General	31
6.2	Axial error motion	31
6.2.1	Test setup	31
6.2.2	Test procedure	32
6.2.3	Data analysis	32

6.3	Radial error motion	33
6.3.1	Test setup	33
6.3.2	Test procedure	33
6.3.3	Data analysis for rotating sensitive direction	33
6.3.4	Data analysis for fixed sensitive direction	34
6.4	Tilt error motion	34
6.4.1	Test setup	34
6.4.2	Test procedure	34
6.4.3	Data analysis for rotating sensitive direction	34
6.4.4	Data analysis for fixed sensitive direction	35
Annex A (informative)	Discussion of general concepts	36
Annex B (informative)	Elimination of reference sphere roundness error	55
Annex C (informative)	Terms and definitions for compliance properties of axis of rotation	59
Annex D (informative)	Terms and definitions for thermally-induced errors associated with rotation of spindle and rotary tables/heads	60
Annex E (informative)	Static error motion tests	61
Annex F (informative)	Measurement uncertainty estimation for axis of rotation tests	62
Annex G (informative)	Alphabetical cross-reference of terms and definitions	67
Annex H (informative)	Linear displacement sensor bandwidth and rotational speed	69
Bibliography		72