

ISO 230-10:2016-02 (E)

Test code for machine tools - Part 10: Determination of the measuring performance of probing systems of numerically controlled machine tools

Contents		Page
Foreword		v
Introduction		vi
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
3.1	General terms	2
3.2	Terms relating to the probing system	2
3.3	Terms relating to probing	5
3.4	Terms relating to scanning probes (See Annex B)	7
4	Preliminary remarks	8
4.1	Influences on the measurement performance of the probing system	8
4.2	Measurement units	9
4.4	Recommended instrumentation and test equipment	9
4.5	Machine conditions prior to testing	9
4.6	Testing sequence	9
4.7	Tests to be performed	9
4.8	Sources of test uncertainty	10
4.9	Reporting of test results	10
5	Thermal influences	11
5.1	General	11
5.2	Environmental temperature variation error (ETVE) test	11
5.3	Other thermal distortion tests	11
6	Probing of workpiece	12
6.1	General	12
6.2	Probing repeatability	12
6.2.1	General	12
6.2.2	Probing repeatability test for single-point surface measurement, RSPT,X, RSPT,Y and RSPT,Z (RSingle_PoinT,X,Y,Z)	13
6.2.3	Probing repeatability test for circle centre location, RCIR,X and RCIR,Y (RCIRcle,X,Y)	13
6.2.4	Probing repeatability test for sphere centre location, RSPH,X, RSPH,Y and RSPH,Z (RSPHere, X,Y,Z)	14
6.3	Stylus tip offset test, A	14
6.3.1	General	14
6.3.2	Test setup and procedure	14
6.3.3	Analysis of results	14
6.4	Probing-tool location repeatability test, RPTL,X, RPTL,Y and RPTL,Z (RProbing-Tool_Location,X,Y,Z)	15
6.4.1	General	15
6.4.2	Test setup and procedure	15
6.4.3	Analysis of results	15
6.5	2D probing error test, PFTU,2D (PForm_Tactile_Unique,2D)	15
6.5.1	General	15
6.5.2	Test setup and procedure	16
6.5.3	Analysis of results	16

6.6	3D probing error test, PFTU,3D (PForm_Tactile_Unique,3D)	17
6.6.1	General	17
6.6.2	Test setup and procedure	17
6.6.3	Analysis of test results	18
6.7	Workpiece position and orientation tests, EPLA,Z, ELIN,Y, ECOR,X, ECOR,Y and ECOR,Z (E PLAnE,Z), (E LIne,Y), (E CORner coordinates,X,Y,Z)	18
6.7.1	General	18
6.7.2	Test setup	21
6.7.3	Test procedure	22
6.7.4	Analysis of results	23
6.7.5	Alternative workpiece position and orientation test	23
6.8	Combined workpiece machining and location test, ECML,X, ECML,Y, ECML,Z, RCML,X, RCML,Y and RCML,Z (E Combined Machining and Location, X,Y,Z), (R Combined Machining and Location, X,Y,Z)	25
6.8.1	General	25
6.8.2	Test setup and procedure	25
6.8.3	Analysis of results	26
6.9	Time delay variation tests	26
6.9.1	General	26
6.9.2	Time delay variation test for individual axes, ESPT,TD,X, ESPT,TD,Y, ESPT,TD,Z (ESingle-Point, Time Delay variation, X,Y,Z)	27
6.9.3	Time delay variation test for XY plane circle measurement, ECIR,TD,X, ECIR,TD,Y, ECIR,TD,D and ECIR,TD,F (ECIRcle, Time Delay variation, X,Y), (ECIRcle, Time Delay variation, Diameter) and (ECIRcle, Time Delay variation, Form)	28
6.9.4	Time delay variation test for sphere measurement, ESPH,TD,X, ESPH,TD,Y, ESPH,TD,Z, ESPH,TD,D and ESPH,TD,F (ESPHere, Time Delay variation, X,Y,Z), (ESPHere, Time Delay variation, Diameter) and (ESPHere, Time Delay variation, Form)	29
6.10	Feature size measurement performance tests	30
6.10.1	General	30
6.10.2	Web size measurement performance test, EWEB,X, EWEB,Y, RWEB,X and RWEB,Y	31
6.10.3	Circle diameter measurement performance test, ECIR,D and RCIR,D (ECIRcle, Diameter) and (RCIRcle, Diameter)	31
6.10.4	Sphere diameter measurement performance test, ESPH,D and RSPH,D (ESPHere, Diameter) and (RSPHere, Diameter)	32
7	Probing of tools	32
7.1	General	32
7.2	Tool-setting system qualification	33
7.3	Tool-setting repeatability	33
7.3.1	General	33
7.3.2	Tool length-setting repeatability with a non-rotating tool, RSET,L,N (RSETting,Length,Non-rotating)	34
7.3.3	Tool length-setting repeatability of a rotating tool, RSET,L,R (RSETting,Length,Rotating)	34
7.3.4	Tool diameter setting repeatability, RSET,D,R (RSETting,Diameter,Rotating)	35
	Annex A (informative) Alphabetical cross-references and short description of symbols	37
	Annex B (informative) Measuring performance with scanning probes	39
	Bibliography	45