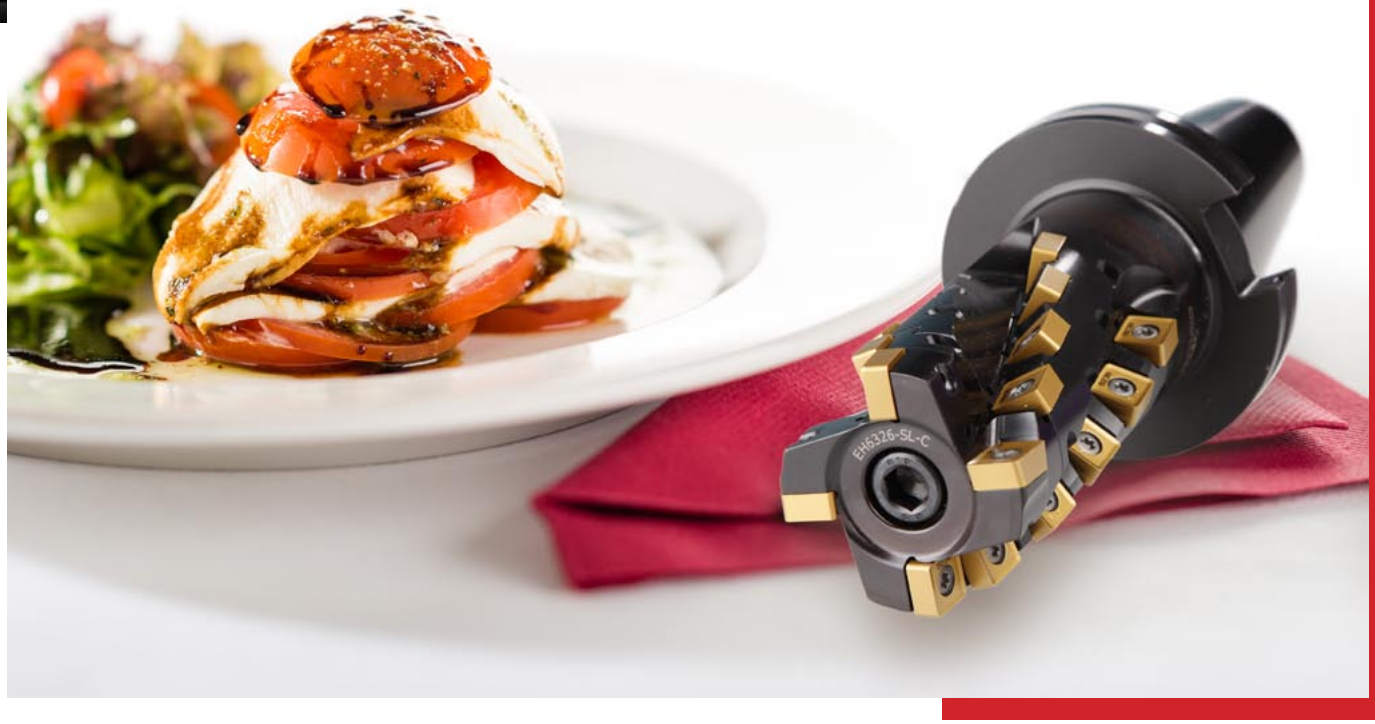
BIG GOURMAND



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HELICAL MILLING CUTTERS
FOR ROUGHING

SNGX 13 • LNET 16

PRAMET

New helical milling cutters for roughing

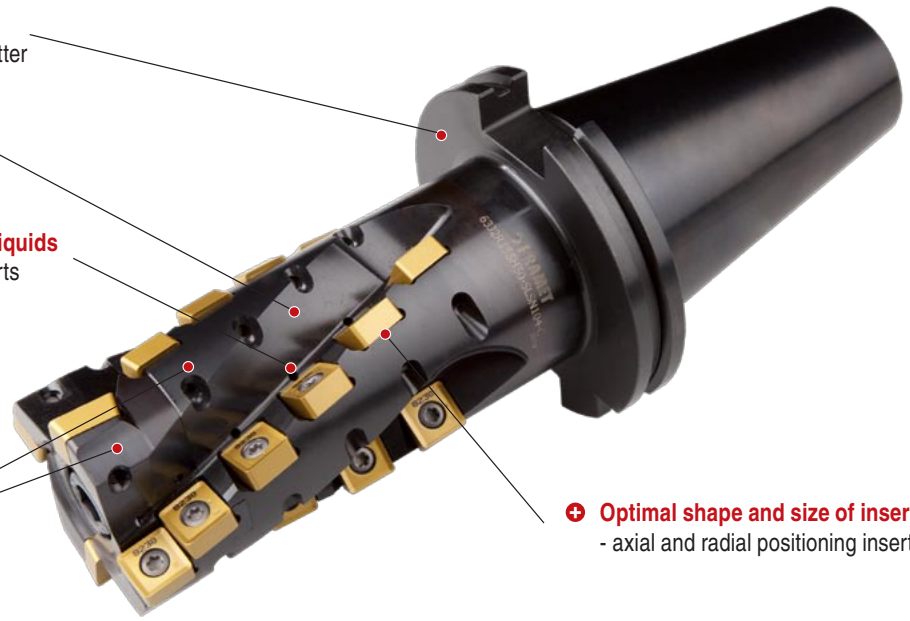
- New concept of milling cutters
- Indexable inserts with 8 cutting edges
- Ideal clamping
- Internal cooling for better chip evacuation
- Long tool life
- Reliability of tool
- Toughness of cutter body and exchangeable heat

NEW GENERATION OF CUTTERS

New production technology
- highest of hardness body cutter

Left handed helix
- stress reduction of spindle

Internal supply for coolant liquids
- optimal cooling of each inserts



Optimal shape and size of inserts pocket
- axial and radial positioning inserts

Divided design of tool
- exchangeable head

NEW GENERATION OF INDEXABLE INSERTS

SNGX 13-R

Unique geometry of indexable inserts
- double side square inserts
- 8 cutting edge

Optimized cutting edge
- optimal geometry for operational reliability
- high strength of cutting edges with negative chamfer
- positive rake angle
- high tool life
- flank stabilization chamfer for reduction of vibrations

SNGX 13-M

Unique geometry of indexable inserts
- double side square inserts
- 8 cutting edge
- geometry for lower power machine

Optimized cutting edge
- more positive geometry with positive chamfer and rake angle
- lower cutting forces
- reliability of cutting edge
- high tool life

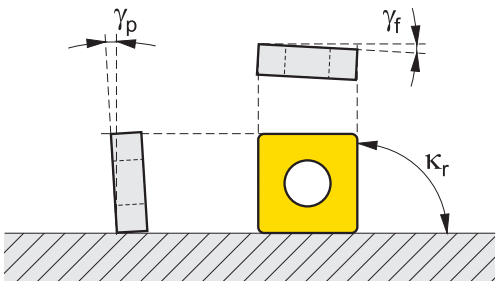
LNET 16-R

Geometry of indexable inserts for firts line of cutters – exchangeable head
- one side inserts

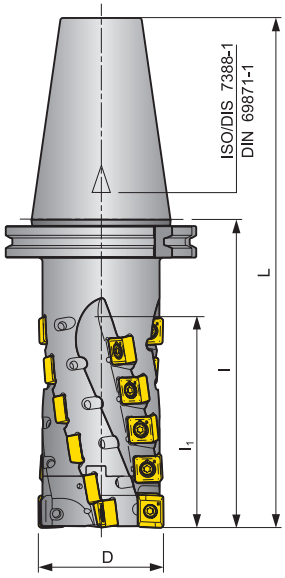
Optimized cutting edge
- high strength of cutting edges with negative chamfer
- positive rake angle
- high tool life and operational reliability
- wiper edge for better surface roughness

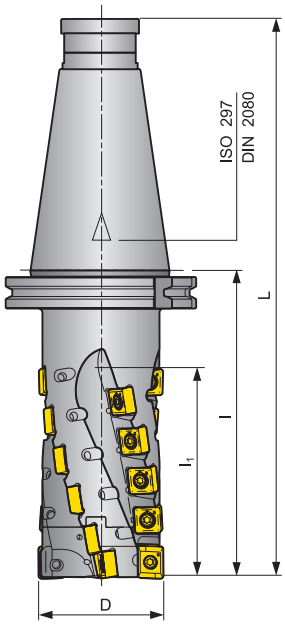
HELICAL MILLING CUTTERS FOR ROUGHING

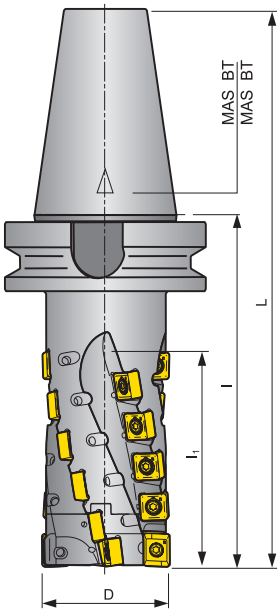
γ_p	-10°	κ_r	90°
γ_f	-9°	$a_{p\,max}$	l_1



Z* - Number of teeth
ZN* - Number of inserts
TS* - Taper







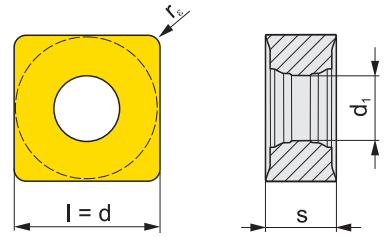
ISO	Assortment	Dimension									
		D	L	l	l_1	Z*	ZN*	TS*	Taper	Cooling	[kg]
63J2R155H50-SLSN104-C	●	63	257	155	104	2+2	2+20	50	ISO/DIS 7388-1	+	4,2
80J2R190H50-SLSN134-C	●	80	292	190	134	2+2	2+26	50	ISO/DIS 7388-1	+	6,6
63J2R155G50-SLSN104-C	●	63	282	155	104	2+2	2+20	50	ISO 297	+	4,2
80J2R190G50-SLSN134-C	●	80	317	190	134	2+2	2+26	50	ISO 297	+	6,6
63J2R175X50-SLSN104-C	●	63	277	175	104	2+2	2+20	50	MAS BT	+	5,4
80J2R210X50-SLSN134-C	●	80	312	210	134	2+2	2+26	50	MAS BT	+	7,8

SPARE PARTS

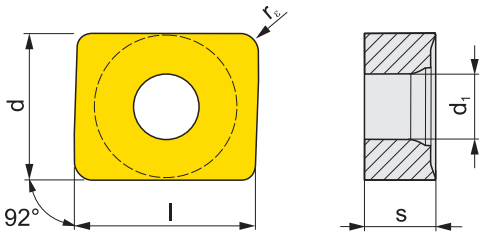
Diameter of cutter	Indexable front part	Connecting screw	Key	Clamping screw	Screwdriver
63	EH6326-SL-C	HS1230	HXK 10	US45012-T20P	SDR T20P-T
80	EH8036-SL-C	HS1640	HXK 14	US45012-T20P	SDR T20P-T

INDEXABLE CUTTING INSERTS

SNGX 13



LNET 16

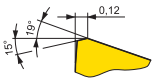
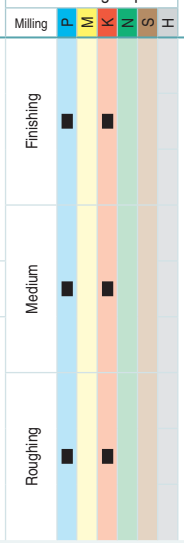
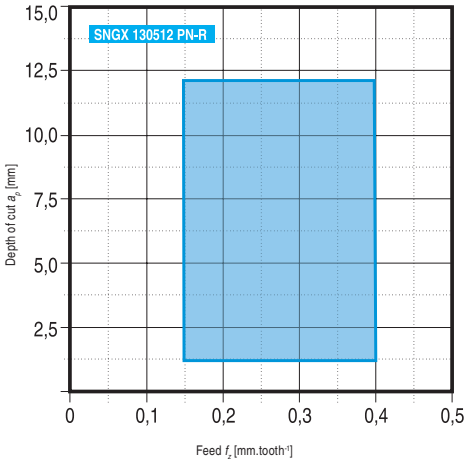


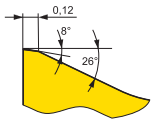
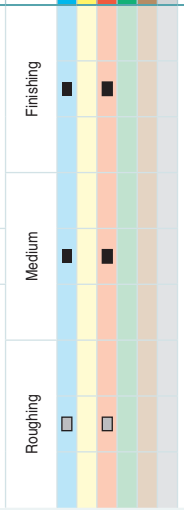
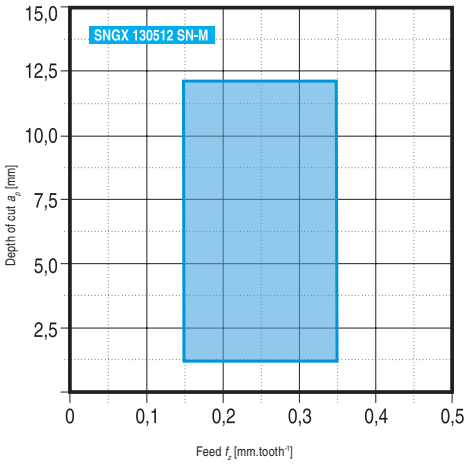
ISO	ANSI	Grades									Dimensions				
		8230	8240								(l)	d	s	d_1	r_ε
SNGX 130512PN-R		●	●								13,2	13,2	6,36	5,9	1,2
SNGX 130512SN-M		●	●								13,2	13,2	6,36	5,9	1,2
LNET 160616SR-R		●	●								16,4	13,2	6,38	5,9	1,6

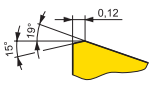
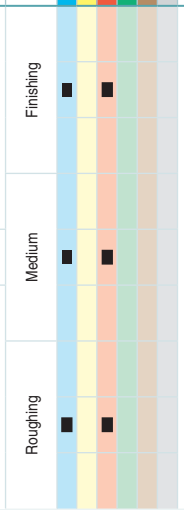
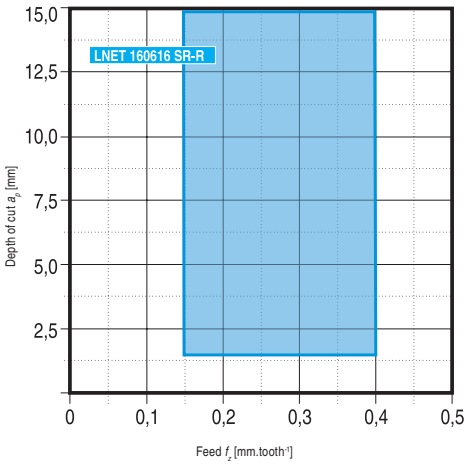
INITIAL CUTTING CONDITIONS

Basic shape of inserts		Cutting conditions		Initial cutting conditions					
				P	M	K	N	S	H
SNGX 130512PN-R 8230	feed	[mm.tooth^{-1}]	0,15 ÷ 0,40	-	0,15 ÷ 0,40	-	-	-
	cutting speed	[m.min^{-1}]	90 ÷ 135	-	85 ÷ 125	-	-	-
SNGX 130512PN-R 8240	feed	[mm.tooth^{-1}]	0,15 ÷ 0,40	-	0,15 ÷ 0,40	-	-	-
	cutting speed	[m.min^{-1}]	90 ÷ 120	-	85 ÷ 110	-	-	-
SNGX 130512SN-M 8230	feed	[mm.tooth^{-1}]	0,15 ÷ 0,35	-	0,15 ÷ 0,35	-	-	-
	cutting speed	[m.min^{-1}]	100 ÷ 150	-	95 ÷ 140	-	-	-
SNGX 130512SN-M 8240	feed	[mm.tooth^{-1}]	0,15 ÷ 0,35	-	0,15 ÷ 0,35	-	-	-
	cutting speed	[m.min^{-1}]	100 ÷ 130	-	95 ÷ 120	-	-	-
LNET 160616SR-R 8230	feed	[mm.tooth^{-1}]	0,15 ÷ 0,40	-	0,15 ÷ 0,40	-	-	-
	cutting speed	[m.min^{-1}]	95 ÷ 140	-	90 ÷ 130	-	-	-
LNET 160616SR-R 8240	feed	[mm.tooth^{-1}]	0,15 ÷ 0,40	-	0,15 ÷ 0,40	-	-	-
	cutting speed	[m.min^{-1}]	90 ÷ 120	-	85 ÷ 110	-	-	-

OVERVIEW OF GEOMETRIES

Geometry	Photo	Workpiece material group (Milling)	Diagram of application	Descr.	Aplied to inserts: SNGX 130512 PN-R
SNGX 13-R	 Profil of cutting edge 			- geometry with positive rake angle, face and flank chamfer - suitable for machining of materials group P and K - suitable for roughing operation and unstable conditions Range of cutting conditions: f_z 0,15 ÷ 0,40 [mm.tooth^{-1}] a_p 1,2 ÷ 12,0 [mm]	

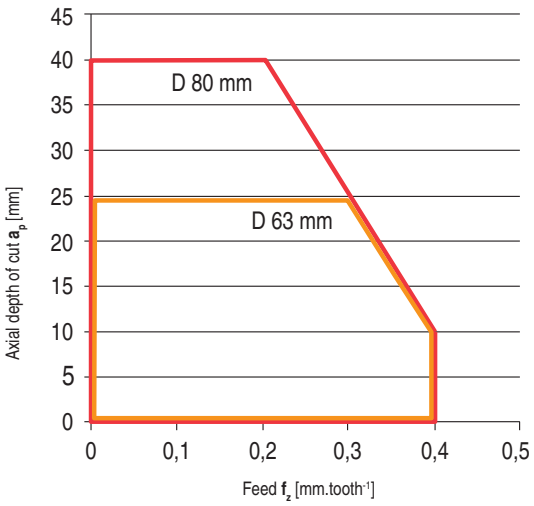
Geometry	Photo	Workpiece material group (Milling)	Diagram of application	Descr.	Aplied to inserts: SNGX 130512 SN-M
SNGX 13-M	 Profil of cutting edge 			- geometry with positive rake angle - suitable for machining of materials group P and K - geometry suitable for lower power machine Range of cutting conditions: f_z 0,15 ÷ 0,35 [mm.tooth^{-1}] a_p 1,2 ÷ 12,0 [mm]	

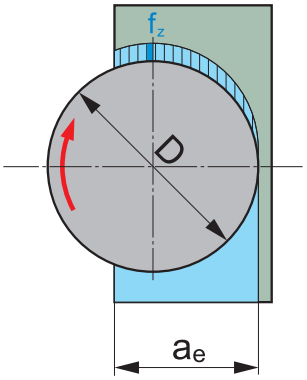
Geometry	Photo	Workpiece material group (Milling)	Diagram of application	Descr.	Aplied to inserts: LNET 160616 SR-R
LNET 16-R	 Profil of cutting edge 			- geometry with positive rake angle - wiper edge - suitable for machining of materials group P and K Range of cutting conditions: f_z 0,15 ÷ 0,40] [mm.tooth^{-1}] a_p 1,6 ÷ 15,0 [mm]	

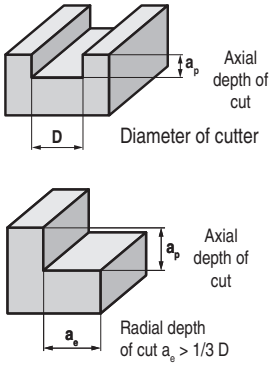
■ - main application ▨ - other applications

RECOMMENDED APPLICATION FOR HELICAL MILLING CUTTERS

SHOULDER AND SLOTT MILLING $a_e > 1/3\ D$







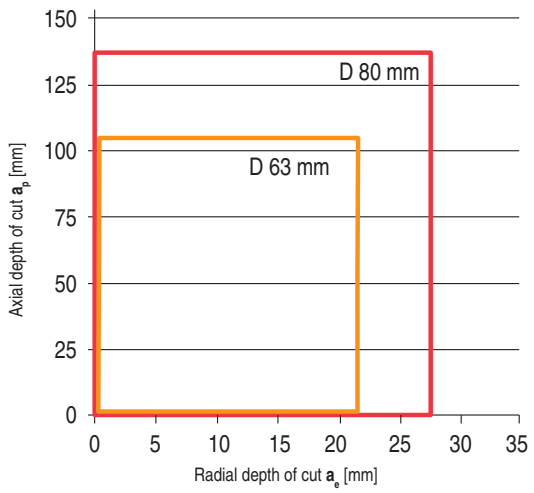
Cutting conditions for steel C45 (200 HB)
Inserts: LNET 160616SR-R
+ SNGX 130512 PN-R; 8230
Cutting speed: v_c = 90 m.min^{-1}

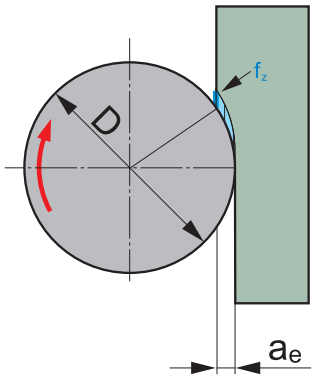
$f_{z\,min}$ = minimal feed per tooth [mm.tooth^{-1}]
$f_{z\,max}$ = maximal feed per tooth [mm.tooth^{-1}]
a_e = radial depth of cut [mm]
a_p = axial depth of cut [mm]
D = diameter of cutter [mm]

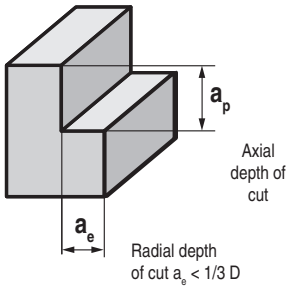
D	a_e = 21		a_e = 25		a_e = 31,5 ÷ 63	
	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$
63	0,16	0,42	0,15	0,41	0,15	0,40

D	a_e = 27		a_e = 35		a_e = 40 ÷ 80	
	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$
80	0,16	0,42	0,15	0,40	0,15	0,40

SHOULDER MILLING $a_e < 1/3\ D$







Cutting conditions for steel C45 (200 HB)
Inserts: LNET 160616SR-R
+ SNGX 130512 PN-R; 8230
Cutting speed: v_c = 100 m.min^{-1}

$f_{z\,min}$ = minimal feed per tooth [mm.tooth^{-1}]
$f_{z\,max}$ = maximal feed per tooth [mm.tooth^{-1}]
a_e = radial depth of cut [mm]
a_p = axial depth of cut [mm]
D = diameter of cutter [mm]

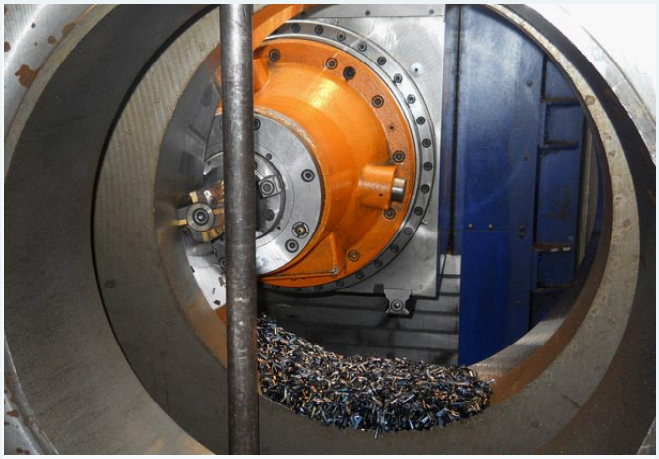
D	a_e = 2		a_e = 5		a_e = 10		a_e = 15		a_e = 21	
	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$
63	0,47	1,26	0,30	0,79	0,21	0,56	0,18	0,47	0,16	0,42

D	a_e = 2		a_e = 5		a_e = 10		a_e = 15		a_e = 21		a_e = 27	
	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$	$f_{z\,min}$	$f_{z\,max}$
80	0,53	1,41	0,34	0,89	0,24	0,63	0,19	0,52	0,17	0,45	0,16	0,42

For steel from 200HB to 300HB is required to decrease feed and cutting speed by 15%
For steel from 300HB to 450HB is required to decrease feed and cutting speed by 30%. For cast irons is possible to increase feed and cutting speed by 20%.

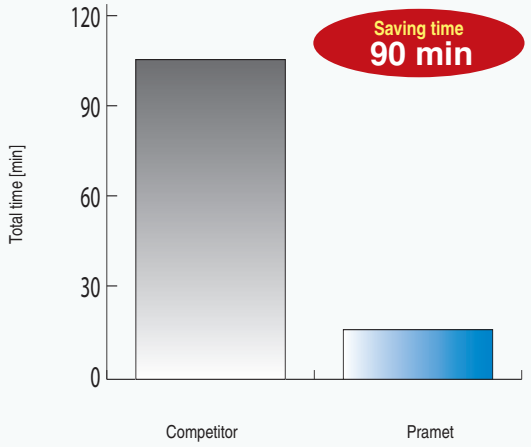
EXAMPLES OF CUSTOMER APPLICATIONS

Example 1:	
Name of workpiece:	crankshaft
Material:	steel 34CrNi
Machine:	TOS Kurim FU150 (35 kW)
Operation:	helical interpolation
Tool:	63J2R155H50-SLSN104-C
	face mills D125 mm; 8 teeth
Inserts:	SNGX 130512PN-R; 8230
	LNET 160616SR-R; 8230
	RHKW 20; P40

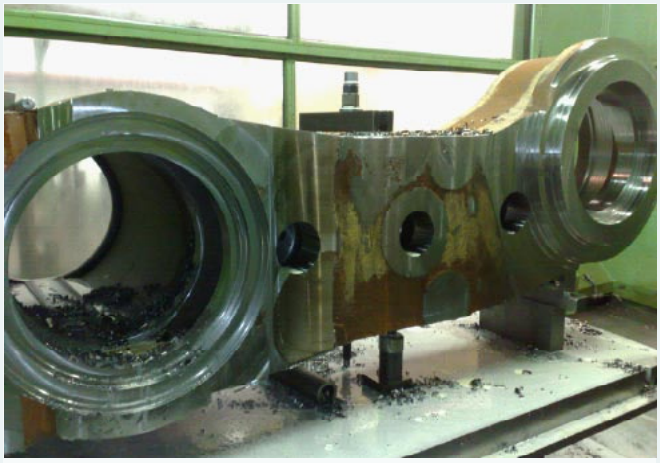


Cutting conditions		Competitor	Pramet	
Cutting speed	v_c	200; 353*	115	m.min^{-1}
Feed per tooth	f_z	0,18; 0,15*	0,60	mm.tooth^{-1}
Axial depth of cut	a_p	3; 0,8*	100	mm
Radial depth of cut	a_e	14,6; 1,36*	13,5	mm
Time of machining	t	30; 75*		min
Total time	T	105	15	min
Material removal rate	Q	31; 1,2*	945	cm^3.min^{-1}

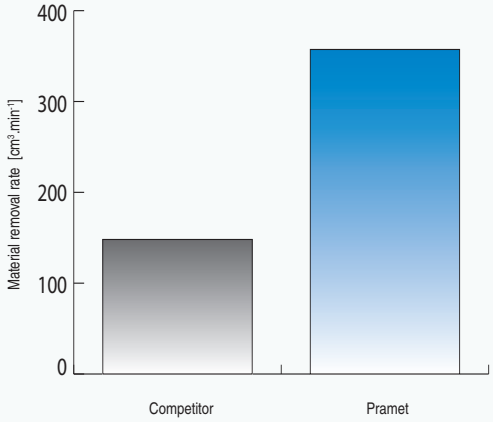
*) *finishing*



Example 2:	
Name of workpiece:	arm of machine
Material:	steel L20HGSNM (350 HB)
Machine:	milling machine DDR
Operation:	helical interpolation
Tool:	63J2R155H50-SLSN104-C
	Helical mills D63 mm; 2 teeth
Inserts:	SNGX 130512PN-R; 8230
	LNET 160616SR-R; 8230
	SCET 12; P35



Cutting conditions		Competitor	Pramet	
Cutting speed	v_c	83	67	m.min^{-1}
Feed per tooth	f_z	0,14	0,22	mm.tooth^{-1}
Axial depth of cut	a_p	60	37	mm
Radial depth of cut	a_e	20	63	mm
Material removal rate	Q	144	350	cm^3.min^{-1}



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