

Free cutting steels

Corus Narrow Strip

Corus Narrow Strip were pioneers in the development of Free cutting steels, formerly GEMCUT, and over the years have refined the process route to produce a cost effective product with consistent machining properties.

The environment

Environmental control is paramount in modern day industry, and accordingly special equipment and specialist techniques are used to add lead during the steel making operation to ensure that the process is safe and that the resulting steel has good consistency.

Steel containing a deliberate addition of lead for machining purposes contains less than 0.35% lead by weight as described in Annex II of the End of Life Vehicle Directive 2000/53/EC.

Analysis

Corus Narrow Strip produce two Free cutting steels, either with or without lead. The two analyses are shown below.

Table 1: Analysis

C	Si	Mn	P	S	Pb
0.070	0.030	0.900	0.040	0.220	0.15
0.150	max	1.200	0.070	0.300	0.25
0.14	0.040	0.900	0.040	0.27	
max	max	1.150	0.070	0.33	

Related Steel Grades

Leaded Free Cutting Steels:

- EN1A
- 220MO7P
- SAE/AISI 12L14
- 9SMnPb28
- SIS 14 19 14
- S250Pb
- 11SMnPb30

Non Lead Free Cutting Steel:

- EN1A
- 9SMN28

Structure

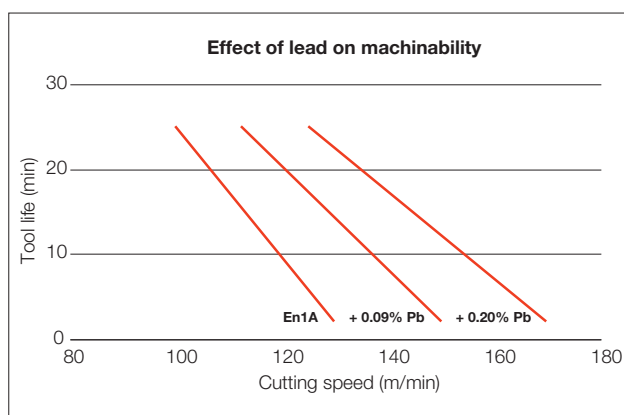
The unique structure of free cutting steels holds the secret to its enhanced machinability.

Machinability

Machinability is improved by sulphur and lead additions giving:-

- Higher cutting speed
- Extended tool life
- Improved chip form and ease of removal of swarf
- Improved productivity
- Lower energy consumption

The chart below illustrates the beneficial effects on machinability of both sulphur and lead.



Reference: Wannell, P. H., Blank, J. R. and Naylor, D. J. In Proc. International Symposium on the influence of Metallurgy on the Machinability of Steel, September, ISIJ/ASM, Tokyo (1977).

Table 2: Size range

Mill Edge		Sheared edge	
Width (mm)	Thickness (mm)	Width (mm)	Thickness (mm)
150 - 350	1.50 - 12.00	26 - 340	1.5 - 3.5
351 - 430	2.00 - 10.00	26 - 390	1.6 - 3.5
431 - 450	2.50 - 10.00	26 - 420	2.5 - 3.5
451 - 503	3.00 - 10.00	26 - 440	3.0 - 3.5
		50 - 465	3.5 - 9.0

- Conditions of supply: - Black or pickled & oiled
- Mill or sheared edge
- Cut lengths from 800mm to 11,000mm
- Coil dimensions: - Inside diameter 508mm
- Outside diameter 1350mm max
- Coil weight: up to 9.5kg/mm of strip width
- Tolerances: width and thickness to EN10048: 1997

Applications

Any applications where increased output speeds in milling, drilling, cutting or thread operations are required e.g.

- Keys for cars
- Keys for doors
- Keys for filing cabinets
- Machined plates
- Nut manufacture
- Washers (threaded)

Hot rolled material requires further processing before some of the applications listed can be manufactured.

Technical support

Corus Narrow Strip has a comprehensive technical support team, available to advise on the use of free cutting steels to achieve maximum benefit. Technical account managers provide specialist advice and help with day-to-day problem solving. Works based metallurgists and the full resources of Corus Research and Development Laboratories are available to assist with longer-term developments.

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