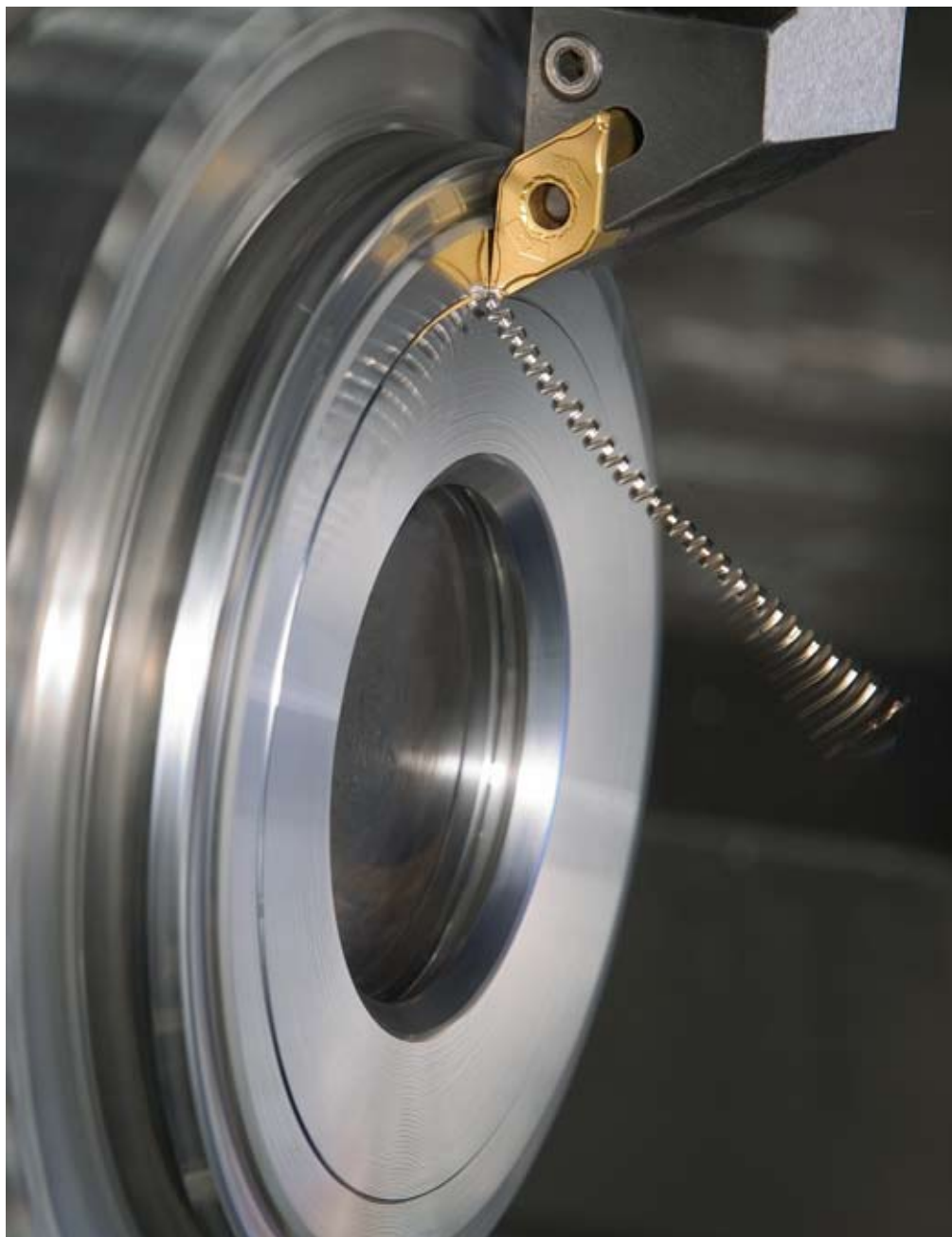


Low carbon turning



Introduction

Low carbon and pressed materials provide often soft and ductile components which can be difficult to machine, causing problems of larger, inconsistent chips which limit success in turning operations. Good chip forming and breaking is the key to maintaining high productivity levels in low carbon steels, as small and manageable chips directed towards the chip breaker of an insert can be evacuated from the component more easily. Chips formed in this way cause fewer jamming and surface finish problems and are an essential factor in improving productivity levels and ensuring more continuous and uninterrupted machining.

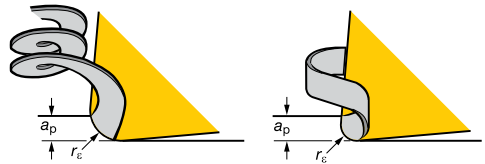
The following information gives an idea of how various factors can influence chip formation and provides application tips for optimising productivity when working with low carbon materials.



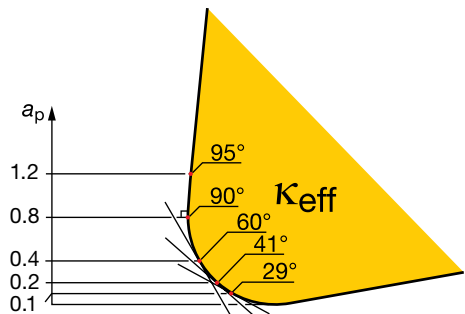
Cutting depth (a_p)

The relationship between cutting depth and the insert nose radius has a big influence on the level of chip breaking that can be achieved. For best results in this area, try to achieve a cutting depth bigger than, or at least close to the nose radius value. If there are no opportunities to do this, it would be beneficial to change to an insert with smaller nose radius and use a Wiper insert, if possible, to maintain the feed capability. This smaller relationship between cutting depth and nose radius value will also help in reducing the radial cutting forces.

Selecting a higher cutting depth or a smaller nose radius (a higher a_p/r_e relationship) is also important to ensure that chips reach the chip breaker.



The a_p/r_e relationship has a big influence on chip formation.

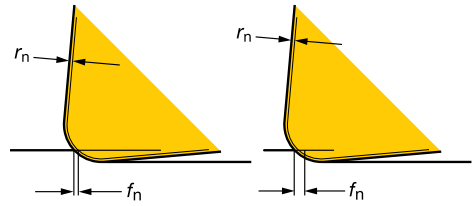


The effective entering angle (K_{eff}) is dependent on the cutting depth; a larger K_{eff} value achieves better chip formation.

Feed (f_n)

Feed rates, when machining low carbon and pressed materials also have a big influence on the chip breaking that can be achieved. A low feed rate will result in thin chips which are very hard to break. Low feeds, in combination with smaller cutting depths also mean that the chip is not able to reach the chip breaker.

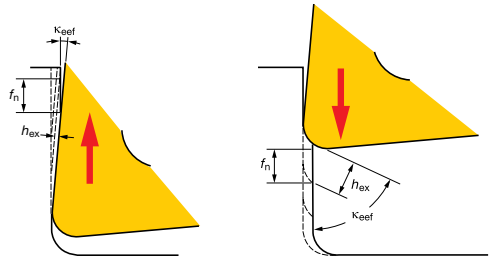
To solve these problems, always aim for the highest feed possible. Take into consideration the stability of the work piece, tool, clamping and surface finish requirements which will have a direct influence on the highest feed that can be achieved. Wherever possible, use of wiper inserts from Sandvik Coromant is advised.



Higher feed (f_n) is required at low cutting depths to direct the chip to the chip breaker.

Cutting directions

For best chip forming performance, always choose a cutting direction which provides an effective entering angle as close to 90° as possible – back turning should be avoided as this gives a very small effective entering angle. Better chip formation can be achieved with a downwards cutting direction on the work piece which also minimise the risk of vibration.

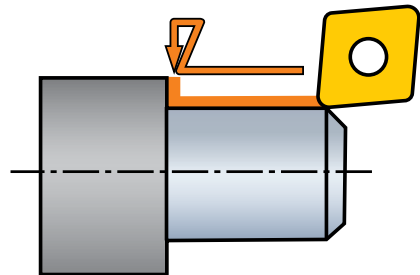


Back turning is not recommended.

A downwards cutting direction gives a more stable operation with better chip formation.

Designations

a_p	Cutting depth
f_n	Feed
κ_{eff}	Effective entering angle
h_{ex}	Chip thickness
r_ϵ	Nose radius
f_n	Edge rounding – could also be seen as T-land in this example



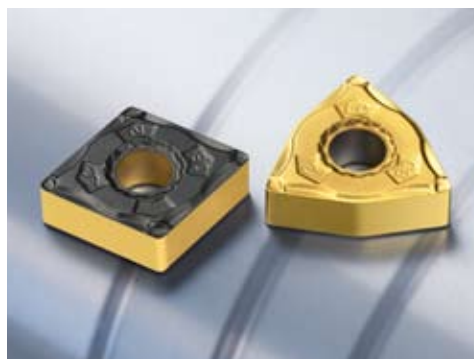
Programming towards centre improves chip forming.

A unique solution for improved chip forming in low carbon materials

Good chip control in low carbon steels can be an essential factor in achieving turning productivity. The new low carbon geometry gives excellent chip formation at optimized cutting data for finishing operations in low carbon steels and pressed materials.

For best machining performance, in mass production of automatic gear boxes within the automotive industry for example, the new geometry can offer:

- More continuous production and less machine downtime with a reduced risk of chip jamming during machining.
- Better component surface finish with fewer chips to damage materials.
- Reduced risk of tool damage from non evacuated chips.
- Increased productivity and surface finish with higher feeds thanks to the availability of wiper inserts.



The low carbon geometry is a step towards trouble free machining in areas where chip evacuation is a great challenge.

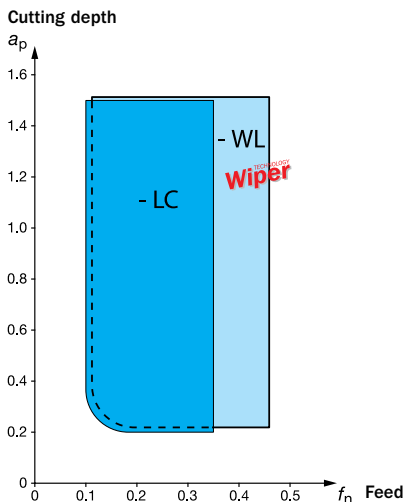
In the first phase, the low carbon geometry is released in three highly competitive grades:

GC4225 – for secure and reliable production in the steel area.

GC1525 – for good surface finish where there are limitations on speed.

GC2025 – for turning in sticky materials with higher toughness demands.

Application area for CNMG 12 04 08 in LC and WL geometry



Head office:
AB Sandvik Coromant
SE-811 81 Sandviken, Sweden
www.coromant.sandvik.com
E-mail: info.coromant@sandvik.com

C-1020:15 ENG/01
© AB Sandvik Coromant 2006.09

SANDVIK
Coromant

Your Productivity Partner