SECOLOR®

TURNING CALCULATOR

USERS GUIDE

TABLE OF CONTENT

VERSION HISTORY

REVISION CHART			
Version	**Author(s)**	**Description**	**Date**
1.0.0	SorH, EllS	Release Version 1.0.0	2009-07-02

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SYSTEM REQUIREMENTS

Windows XP or later Microsoft operating systems .NET Framework 3.5, Service pack 1

INSTALLATION

The system will automatically be downloaded and installed when clicking the download button.

UPDATES

If online and when starting the Secolor® Turning Calculator, the program will check if a new version is available. If so, a button 'Download latest version' will appear on the upper right of the users interface window. By clicking on this button the system will automatically be updated. (Click-once functionality)

The update may include either the systems functionality or the cutting data database or both.

TRADEMARKS

1 INTRODUCTION

The Secolor Turning Calculator calculates recommendations for cutting speed, using h_e and Colding's tool life equation. The cutting speed recommendations are only available for applicable combinations of materials and grades. The Calculator includes all turning grades and chip breakers, but has no inbuilt product database. It is the responsibility of the user to make combinations of selections and inputs that represent actual SECO products. For complete product selection, please see SecoCut[1] or Seco Navigator.

All descriptions in this manual are based on the metric system but the functions are valid for inch as well. Changing from the metric system to inch and vice versa can be done by any time.

Metric/Inch

Work material

Select from list
- SMG 1–15
- Superalloys
- Titanium

Calibration

- R_m for SMG 1-6
- HRC for SMG 7

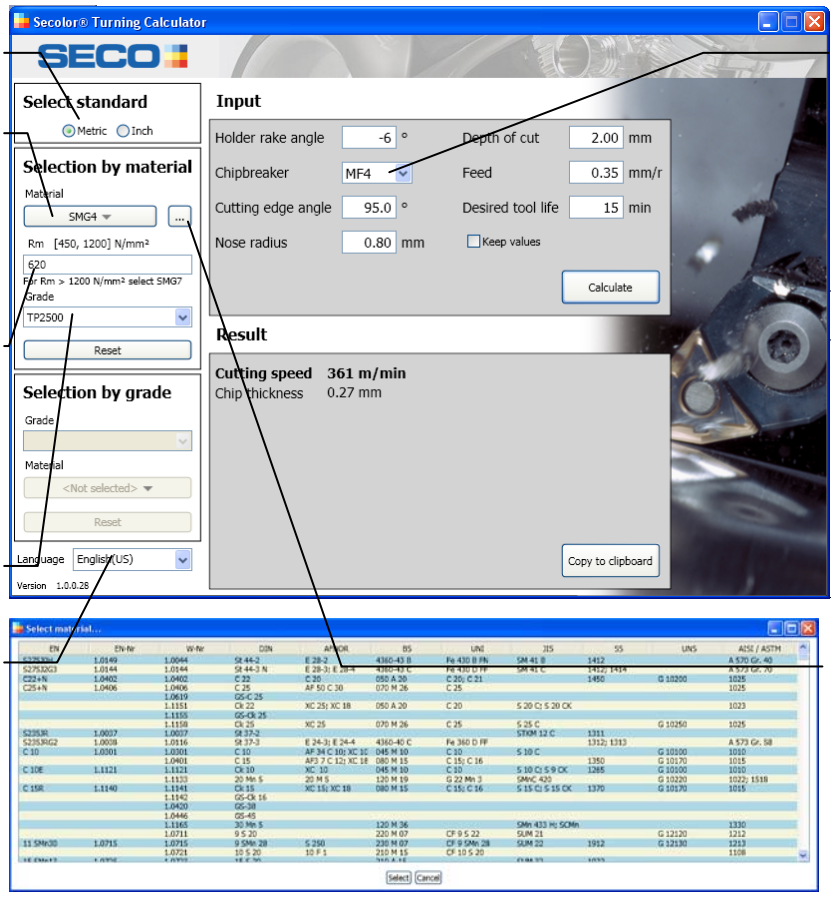
Nominal values are used as default.

Grade

Select from list

Language

Select from list



Chipbreaker

Select from list

Material cross reference specs

- Sort by desired specification
- Select from list

Figure 1: Overview of input parameters and available selections in the Secolor Turning Calculator

[1] SecoCut can be downloaded from www.secotools.com. Since the SecoCut includes all the the Seco cutting tools, the size of the database is 50Mb, and the download time as well as the required space on the local hard disc increases substantially.

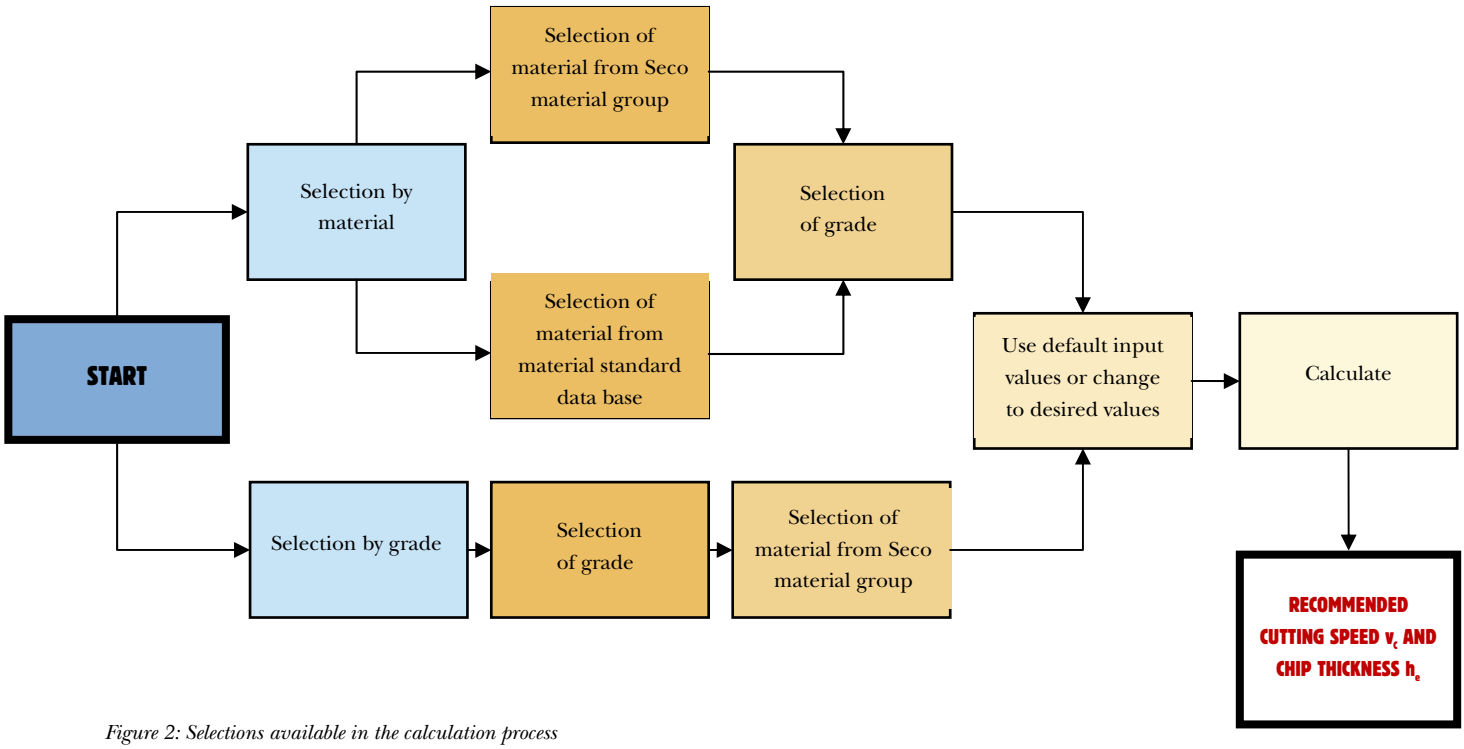


Figure 2: Selections available in the calculation process

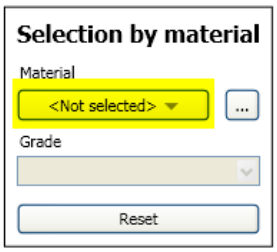
2 CALCULATIONS OF CUTTING SPEED

There are two different preferences available for selection of parameters; selection by material and selection by grade.

2.1 SELECTION BY MATERIAL

Selection by grade is similar.

Access and select materials from the Seco Material Groups (SMG)



Seco Material Groups

SMG1 Low carbon – very soft steels, purely ferritic steels

SMG2 Free-cutting steels, except free-cutting stainless steels

SMG3 Structural steels, ordinary carbon steels with low to medium carbon content (<0.5 %C)

SMG4 Medium to high carbon steels, ordinary low alloy steels, high carbon steels (>0.5 %C)

SMG5 Normal tool steels, harder quenching and tempering steels

SMG6 Difficult tool steels, high-alloy steels, high hardness steels

SMG7 Difficult high strength steels, hardened steels, manganese steels

SMG8 Easy-cutting stainless steels, free-cutting stainless steels

SMG9 Moderately difficult stainless steels, austenitic and duplex steels

SMG10 Difficult stainless steels, austenitic and duplex steels

SMG11 Very difficult stainless steels, austenitic and duplex stainless steels

SMG12 Moderately hard grey cast iron

SMG13 Hard grey cast iron, malleable cast iron, nodular cast iron

SMG14 Difficult grey cast iron, moderately difficult malleable cast iron, nodular cast iron

SMG15 Very difficult grey cast iron, difficult malleable cast iron, nodular cast iron

SA Ni-based

SA Co-based

SA Fe-based

Titanium alloys

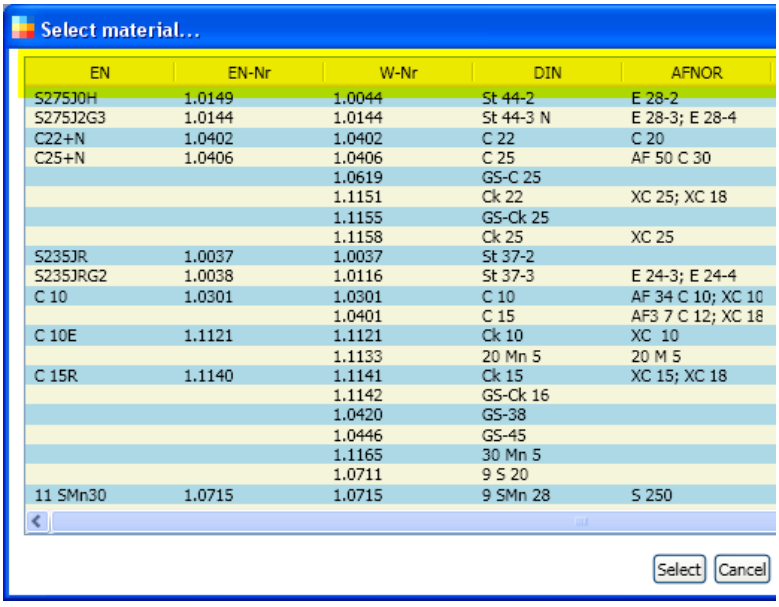
2.2 SELECT MATERIAL FROM THE STANDARD DATA BASE

To access the data base and materials organized into standards, see 

Click on desired standard spec in the header, and the materials will be sorted in alphanumeric order.

Note that standards may be overlapping, more than one instance of a standard may occur. Compare with the other standards to select the best fit.

Click on the desired material and press “select”.

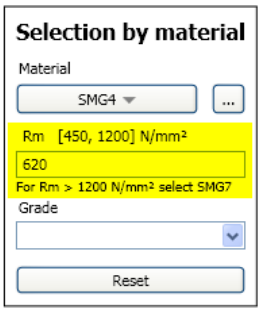


Available standards:

EN	New European standard	European Committee for Standardization
EN-Nr	New European standard	European Committee for Standardization
W-Nr	German standard	Werkstoffnummer
DIN	German standard	Deutsches Institut für Normung
AFNOR	French standard	Association Française de Normalisation
BS	British standard	British Standard
UNI	Italian standard	Ente Nazionale Italiano di Unificazione
JIS	Japanese standard	Japanese Industrial Standards (日本工業規格)
SS	Swedish standard	Svensk Standard
UNS	American standard	Unified Numbering System
AISI/ASTM	American standard	American Iron and Steel Institute/ American Society for Testing and Materials

2.3 CALIBRATE BY USING R_m OR HRC

According to selected SMG group, R_m and HRC can be used for calibration.



- For SMG 1-6 R_m
- For SMG 7 HRC
- For SMG 8-15 not available

By specifying the actual R_m or HRC value, the calculation is calibrated to reach increased accuracy for SMG 1-7. Please note; when using inch, R_m is defined in ksi.

2.4 SELECT INSERT GRADE

See type of grade on the underside of the insert boxes.

With the selected material, only the grades with available cutting data are listed. When using “selection by grade”, only materials with available cutting data for the selected grade are listed.

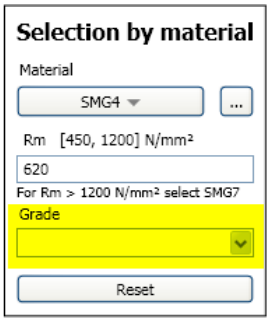


Figure 3: Type of insert grade can be found on the underside of the insert box.

3 INPUT

All parameters have default values except chipbreakers, please adjust when needed. Values outside the model will be identified by a red frame. Note that the calculator uses mathematical formulas to calculate cutting speed; this means that cutting speed can be calculated for combined insert characteristics that are not supported as actual products.

3.1 HOLDER RAKE ANGLE

See holder characteristics in catalogue, γ_0.

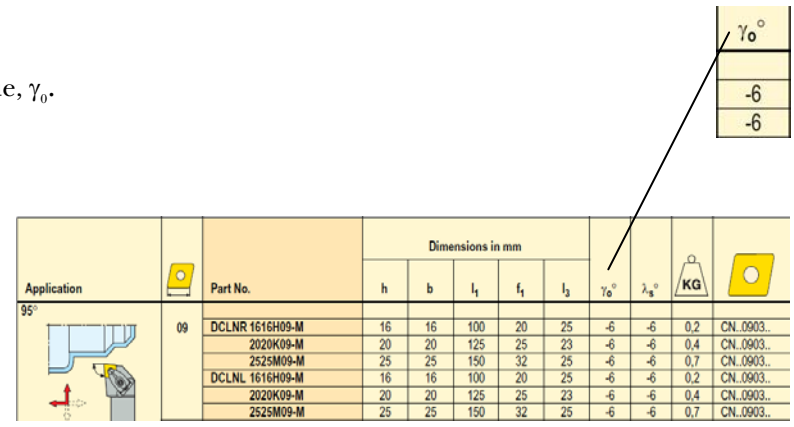


Figure 4: Holder rake angle, γ_0 in the holder properties shown in the catalogue.

3.2 CHIPBREAKER

See insert characteristics

Figure 5: Chipbreaker type can be found on the underside of the insert box.

3.3 CUTTING EDGE ANGLE, κ_r

Input range: [5° : 135°]

The cutting edge angle is the angle between cutting edge and direction of major feed and the working cutting edge angle is the angle between cutting edge and the direction of working feed; please refer to the examples below.

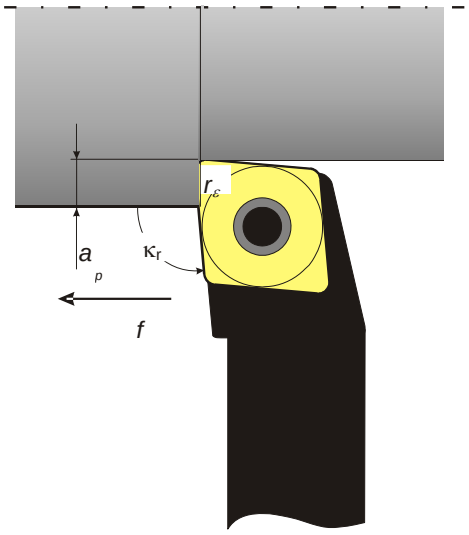


Figure 6: Longitudinal turning (Cutting edge angle)

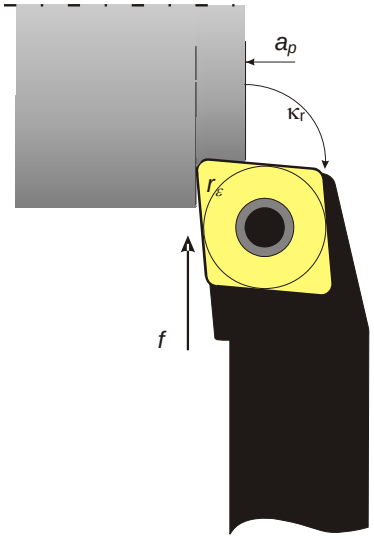


Figure 7: Facing inwards

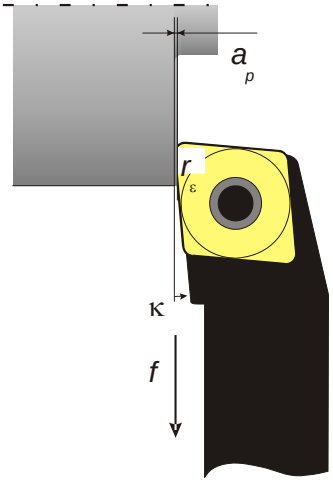


Figure 8: Facing outwards

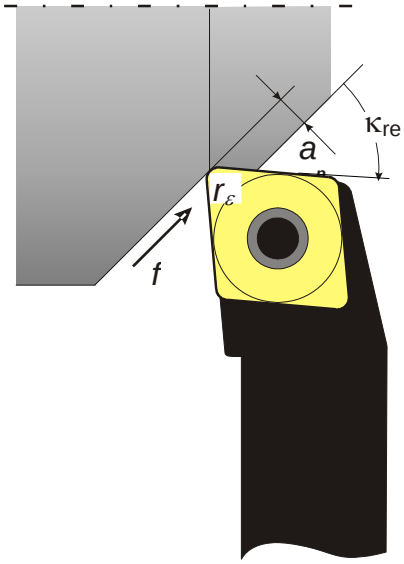


Figure 9: Taper inwards (Working cutting edge angle)

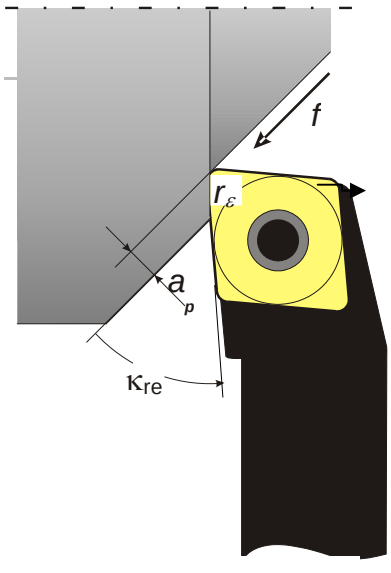


Figure 10: Taper outwards

3.4 NOSE RADIUS, r_ε

Input range: [0,1 : 3] mm

See insert characteristics

Figure 11: The nose radius can be found as the last two figures in the identification number for the insert geometry. This can be found on the underside of the insert box.

3.5 DEPTH OF CUT, a_p

Input range: [r_ε : 50] mm

The perpendicular direction to the feed.

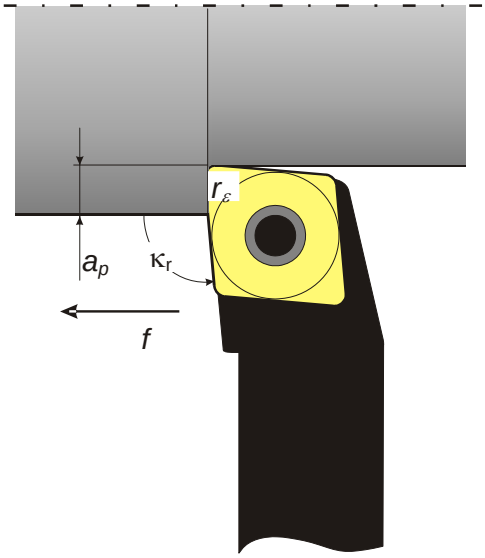


Figure 12: Definition of nose radius r_ε, cutting depth a_p, feed f and cutting edge angle κ_r

3.6 FEED, f

Input range: [0,05 : 0,5xr_ε] mm/rev

3.7 DESIRED TOOL LIFE

Estimated efficient cutting time may be changed to desired value within model limits. Tool life selection range for the material groups;

- ISO P SMG1-7 [3 : 60] minutes
- ISO M SMG8-11 [2 : 40] minutes
- ISO K SMG12-15 [3 : 60] minutes
- Superalloys [2 : 20] minutes

3.8 KEEP VALUES

The default values in the input data may change for different selections of materials and insert grades. To keep the selected input data for comparison to other material and grade selections, please check the box 'Keep values'.

3.9 CALCULATE

Calculate

Returns recommended cutting speed and chip thickness (h_e).

Traditional definition of h_e for general turning:

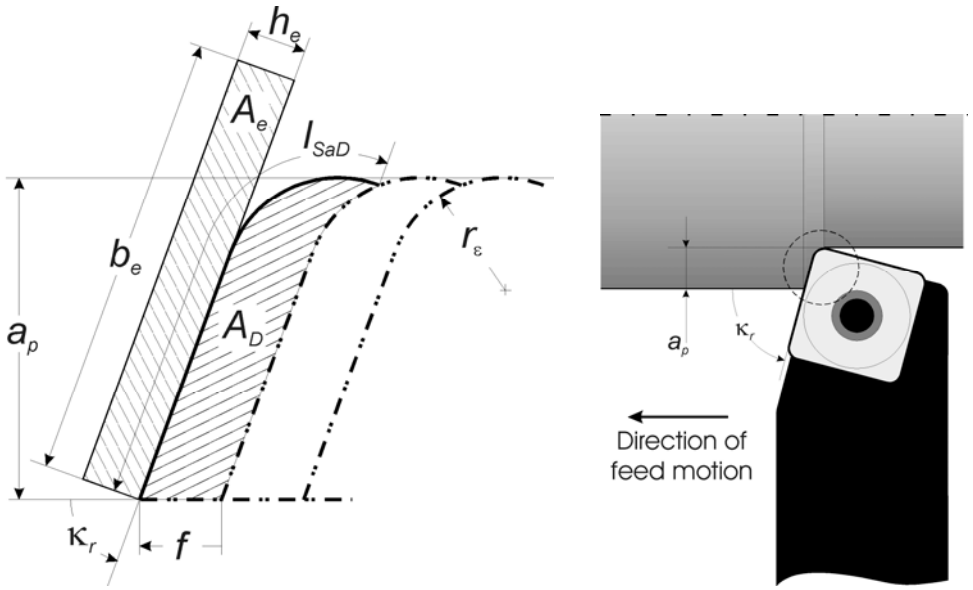


Figure 13: The definition of h_e

$$h_e = \frac{A_e}{b_e} \quad \text{where} \quad A_e = A_D,\ b_e = l_{SaD}$$

3.10 COPY TO CLIPBOARD

Copy to clipboard

Copy to clipboard can be used to paste the results in other documents.

Material	SMG4	
Rm	620	N/mm²
Grade	TP2500	
Holder rake angle	-6	°
Chipbreaker	MF4	
Cutting edge angle	95.0	°
Nose radius	0.80	mm
Depth of cut	2.00	mm
Feed	0.35	mm/r
Desired tool life	15	min
Chip thickness	0.27	mm
Cutting speed	361	m/min

Figure 14: Cutting data pasted in cells. (The table shown has been formatted after pasting.)