
International Standard



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Basic quantities in cutting and grinding — Part 4 : Forces, energy, power

Grandeurs de base en usinage et rectification — Partie 4: Forces, énergie et puissance

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 3002/4 was prepared by Technical Committee ISO/TC 29, *Small tools*.

Basic quantities in cutting and grinding — Part 4: Forces, energy, power

0 Introduction

The forces considered in this part of ISO 3002 are those exerted by the tool upon the workpiece.

Forces can vary in time; in this part of ISO 3002 instantaneous forces, torques, and power are considered at an instant in time which, if necessary, should be specified.

Forces, torques, energy and power in this part of ISO 3002 may be considered in relation to a cutting part or to the tool as a whole. Whenever a clear distinction must be made the suffix "S" should be added to the symbols when related to the cutting part.

1 Scope and field of application

This International Standard defines a nomenclature for certain basic concepts concerning the machining and grinding of materials. This part of ISO 3002 establishes and defines those terms used for forces, energy and power in connection with cutting. It should be read in conjunction with ISO 3002/1 which is more general.

It is generally applicable to all machining operations, including grinding. However certain terms specifically for grinding are defined in ISO 3002/5.

The definitions¹⁾ are divided into five main clauses: the first two deal with forces and torques exerted by a tool or by the cutting part on the workpiece, the next two are concerned with energy and power for a particular operation on a specific machine tool, and the last gives details of individual quantities where these may differ from the basic quantities.

NOTE — In addition to the terms given in the three official ISO languages (English, French, Russian), this part of ISO 3002 gives the equivalent terms in German, Italian and Dutch; these terms have been included at the request of Technical Committee ISO/TC 29, and are published under the responsibility of the committee members for Germany, F.R. (DIN), Italy (UNI) and the Netherlands (NNI). However, only the terms given in the official languages can be considered as ISO terms.

2 References

ISO 841, *Numerical control of machines — Axis and motion nomenclature.*

ISO 3002/1, *Basic quantities in cutting and grinding — Part 1: Geometry of the active part of cutting tools — General terms, reference systems, tool and working angles, chip breakers.*

ISO 3002/2, *Basic quantities in cutting and grinding — Part 2: Geometry of the active part of cutting tools — General conversion formulae to relate tool and working angles.*

ISO 3002/3, *Basic quantities in cutting and grinding — Part 3: Geometric and kinematic quantities in cutting.*

ISO 3002/5, *Basic quantities in cutting and grinding — Part 5: Basic terminology concerning grinding by wheel.*²⁾

3 Forces and torques exerted by the tool

3.1 total force exerted by the tool: The resultant of the *total force* F (see 4.1) exerted by all *cutting parts* engaged.

3.2 total torque exerted by the tool M : The entire torque produced by the cutting action of a tool around a specified axis.

3.3 cutting torque M_c : The torque exerted around the axis of rotation of the *primary motion*.

4 Forces exerted by a cutting part

Although it is realized that the *total force* on the *cutting part* does not act only on the *cutting edge*, it is assumed that the origin of the total force vector is located at the *cutting edge principal point*. Torques so caused are not considered here.

All planes and directions needed for the resolution of the *total force* are defined in the *cutting edge principal point*.

4.1 total force F exerted by a cutting part: The entire force produced by the action of a *cutting part* of the tool on the workpiece.

1) Definitions of all concepts mentioned or used in this part of ISO 3002 (printed in *italics*) can be found either in the body of this part or in the other parts, to which the reader is referred.

2) At present at the stage of draft.