

DIN ISO 16084:2021-06 (E)

Balancing of rotating tools and tool systems (ISO 16 084:2017)

Contents		Page
National foreword		3
National Annex NA (informative) Bibliography		4
Foreword		5
Introduction		6
1 Scope		7
2 Normative references		7
3 Terms, definitions, symbols and abbreviated terms		7
3.1 Terms and definitions		7
3.2 Symbols and abbreviated terms		9
4 Requirements		12
4.1 General		12
4.1.1 Clamping inaccuracies		12
4.1.2 Influence of balancing machines		12
4.1.3 Effects and frequent consequences of permissible residual unbalances according to ISO 1940-1		13
4.1.4 Inherent properties of machine tools and components		13
4.2 Balancing requirements based on the spindle load		13
4.2.1 General		13
4.2.2 Determination of the balancing requirements		16
4.2.3 Measuring accuracy of balancing machines, influence of run-out and repeatability of measuring results		20
4.2.4 Application criterion of static and dynamic balancing		21
4.2.5 Permissible residual dynamic unbalances		21
4.2.6 Balancing requirements for tool systems with guidance		26
4.2.7 Influence of the HSK (hollow taper shank) on the dynamic unbalance		28
4.3 Safety-related unbalance limitations (G40) according to ISO 15641		29
4.4 Graphic visualization of the balancing requirements		29
4.5 Special tools with asymmetric body shapes		31
5 Balancing of tool systems		31
5.1 General		31
5.2 Balancing of tool system components		33
5.3 Influence of the angular orientation of component unbalances		35
5.4 Influence of clamping dislocations		35
5.5 Integration of tool system components balanced according to ISO 1940-1		36
5.6 Calculation of the permissible rotational speed depending on actual unbalance		36
5.7 Determination and calculation of the position of the centre of gravity		37
5.7.1 Experimental determination of the centre of gravity		37
5.7.2 Calculation of the centre of gravity of a modular tool system		37
5.8 Balancing of tools and components with alternative interfaces		38
5.9 HSK adapters with rotationally symmetrical tools		38
5.10 Remarks for setup and balancing of tool systems		39
6 Data representation and exchange		40
Annex A (informative) Permissible residual unbalances — Theoretical approach and calculation examples		42
Annex B (informative) Calculation examples of tool systems		67
Annex C (normative) XML file structure for the documentation of balancing information		72
Annex D (informative) Fundamental unbalance formula, correlations and practical advice		74
Bibliography		77